SIGMA UNIVERSITY

Sigma University International Conference Advanced Research in Science, Technology, and Management (SICARSTM-2026)

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In Collaboration with

HUTECH University of Technology

UEF UNIVERSITY OF ECONOMICS & FINANCE

28-29 April 2026

Hybrid Mode

Sigma University,
Vadodara, Gujarat, India

SIGMA UNIVERSITY

About the Sigma University

Sigma University is a private, multidisciplinary university located at Ajwa–Nimeta Road, Vadodara, Gujarat India. The University offers a wide spectrum of academic programmes at the diploma, undergraduate, postgraduate, and doctoral levels across diverse disciplines including Engineering, Management, Pharmacy, Science, Allied Health, Nursing, Design, Hospitality Management, Law, Social Work and Humanities. guided by the motto "Knowledge is ultimate power"- " ज्ञानं परम् शक्तिः " Sigma University is committed to nurturing holistic development through quality education, innovation, and experiential learning. The University envisions becoming an institution of global excellence by fostering an inclusive learning ecosystem that enables learners to develop academic competence, ethical values, leadership qualities, and social responsibility, thereby shaping visionary leaders and responsible global citizens.

Ho Chi Minh City University of Technology (HUTECH) University, Vietnam

Established in 1995, Ho Chi Minh City University of Technology (HUTECH) is a leading multidisciplinary private university in Vietnam, committed to quality education, applied research, innovation, and social responsibility. HUTECH offers 61 undergraduate and 19 graduate programs across engineering, technology, business, law, design, social sciences, and health sciences. HUTECH has 30 academic programs accredited by the Ministry of Education and Training (MOET), 14 programs assessed by AUN-QA (ASEAN University Network – Quality Assurance), and 4 programs accredited by FIBAA (Foundation for International Business Administration Accreditation). HUTECH is internationally recognized by QS (Quacquarelli Symonds), having earned QS Stars 4-Star, with 5-Star ratings in Teaching, Employability, Facilities, Good Governance, and Equity – Diversity - Inclusion. In the 2025 QS Asia University Rankings, HUTECH was ranked #287 in Asia, $67 in South-Eastern Asia and #6 in Vietnam, reflecting its growing academic reputation and international standing.

Ho Chi Minh City University of Economics and Finance (UEF), Vietnam

Established in 2007, the University of Economics and Finance (UEF) in Ho Chi Minh City is a dynamic private university with a strong international orientation, committed to excellence in economics, finance, business, management, and technology. UEF currently offers 37 undergraduate programmes, 6 master's specialisations, and multiple doctoral pathways, alongside 4 elite Talent Programmes designed for high-achieving students and delivered with advanced English-medium instruction and internationally benchmarked curricula.

While UEF delivers most programmes bilingually in alignment with Vietnam's national higher-education framework, a distinctive institutional strength lies in its fully offline UK and US degree programmes conducted entirely in English on its Ho Chi Minh City campus, enabling students to earn internationally recognised qualifications without leaving Vietnam.

With a student population approaching 20,000, UEF has rapidly emerged as one of Vietnam's most internationally engaged universities, integrating academic rigour, industry partnership, global collaboration, and practice-based learning to develop graduates equipped for leadership in a globally connected environment.

About the Conference SICARSTM -2026

The First International Conference organized by Sigma University on Advanced Research in Science, Technology, and Management (SICARSTM–2026) aims to provide a global platform for academicians, researchers, scientists, technologists, entrepreneurs, and policymakers to exchange innovative ideas and research outcomes. The conference emphasizes interdisciplinary collaboration to address global challenges through sustainability, innovation, and management excellence.

This initiative of Sigma University aligns with India's mission for "Atmanirbhar Bharat" and the UN Sustainable Development Goals (SDGs) by integrating scientific advancement, technological innovation, and responsible management practices for societal impact.

Message from Patron & Vice Patron

It is our distinct honor and privilege to extend heartfelt greetings on the occasion of the International Conference on Advanced Research in Science, Technology, and Management.
This prestigious conference reflects our unwavering commitment to academic excellence, innovation, and the pursuit of transformative knowledge. It serves as a dynamic platform for scholars, researchers, and professionals to exchange ideas, inspire collaboration, and contribute meaningfully towards shaping a progressive and sustainable future.
we extend our best wishes to all distinguished participants for enriching deliberations, insightful discussions, and outstanding success in their academic and research endeavors

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Shree Shailesh Shah, Patron &
Smt. Jyotshanaben Shah, Vice Patron
Sigma University

Message from the President

It gives me great pleasure to present the First International Conference on Advanced Research in Science, Technology, and Management (SICARSTM–2026) organized by Sigma University.

This conference represents a significant step in fostering interdisciplinary dialogue and collaboration among academicians, researchers, industry experts, and policymakers from across the globe. At Sigma University, we believe that research must extend beyond theoretical frameworks and contribute meaningfully to societal and industrial transformation.

In today's rapidly evolving world, the role of research is not limited to knowledge creation, but to generating solutions that address real-world challenges.In this context, India is not only participating in global research ecosystems but is actively shaping them through innovation, scale, and responsibility.

SICARSTM–2026 reflects our commitment to aligning academic inquiry with national priorities such as Atmanirbhar Bharat and global goals including the United Nations Sustainable Development Goals.

We hope this conference serves as a platform for meaningful exchange, impactful collaborations, and the advancement of knowledge that creates lasting value.

Dr. Harsh Shah
President, Sigma University

Message from the Vice President

On the occasion of the *International Conference on Advanced Research in Science, Technology, and Management*, the Office of the Vice President, Sigma University, is pleased to share the message of the Honorable Chair.

My heartful Greetings to the delegates of the Conference!

I believe conferences on such inter-disciplinary subjects play a vital role in bringing people from varied disciplines onto a common platform to exchange ideas, share insights, and learn from one another. At a time when the world is changing rapidly, the need to connect research in science, technology, and management with practical challenges has never been greater. The Chair encourages all delegates to make the most of this opportunity.

I sincerely hope that this conference will inspire new ideas, strengthen academic connections, Collaborations and contribute to impactful research that benefits society at large.

My best wishes for the great of the conference!

Dr. Shreya Shah
Vice President, Sigma University

Message from the Managing Director

It's my profound privilege to share this message for the ***International Conference on Advanced Research in Science, Technology, and Management (SICARSTM–2026)*** organized by Sigma University.

This initiative reflects the true spirit of global academic partnership. Interdisciplinary research platforms provide support to academic growth and help to cop-up with real-world challenges in a thoughtful and practical way

I wish the research presented in this Souvenir publication will become a pathbreaker for the young minds for new innovation and research and it can serve as a vital tool for influencing national policies in coming times.

I extend my sincere thanks to our esteemed collaborators, organizers, and all contributors for their efforts and commitment. I wish SICARSTM–2026 great success and hope it proves to be a meaningful and enriching experience for all involved.

With best wishes for continued learning and innovation!

Dr. Jigar Patel
Managing Director, Sigma University

Message from the Provost (Vice Chancellor)

It gives me immense pleasure to extend a warm welcome to all participants, scholars, and distinguished guests to the *International Conference on Advanced Research in Science, Technology, and Management (SICARSTM–2026)*, being hosted at Sigma University, Vadodara, on 28–29 April 2026 in hybrid mode.

This conference marks a significant milestone in our academic journey as it brings together a vibrant community of academicians, researchers, industry experts, and policymakers from across the globe. The multidisciplinary nature of this conference—encompassing science, engineering, technology, healthcare, and management—reflects our commitment to fostering integrated knowledge systems and encouraging holistic research approaches to address contemporary global challenges.
We are particularly proud of our international collaboration with the *Ho Chi Minh City University of Technology (HUTECH)* and the *University of Economics and Finance (UEF), Vietnam*. This partnership exemplifies our shared vision of promoting global academic engagement, cross-cultural exchange, and impactful research collaborations that transcend geographical boundaries.

SICARSTM–2026 is designed as a dynamic platform to facilitate meaningful dialogue, dissemination of innovative research, and the development of sustainable solutions aligned with global priorities and the United Nations Sustainable Development Goals. The diverse conference tracks further reinforce the importance of interdisciplinary research and the integration of scientific, technological, and managerial perspectives.
I am confident that this conference will inspire insightful discussions, foster new collaborations, and contribute significantly to advancing knowledge and innovation for societal progress.

I extend my sincere appreciation to all collaborators, organizing committee members, and participants for their valuable contributions and enthusiastic participation.
With best wishes for the success of the conference.

Dr. Priyesh Gandhi
Provost (Vice Chancellor)
Sigma University, Vadodar

Message from the Pro-Vice Chancellor

Distinguished guests, respected scholars, esteemed colleagues, and dear students,
It is both an honour and a privilege to welcome you all to this international conference. I am delighted to see such a vibrant gathering of minds from across the globe, united by a shared commitment to knowledge, innovation, and collaboration.

Universities are not merely institutions of learning; they are living ecosystems of ideas. In a world that is increasingly interconnected, the responsibility we carry as educators and researchers extends far beyond our campuses. This enables to the delegates an opportunity to challenge assumptions, to listen with openness, and to build bridges across disciplines and cultures.

I strongly believe, knowledge, when shared, becomes a force for transformation. The ideas exchanged during the conference would definitely have the potential to shape policies, influence communities, and create a better future for generations to come.

I extend my sincere gratitude to all who have made this conference possible. Thank you, and I wish you all a successful and impactful conference.

Dr. Umesh M. Upadhyay
Pro-Vice Chancellor, Sigma University

Message from the Chief Finance & Accounts Officer

It is a privilege to extend my greetings on the occasion of this International Conference at Sigma University.

In the evolving landscape of higher education, knowledge alone is not enough—its visibility, impact, and global relevance define institutional excellence. Conferences such as this serve as powerful catalysts, transforming academic dialogue into innovation, collaboration, and measurable outcomes.

At Sigma University, we view research and academic initiatives as strategic investments that build institutional reputation—an asset of growing significance in the NAAC-driven era. Reputation today is not abstract; it directly translates into reputational income through stronger industry linkages, research funding, and global partnerships.

I commend the organizers for creating a platform that brings together distinguished minds. I am confident this conference will leave a lasting academic and institutional impact.

Wishes for the great success of the conference.

Mr. Harshank Patel
Chief Finance & Accounts Officer
Sigma University

Message from the Dean Academics

It gives me great pleasure to welcome you to the International Conference on Advanced Research in Science, Technology, and Management (SICARSTM–2026), to be held on 28–29 April 2026 at Sigma University.

This conference provides an important international platform for academicians, researchers, industry professionals, and students to share knowledge, innovative ideas, and meaningful research outcomes. In today's rapidly changing world, progress in science and technology must be guided by responsible management and a strong commitment to sustainability. SICARSTM–2026 encourages interdisciplinary dialogue to address real-world challenges and create solutions with societal impact.

At Sigma University, we believe that academic excellence thrives through collaboration, curiosity, and ethical research. I am confident that this conference will inspire new partnerships, enrich learning, and contribute to global knowledge.

I wish all participants a stimulating and rewarding conference experience and networking.

Prof. (Dr.) M. Balaganapathy
Dean-Academics, Sigma University

Message from the Registrar

My sincere greetings to all!
It's my profound privilege to penned down this message for the souvenir of the International Conference on Advanced Research in Science, Technology, and Management (SICARSTM–2026).
In a time of constant change, knowledge isn't just something we gain it's something we must keep questioning, improving, and using wisely. Such intellectual gatherings remind us that progress is born not in isolation, but through dialogue that transcends borders, disciplines, and perspectives.
I wish the upcoming days of this conference will encourage each one of you to engage deeply with shared knowledge and wisdom. I look forward for enthusiastically participation of all the researcher who have contributed their intellectual thoughts. I extend my sincere gratitude to the organizers, participants, and all those who have contributed to making this event possible.
Thank you, and I wish you a successful conference.

Mr. Priyank Patel
Registrar, Sigma University

Message from the Conference Chair

It is a profound honour and privilege to welcome you to the **International Conference on Advanced Research in Science, Technology, and Management (SICARSTM–2026),** hosted by Sigma University, Vadodara, Gujarat. This landmark event is being organized in esteemed collaboration with **HUTECH University and the University of Economics and Finance (UEF), Vietnam**, with the aim of fostering a global platform for the exchange of innovative research and ideas.

The theme of this conference highlights the importance of interdisciplinary collaboration in addressing global challenges through innovation and sustainability. By integrating advancements in science and technology with responsible and forward-looking management practices, we aspire to contribute meaningfully toward a more sustainable future.

This conference is further enriched by the presence of our distinguished international collaborators. We are deeply honoured to have Dr. Ly Thien Trang, Vice President, Ho Chi Minh City University of Technology (HUTECH), Vietnam, and Dr. Ngo Minh Hai, Vice President, University of Economics & Finance (UEF), Vietnam, serving as Conference Chairs and Prof. Anil Bhardwaj, Director, Physical Research Laboratory, Ahmedabad.

Their leadership and vision significantly strengthen this platform for global academic exchange.

I am confident that this collaboration will enhance knowledge sharing and create valuable opportunities for joint learning, research, and innovation across borders. I extend my best wishes to all participants for a rewarding and intellectually enriching experience.

Dr. Ageetha Vanaamudan
Conference Chair Dean, Faculty of Science, Sigma University

Message from the Conference Chair

"Kem cho (કેમ છો) - Warm greetings to Sigma University and the SICARSTM–2026 Organising Committee,

It is a great honour for me, as International Chair, to contribute a message to the International Conference on Advanced Research in Science, Technology, and Management (SICARSTM–2026), hosted by Sigma University. This conference serves as an important global platform for academics, researchers, industry leaders, and policymakers to exchange innovative ideas and research outcomes, while promoting interdisciplinary collaboration to address complex global challenges.
The vision of SICARSTM–2026 aligns strongly with the aspirations of *"आत्मनिर्भर भारत"* and the United Nations Sustainable Development Goals (SDGs), particularly in advancing sustainability, innovation, and responsible management practices for meaningful societal impact.

On behalf of Ho Chi Minh City University of Technology (HUTECH), I would like to express our sincere appreciation to Sigma University for inviting us to co-organise this significant conference. Our partnership has grown steadily since the signing of the Memorandum of Understanding in August 2024. Since then, we have witnessed meaningful academic exchange activities. I had the pleasure of visiting Sigma University during its 3rd Foundation Day, where I delivered a professional development workshop for 31 faculty members. It was truly an enriching experience to interact, share insights, and learn from the dedicated academic community at Sigma.

We were also delighted to host visits from Dr. Nipa, Dean of Engineering, and Dr. Priyanka, Dean of the Faculty of Pharmacy. Their time at HUTECH was marked by a series of productive workshops for both students and faculty, alongside valuable cultural immersion activities with our colleagues and students.

These exchanges have significantly strengthened our institutional relationship and created a strong foundation for future collaboration. We are confident that SICARSTM–2026 will further deepen our partnership and contribute to advancing knowledge, innovation, and sustainable development at both regional and global levels. We look forward to the great success of the conference and to continued collaboration in the years ahead.

Dr. Ly Thien Trang
Vice President of Ho Chi Minh City University of Technology,
HUTECH, Vietnam

Message from the Conference Chair

Warmest wishes to Sigma University and the dedicated members of the SICARSTM–2026 Organizing Committee,

It is a profound honor to contribute to the proceedings of the International Conference on Advanced Research in Science, Technology, and Management (SICARSTM–2026), hosted by Sigma University. This conference stands as a vital intersection for academic rigor and industrial foresight, aligning perfectly with global efforts toward sustainable innovation and the digital transformation of management practices.

My address to this assembly, titled **"From Pipelines to Platforms to Protocols: Orchestrating Value in the On-Chain Economy,"** explores a fundamental shift in how value is created and captured. We are moving beyond the centralized efficiency of platforms toward decentralized, programmable protocols. This transition is not merely a technological update; it is a structural revolution that is fundamentally disrupting startup strategies and traditional investment paradigms.

In this era of the "on-chain economy" the agility of decentralized models challenges the dominance of traditional business pipelines. My discussion will focus on how startups can leverage these protocols to build trustless, scalable ecosystems that were previously impossible. Furthermore, I will incorporate practical insights from my ongoing work in developing the **Regulatory Sandbox for the Ho Chi Minh City International Financial Center**. This practical framework offers a unique vantage point on how forward-thinking policy can serve as a catalyst, rather than a barrier, to empowering next-generation business models.

The collaboration between the University of Economics and Finance (UEF) and Sigma University represents our shared commitment to fostering an international environment where such groundbreaking ideas can flourish. We believe that by bridging the gap between theoretical research and regulatory application, we can better prepare our students, faculty, and industry partners for the complexities of the global digital economy.

I wish to express my sincere gratitude to the organizing committee at Sigma University for their vision and hospitality. May these proceedings serve as a valuable resource for all who seek to navigate and shape the future of technology and management.

I look forward to the continued success of SICARSTM–2026 and to the many impactful collaborations that will surely emerge from our time together in Vadodara.
With warm regards,

Dr. Ngo Minh Hai
Vice President, University of Economics and Finance (UEF), Vietnam

Message from the Organizing Secretary

It gives me immense pleasure to present the Abstract Book of the International Conference on SICARSTM 2026 organized at Sigma University. This conference has received an overwhelming response, with over **Three hundreds (300) abstracts** submitted from **across countries** and more than Twenty-five (25) **institutions**, reflecting its global outreach and academic significance.

We are privileged to host eminent international speakers such as **Dr. Ly Thien Trang (HUTECH, Vietnam)** and **Dr. Ngo Minh Hai (UEF, Vietnam)**, along with S**ixteen 16 distinguished dignitaries** and academic leaders. Their participation significantly enhances the quality and impact of this conference.

After a rigorous peer-review process, **Two Hundreds and forty six (246) high-quality abstracts** have been shortlisted for presentation across multiple thematic tracks in science, technology, and management. The diversity and depth of these contributions highlight the importance of interdisciplinary research in addressing contemporary challenges.
I sincerely thank all authors, reviewers, session chairs, and organizing committee members for their dedication and support. I also express my gratitude to our esteemed dignitaries for their guidance.
I am confident this abstract book will serve as a valuable knowledge resource and foster future collaborations.

Dr. Rohit Khedkar

Professor & Dean, Faculty of Doctoral Studies and Research, Sigma University,

Dr. Ajeet Kumar Sahoo, Associate Professor, Centre for the Study of the World Economy School of International Studies, Jawahar Nehru University.

Dr. Ajeet Kumar Sahoo is an academic and researcher in Economics with over 12 years of experience in teaching and research. Holding a Ph.D. in Economics, his work focuses on macroeconomic policy analysis, agricultural economics, and the role of foreign investment and aid in development.

His research has been published in reputed journals and edited volumes, including *The Indian Economic Journal* and *Arthaniti: Journal of Economic Theory and Practice*. They have also contributed several book chapters to international publications by Springer, Taylor & Francis, and IEEE, with a particular focus on agricultural efficiency, crop diversification, and production modeling in India. Sir's work reflects a strong interest in applying quantitative and analytical methods to address real-world economic challenges, especially in the agricultural sector.

Chanchlesh Parihar is a seasoned Human Resources leader with over 25 years of extensive experience in human resources, learning and development, administration, and operations. Currently serving as Director of Human Resources at one of Gujarat's premier five-star deluxe resorts, he is known for his strategic vision, operational excellence, and people-centric leadership.

A certified PoSH Trainer and Train-the-Trainer professional, Mr. Parihar specializes in employee engagement, statutory compliance, industrial relations, and sustainable HR practices. He is also adept at integrating Artificial Intelligence into HR processes, driving innovation and organizational transformation in today's evolving workplace.

Throughout his distinguished career, he has successfully designed and implemented forward-thinking HR policies, led impactful training initiatives, and cultivated high-performance work cultures. His expertise lies in building safe, inclusive, and future-ready workplaces that empower individuals and enhance organizational effectiveness.

As a passionate trainer, mentor, and HR strategist, Mr. Parihar remains committed to developing talent, promoting workplace excellence, and fostering a culture of continuous learning, innovation, and growth. His leadership continues to make a significant impact in the hospitality industry and beyond.

Dr. Dasari Chennappa is a distinguished academician, researcher, and administrator, currently serving as Professor of Commerce at Osmania University. He also holds the positions of Dean, Faculty of Commerce at Satavahana University, and Principal of University College of Commerce and Business Management, Osmania University.

He earned his M.Com., M.Phil., and Ph.D. from Osmania University, Hyderabad, and an MBA from Indira Gandhi National Open University. With over 24 years of teaching and research experience, his areas of specialization include Insurance, E-Commerce, and Financial Services.

Dr. Chennappa has successfully completed six funded research projects, including four minor and two major projects. His scholarly contributions include 43 research papers published in reputed national and international journals. He has organized three international conferences and three national seminars, while actively participating in numerous academic events across India and abroad.

A dedicated research mentor, he has guided two M.Phil. and eight Ph.D. scholars to completion. He is a recipient of the prestigious UGC Research Award (2012–2014) and the Best Teacher Award from the Government of Telangana. He is also a columnist for Eenadu and serves as Founder-cum-Executive Editor of the Osmania Journal for International Business Studies.

Prof. Harsh Thakrar is a Senior Lecturer in Finance and FinTech at University of Wollongong and a former investment banking leader contributing to India's evolving digital finance ecosystem. With over a decade of experience in FinTech, capital markets, mergers and acquisitions, and financial strategy, he has held leadership roles at RBL Bank, Kotak Mahindra Bank, JM Financial, and Leonem Advisory. He also founded and chaired the BBA (FinTech) program at NMIMS University.

A Chartered Accountant and Chartered Financial Analyst (USA), Prof. Thakrar is currently pursuing his Ph.D. in Finance, with research interests spanning FinTech, sustainable finance, portfolio management, risk management, and market integration. His research has been published in leading ABDC-listed journals, covering blockchain, ESG, AI-driven financial integration, and FinTech-enabled trade competitiveness.

He is a regular contributor to prominent publications including The Times of India, Mint, and the Free Press Journal. Recognized as a 30 Under 30 FinTech Leader in 2025, he has spoken at major global forums such as the Global FinTech Fest and the Singapore FinTech Festival. He also serves as an Advisor to Harvard Business Review and is a recipient of the prestigious British Council Going Global Partnerships Grant.

Dr. Shrikant S. Kalamkar (M.Sc., Ph.D.) is an accomplished academician and researcher with over 21 years of experience in teaching, research, and academic administration. His expertise includes agricultural economics, agribusiness, policy research, and curriculum development, with a strong focus on evidence-based policymaking and sustainable development.

Over his distinguished career, Dr. Kalamkar has completed 61 research projects and is currently leading 18 ongoing projects supported by the Ministry of Agriculture & Farmers Welfare. He has made significant scholarly contributions with 151 research publications in journals, books, and conference proceedings, along with 13 authored books. He has also prepared numerous policy briefs and alerts submitted to the Prime Minister's Office and the Ministry of Agriculture through the Centre for Management in Agriculture, Indian Institute of Management Ahmedabad, highlighting the practical impact of his research.

As a dedicated mentor, he has successfully guided nine Ph.D. scholars and contributed to academic innovation by designing curricula in Agribusiness and coordinating the M.A. Agribusiness Economics program. He has organized 15 academic events and participated in over 150 national and international conferences.

Dr. Kalamkar has received 10 prestigious awards, including a University Gold Medal and multiple best paper awards, reflecting his commitment to research excellence, mentorship, and advancing agribusiness and agricultural economics.

Dr. Mihir Chauhan is an Assistant Professor in the Mechanical Engineering Department at Nirma University, where he has been serving since 2008. He earned his BE in Mechanical Engineering (2005), ME in CAD/CAM (2007), and PhD from Nirma University (2016). His academic contributions include two granted patents, numerous international publications, and the supervision of PhD research in Robotics. He also leads several funded research projects supported by Nirma University and external agencies. His research interests include Soft Robotics, Stress Analysis of Composite Materials, Reconfigurable Mechanisms, Bioinspired Robotics, and the Dynamics of Mechanical Systems. Dr. Chauhan is presently affiliated with Florida Atlantic University, USA, as an Associate Graduate Research Professor in the Ocean and Mechanical Engineering Department (2023-2028). Earlier, he also served as an Adjunct Faculty at FAU in 2022 as part of a faculty exchange program. He is the Faculty Advisor of Team Nirma Robocon, India's most successful Robocon team, with 11 national championships and multiple international accolades, including 7th place in 2021 and 3rd place in 2022 at the ABU Robocon International. He also mentors Team Nirma AUV, which has achieved national titles at AMU ROV in both 2023 and 2024, and won Second Prize at SAUVC 2025 in Singapore. Additionally, he has been Faculty Advisor of the Mechanical Engineering Students' Association (MESA) since 2010, actively promoting student-driven academic and technical initiatives.

Professor (Dr.) Mohamed Rafik Noor Mohamed Qureshi received his Ph.D. from the Indian Institute of Technology (IIT) Roorkee. He has an extensive research portfolio, with over 150 publications to his credit, an h-index of 42, an i10-index of 112, and more than 7,500 citations. He has successfully completed several research projects funded by national and international agencies.

Prof. Qureshi is a recipient of the Best Ph.D. Thesis Award in recognition of his outstanding research contributions. He has supervised ten doctoral scholars to completion and has evaluated more than 50 Ph.D. theses for various universities. He has actively participated in over 50 national and international seminars, conferences, and webinars, and has delivered expert lectures in numerous short-term training programs organized by leading academic institutions in India and abroad.

He serves on the editorial and reviewer boards of several reputed national and international journals. His research interests include Logistics and Supply Chain Management, Production and Operations Management, Quality Management, Flexible Manufacturing Systems, Net-Zero Emissions, and emerging paradigms such as Industry 4.0 and Industry 5.0.

Prof. (Dr.) Amit P. Ganatra is a distinguished academic leader, researcher, and administrator with over 25 years of undergraduate teaching experience and more than 21 years of concurrent postgraduate teaching and research. He currently serves as Director (Dean) of Research & Development and Dean, Faculty of Engineering and Technology, at CVM University, Vallabh Vidyanagar, Gujarat, where he provides strategic leadership for the university's research ecosystem, promotes interdisciplinary innovation, and strengthens industry-academia collaborations. He previously served as Provost (Vice-Chancellor) of Parul University from August 2022 to October 2025 and held several key leadership positions at CHARUSAT between 2001 and 2022.

His expertise spans Computer Engineering, Data Analytics, Big Data, Artificial Intelligence, Machine Learning, Deep Learning, Explainable, Generative and Responsible AI, Soft Computing, Cloud Computing, Software Engineering, IoT, and Blockchain. Dr. Ganatra has authored or co-authored over 183 research papers, earning more than 7,100 cross-platform citations and 3,100 Google Scholar citations. He has successfully guided over 15 Ph.D. scholars and supervised two postdoctoral researchers, while securing research funding exceeding ₹2 crore.

A prolific innovator, he has filed patents, led major research projects, and actively collaborates with industry. Through professional societies, workshops, invited lectures, and academic mentorship, he continues to advance research, innovation, and excellence in higher education.

Prof. (Dr.) Shakir Khan (SMIEEE)

Currently working as Full time Professor since October, 2015, at College of Computer Science and Information Sciences in Imam Mohammed Ibn Saud Islamic University. His responsibility includes teaching and research along with QADC member and department representative for NCAAA and ABET quality standard. Sir has worked as Researcher/Assistant Professor in King Saud University (KSU), Riyadh (Saudi Arabia) from 19th September, 2010 till August, 2015. His research interest includes Cloud Computing, Data Mining, Machine Learning, Artificial Intelligence, and Innovative Technology for education and e-Learning and published 65 plus research paper in international journals and conferences.

Dr. Samir Patel is an academician and transportation planning expert in Civil Engineering, currently serving as an Assistant Professor. He has over 8+ years of academic and professional experience, with specialization in transportation planning, urban mobility, GIS applications, and sustainable infrastructure systems.

He has authored and contributed to 15+ research publications in reputed international journals including Transportation Research Part A: Policy and Practice (SCI Indexed), Innovative Infrastructure Solutions, and Proceedings of the Institution of Civil Engineers – Municipal Engineer. His research work primarily focuses on Public Bicycle Sharing Systems (PBSS), Intelligent Transportation Systems (ITS), and sustainable urban mobility frameworks, contributing to policy-oriented research at national and international levels.

Dr. Sameer Patel has significant consultancy experience with organizations such as Surat Municipal Corporation, Surat Urban Development Authority (SUDA), and Vapi Urban Development Authority (VUDA), contributing to projects including PBSS planning, EV master planning, infrastructure strategy, and GIS-based development planning.

He actively contributes as a reviewer for reputed international journals, including Transportation Research Record (TRB, USA), Taylor & Francis journals, and Springer publications.

Dr. Patel is widely recognized for his policy-driven research, academic leadership, and contribution to sustainable urban transport systems, aligned with national initiatives such as Smart Cities Mission.

Dr. Pranavkumar D. Bhangaonkar is a dedicated academician and researcher in Civil Engineering with over 19 years of experience spanning teaching, research, and academic administration. Holding a Ph.D. in Civil Engineering, his expertise lies in fluid mechanics, hydrology, water resources engineering, irrigation engineering, and GIS & remote sensing. He has served in key leadership roles, including Principal and Head of Department, demonstrating strong capabilities in institutional development, curriculum delivery, and research mentoring.

Dr. Bhangaonkar has actively contributed to research and innovation, including serving as Principal Investigator for a GUJCOST-funded project and publishing in reputed journals indexed in Scopus and UGC Care. His work primarily focuses on water quality assessment, environmental flow, and sustainable water resource management. He has also guided numerous student projects that have received national-level recognition.

An active contributor to academia beyond teaching, he has delivered expert lectures, conducted workshops, and participated in national and international conferences. Recognized with awards such as the Pedagogical Innovation Award and Best Paper Award, he is also a reviewer and editorial board member for reputed journals. His commitment to academic excellence and sustainable engineering practices makes him a valuable asset to any institution.

Dr. Snehal Popli, working as Assistant Professor at G H Patel College of Engineering & Technology, The Charutar Vidya Mandal (CVM) University, Vallabh Vidyanagar. She has 25 years of experience of teaching at UG and PG level. She has completed her Ph.D. in 2018. She obtained M.E Civil (Environmental Engineering) and B.E from The Maharaja Sayajirao University of Baroda, Vadodara. Indian government has granted Indian patent for 20 years titled "A Process for Reductive degradation of Pollutants using Electrochemically Pre-activated noble metal particles in the absence of Reducing agent". Her research interest includes Water & Wastewater Engineering and Air pollution control techniques. She has published more than 25 research paper in various International/National Journals and Conferences. One of the papers has impact factor of 9.0 in Scopus indexed journal. She has co-authored books titled "Environmental Studies" and Environmental Science. She has delivered more than 15 expert talks at various state and national level workshops. She has delivered 4 expert sessions in ATAL FDP also. She has received the "Gaurav Puraskar" on Vidyanagar day celebration and CVM Platinum Jubilee Celebrations on 03/03/2020 organised by CVM.

Dr. W. B. Gurnule is a distinguished Indian chemist, academician, and researcher, currently serving as Professor and Head of the Department of Chemistry at Kamla Nehru Mahavidyalaya, Nagpur. With an outstanding research career, Dr. Gurnule has made significant contributions in polymer chemistry, nanomaterials, semiconducting materials, ion-exchange resins, biodegradable polymers, conducting polymers, and epoxy resins. Sir is recipient of numerous prestigious honors, Best Researcher Award by Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur on 5th Sep. 2018. ISCAS prestigious Silver Medal Award received in 11th ISCAS National Conference at Nagpur. Recently Leading Educationist of India Award-2022 received by Friendship Forum, Goa. He is Chief Editor of National ACT Newsletter. He has uploaded more than 350 Lectures of Chemistry on YouTube.

He has successfully completed 03 Research Projects of UGC. He has published over 260 research papers in reputed national and international journals and presented more than 116 papers at conferences worldwide. A prolific scholar, he holds 12 Indian patents, has authored 32 books and 45 book chapters published by Springer, Elsevier, Apple Academic Press inc. Canada and has published over 360 science articles in newspapers to promote scientific awareness. He has successfully guided 30 Ph.D. scholars and 21 M.Phil. students. He is an active reviewer for several leading international journals and has delivered more than 90 invited lectures.

Dr. Indrajit Sinha is presently Professor in the Department of Chemistry and Associate Dean of Academic Affairs (UG) at the Indian Institute of Technology (BHU), Varanasi. He obtained his B.Sc. (Hons) Chemistry from Ramjas College, Delhi University, M.Sc. in Chemistry from IIT Delhi and Ph.D. from Institute of Technology, Banaras Hindu University. His academic and research interests span the broad areas of computational and experimental physical chemistry. His current research interests include the design and development of novel adsorbents/photocatalysts/catalysts for critical applications. Along with thorough experimental investigations, Prof. Sinha's group uses DFT and classical molecular dynamics techniques to simulate adsorption, catalysis and photocatalysis mechanisms. He has supervised 10 PhDs and has ~123 research publications in the reputed international journals, patents, book chapters, peer-reviewed proceeding etc.

Dr. Raghvendra A. Bohara is a Senior Scientist at CrannMed Ltd., Galway, Ireland, with over a decade of experience in biomaterials, nanomedicine, and translational biomedical research. His work focuses on advanced drug delivery systems, nanostructured biomaterials, and medical devices, particularly in cancer theranostics and inflammatory diseases. He has authored over 70 peer-reviewed publications with more than 5,200 citations and an H-index of 40, and has been recognized among the Top 2% Scientists worldwide by Stanford University and Elsevier (2023–2025) Dr. Bohara serves as Managing Editor of Biomaterials (Elsevier) and Associate Editor for leading journals including Scientific Reports, Discover Nano, Discover Applied Sciences, and PLOS ONE . He is also an editorial board member of Materials Today Bio and other prominent journals.

He is a recipient of the Government of Ireland Postdoctoral Fellowship and recognition from the Royal Society of Chemistry as a highly cited author. His research has led to patented technologies and ongoing commercialization efforts in targeted therapies. His interdisciplinary work bridges engineering and biomedical sciences, with a strong focus on translating innovative research into clinically relevant healthcare solutions.

Nadeeka Dimuthu Kumari Ranadeva is a Sri Lankan biomedical scientist and academic with expertise in molecular pathology, human genetics, biochemistry, medical statistics, and public health research. She earned her BSc in Human Biology (Biochemistry Special) from the University of Sri Jayewardenepura, an MSc in Molecular Pathology from the University of Colombo in 2020, and a Master's in Medical Statistics from the University of Kelaniya in 2025. She is currently pursuing PhD research focused on AI-based diagnostics.

Her research spans genetic diagnostics, metabolic health, substance-use disorders, biomedical innovation, and translational molecular techniques. She has authored several Scopus-indexed publications in reputed journals, including Springer Nature and Cambridge Core. Her notable contributions include tetra-primer ARMS-PCR assay development, CYP2D6 pharmacogenetic variant analysis, and collaborative national research in addiction rehabilitation and epidemiology.

Her present academic interests emphasize AI-driven diagnostic methods, statistical modelling, machine learning, and predictive biomedical analytics. She actively supervises undergraduate and postgraduate research in bioinformatics, pharmacognosy, molecular diagnostics, and public health.

With over a decade of academic leadership at KIU, she has served as Senior Lecturer, Head of Biomedical Science, Dean of Health Sciences, Deputy Vice Chancellor, and Chair of several quality assurance committees. She has also led World Bank-funded AHEAD initiatives and participated in academic training programs in Hong Kong and Japan.

Dr. Sajeewanie Liyana-arachchi Vice Chancellor, KIU University, Sri Lanka

Dr. Sajeewanie Liyana-arachchi serves as the Vice Chancellor of KIU University, Sri Lanka, marking a pivotal chapter in the institution's leadership. A distinguished academic with over two decades of experience, she previously served as the Honorary Dean of KIU's Faculty of Management and held a senior lectureship at Sabaragamuwa University. Her academic expertise is rooted in management and marketing, specifically focusing on consumer behavior, green marketing, and sustainability. Dr. Liyana-arachchi holds a PhD from Management and Science University (Malaysia), an MBA from the University of Kelaniya, and professional certifications from SEDA (UK) and the University of Colombo.

Her transformational leadership has been recognized through several prestigious 2025 accolades, including the Academic Excellence Award from MSU Malaysia and the Trailblazer in Transformational Leadership Award. As the University's principal executive officer, she provides strategic direction while overseeing academic standards, institutional integrity, and global partnerships. Beyond her administrative duties, she chairs key governance committees, including Audit and Disciplinary boards—and remains a dedicated mentor in postgraduate research. By bridging the gap between academia, industry, and government, Dr. Liyana-arachchi continues to strengthen KIU University's reputation as a hub for educational excellence and innovation.

Dr. Shilpi Kushwaha is a Senior Scientist at CSIR-Central Salt and Marine Chemicals Research Institute. She earned her Ph.D. in Chemistry from The Maharaja Sayajirao University of Baroda in 2012. In 2013, she was awarded the prestigious Fulbright Postdoctoral Scholarship to conduct research at the Biodesign Institute, Arizona State University.

Dr. Kushwaha received the DST-Young Scientist Fellowship during 2015–2018 and worked in the Organic Chemistry Division at CSIR-National Chemical Laboratory. She joined CSIR-CSMCRI as a Scientist in 2018 and was honored with the prestigious CSIR-Young Scientist Award in 2021 for her pioneering work on uranium extraction from secondary sources, including seawater and acidic effluents, using crystalline thin films and polymeric nano-rings.

Her research expertise lies in the synthesis of function-specific small organic molecules, hydrogen-bonded organic frameworks, supramolecular self-assemblies, and woven materials. Her laboratory is currently focused on transforming molecular materials into advanced nanomaterials, including two-dimensional sheets, fibers, rings, spheres, and thin films, for applications in separation science, uranium extraction, molecular sieving, and catalysis through small-molecule activation.

Dr. Kushwaha has published around 40 research papers in high-impact journals and holds several patents for her innovative contributions.

Dr Mukesh Dhanka is an Assistant Professor and Transitional Scientist at the Department of Biological Sciences and Engineering, Indian Institute of Technology Gandhinagar, India. He earned his PhD in Biomedical Engineering from the Indian Institute of Technology Bombay, India. His research group (Biomaterials and Drug Delivery Lab) at IIT Gandhinagar focuses on the development of biomaterials-based advanced therapeutics and devices (Hydrogels, nanoparticles, composites, and drug delivery platforms) to address significant clinical problems, including joint disorders, GIT disorders, chronic wounds, drug-resistant bacterial infections, and bone degeneration, among others. While working on highly collaborative and interdisciplinary projects, he has published over 35 research articles, 4 book chapters, and 6 reviews in peer-reviewed journals. 4 Indian patents have been granted, and more than 18 patent applications are currently under review at the Indian Patent Office. For the first time in the world, he has developed a small molecule-based endoscopically injectable self-assembled hydrogel platform for GIT-associated polyp removal. Up until now, he has supervised 4 M.Tech theses, 4 postdocs, and several research interns in his lab at IIT Gandhinagar. He was also the guest editor for a themed collection on targeted biomedical applications of nanomaterials to be published across Nanoscale, Nanoscale Advances, Journal of Materials Chemistry B, and Materials Advances. Dr. Dhanka has received several awards, including the Young Scientist Award from the Society of Young Biomedical Researchers (India) and the Wilson Greatbatch Memorial Award 2025, for his patented technologies. He has served as a project proposal reviewer for several funding agencies in India, including GSBTM, DST, and the Board of Research in Nuclear Sciences (BRNS). His group aims to develop quickly translatable and affordable biomedical platform technologies with a wide societal impact.

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Sigma University International Conference Advanced Research in Science, Technology, and Management (SICARSTM–2026)
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Abstract ID:	*OPT1-001*

Advanced Experimental Strategies for RP-HPLC Method Development: Mechanistic Understanding, Selectivity Control and Robustness

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Abstract
Reversed-phase high-performance liquid chromatography (RP-HPLC) method development has evolved from empirical trial-and-error practices to a science-driven discipline grounded in mechanistic understanding, systematic experimentation, and robustness assurance. Modern approaches view chromatographic methods as integrated knowledge systems in which physicochemical properties of analytes, stationary-phase chemistry, mobile-phase composition, and operating conditions collectively govern selectivity and performance. Central to this paradigm is the definition of an analytical target profile (ATP), which translates the intended purpose of the method into measurable performance attributes. Experimental strategies now emphasise structured scouting, multivariate design of experiments, and analytical quality by design (AQbD) to identify critical method parameters and establish a method operable design region. Advances in stationary phases, including core–shell, monolithic, phenyl, pentafluorophenyl, and mixed-mode columns, have expanded selectivity control, while mobile-phase engineering and pH optimisation remain pivotal. Integration of robustness testing, stability-indicating capability, green analytical chemistry, and emerging predictive and machine-learning tools further strengthens method reliability. Collectively, these strategies enable the development of efficient, transferable, and resilient RP-HPLC methods suitable for contemporary pharmaceutical and analytical challenges.

Keywords: Reversed-phase HPLC, Analytical Quality by Design (AQbD), Selectivity optimization; Method robustness, Chromatographic method development.

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Abstract ID:	*OPT1-002*

Niosomes: A Novel Vesicular Drug Delivery System

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Abstract
Niosomes are vesicular drug delivery carriers composed of non-ionic surfactants arranged in a bilayer structure containing both hydrophilic and lipophilic domains. This structural arrangement enables them to encapsulate a broad range of therapeutic agents, including both water-soluble and lipid-soluble drugs. In recent years, niosomes have emerged as a promising alternative to conventional drug delivery systems and liposomes because of their improved chemical stability, biodegradability, low toxicity, and cost-effective production.The characteristics of niosomes are influenced by several formulation parameters, such as the type of surfactant, cholesterol concentration, hydrophilic–lipophilic balance, critical packing parameter, and the method of preparation. By modifying these factors, it is possible to regulate vesicle size, morphology, surface charge, and drug entrapment efficiency, which are crucial for achieving effective targeted and controlled drug release. Drug encapsulation within niosomes enhances systemic circulation time, improves drug penetration into target tissues, increases therapeutic efficacy, and minimizes adverse effects.Because of these advantages, niosomes have been extensively explored for use in cancer therapy, immunological applications, central nervous system drug delivery, and transdermal and oral administration. Overall, niosomes offer a versatile and efficient platform with strong potential for future targeted drug delivery systems.
Keywords: Niosomes, Drug delivery, Non-ionic surfactants, Bilayer, Entrapment efficiency, Vesicular carriers, Targeted therapy

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Abstract ID:	*OPT1-003*

Importance of Dissolution Testing for Pharmaceutical Dosage Form

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Abstract
Dissolution testing is a critical analytical tool used to evaluate the rate and extent of drug release from solid oral dosage forms. It serves as a key quality attribute that directly influences drug bioavailability, therapeutic efficacy, and product performance. The dissolution profile is particularly significant for poorly water-soluble drugs, where dissolution often represents the rate-limiting step in systemic absorption. In pharmaceutical development, dissolution testing supports formulation optimization, excipient selection, and manufacturing process control. It also plays a central role in establishing in vitro–in vivo correlation (IVIVC), facilitating prediction of clinical performance and enabling biowaivers where applicable. Additionally, dissolution studies are integral to stability testing and post-approval changes, ensuring maintained product quality throughout shelf life. Overall, dissolution testing remains an indispensable component of pharmaceutical research, development, and quality assurance, providing a scientific basis for ensuring safety, efficacy, and regulatory acceptance of drug products. Dissolution testing plays a significant role in evaluating nanosuspension-based drug delivery systems, particularly for poorly water-soluble compounds. Reduction of particle size to the nanometer range increases surface area and enhances dissolution. In vitro dissolution profiling enables assessment of particle size distribution effects, stabilizer performance, and physical stability of nanosuspensions. It also supports prediction of bioavailability enhancement and establishment of IVIVC where feasible. Consequently, dissolution testing serves as a critical quality attribute in the development and regulatory evaluation of nanosuspension formulations.

Keywords: Dissolution Testing, Bio-availability, Quality Attribute of Drug, IVIVC

Abstract ID:	*OPT1-004*

Friendly RP-HPLC Method Development and Validation for the Simultaneous Quantification of Rosuvastatin Calcium and Colchicine with Force Degradation study

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Abstract

The green chemistry is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances. The growing emphasis analytical chemistry has encouraged the development of environmentally responsible methods that minimize solvent consumption, waste generation and energy use without compromising analytical performance. A simple and precise eco-friendly stability indicating method for the simultaneous Quantification of Rosuvastatin Calcium and Colchicine in synthetic mixture was developed and validated using RP-HPLC. The chromatographic separation of the drugs was achieved with an Shimpack ODS C18 (250 mm x 4.6 mm, 5µm) Acetonitrile: Methanol: Water (40:25:35%v/v/v) as the mobile phase. The instrument was set at a flow rate of 1.0 mL min−1 at ambient temperature and the wavelength of the UV-visible detector was 243nm. The method showed excellent linearity over a range of 1–5 µg mL−1 for Colchicine and 40-200 µg mL−1 for Rosuvastatin Calcium. The correlation coefficients for Colchicine and Rosuvastatin Calcium were noted to be 0.9916 and 0.9993, respectively. The mean recovery values were found to be 98.53 – 101.70 % and 98.86 – 101.71 %. The proposed method could be suitable for quantitative determination of these drugs in pharmaceutical preparations and also for quality control in bulk manufacturing. Stress, testing, which covered acid, base, peroxide, photolytic and thermal degradation, was performed on each test to prove the specificity of the method and that the degradation was achieved. No interferences were observed from the stress degradation products.

Keywords: Green & Sustainable Chemistry, HPLC Method, Stability Indicating, Rosuvastatin Calcium, Colchicine

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Abstract ID:	*OPT1-005*

Advances in Polystyrene Recycling and Quality Evaluation

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Abstract
Polystyrene is a widely used thermoplastic in packaging, insulation, and consumer products, but its low recycling rate and frequent single-use disposal contribute significantly to plastic waste accumulation. Conventional mechanical recycling is often limited by contamination and material degradation, creating the need for more sustainable recovery technologies. This study reviews recent progress in chemical recycling of polystyrene, focusing on polymer-to-monomer conversion as an approach to recover high-purity styrene and support circular material use. The objective is to evaluate advances in depolymerization technologies, reaction mechanisms, and process optimization, while assessing environmental and quality-related considerations. A systematic analysis of recent developments in thermal and catalytic pyrolysis, solvolysis, hydrogenolysis, and emerging photochemical and ionic-liquid-assisted methods was conducted. Key process parameters, reaction pathways, and operational challenges were examined along with environmental performance using life-cycle perspectives. Results indicate that optimized depolymerization processes can achieve high styrene recovery with improved selectivity, although process efficiency depends strongly on feedstock composition and catalyst stability. Advanced catalytic and solvent-based approaches show potential for reducing energy demand and improving product quality compared to conventional thermal processes. Overall, polymer-to-monomer conversion offers a promising route for sustainable polystyrene recycling. Continued improvements in process efficiency, quality assurance, and environmental evaluation are essential to enable large-scale implementation and support a circular plastic economy.

Keywords: Polystyrene, Polymerization, Environment, Depolymerization

Sigma University International Conference Advanced Research in Science, Technology, and Management (SICARSTM–2026)
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Abstract ID:	*OPT1-006*

Integrated Recycling Frameworks for Multilayer Plastic Packaging

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Abstract

Multilayer plastic packaging (MLP) plays a vital role in modern packaging due to its excellent barrier properties, durability, and ability to extend product shelf life. By combining different materials into a single structure, MLPs enhance product protection and reduce losses during transportation and storage. However, their structural complexity makes recycling difficult and creates significant sustainability challenges. Conventional mechanical recycling methods are often ineffective for multilayer plastics because of material incompatibility and contamination. As a result, research is increasingly focused on advanced recycling approaches. Innovative techniques such as solvent-based delamination, hydrolysis, glycolysis, and enzymatic degradation are being explored to selectively separate and recover valuable materials. These processes offer promising opportunities to reduce landfill disposal and improve resource recovery. Despite recent progress, several challenges remain, including feedstock contamination, lack of standardized recycling practices, and high processing costs. Emerging solutions such as improved material design, advanced sorting technologies, and catalytic depolymerisation processes are helping to improve recycling efficiency. Addressing multilayer plastic waste requires a holistic approach involving researchers, industry, policymakers, and consumers. Integrating life-cycle assessment with advanced recycling strategies within a circular economy framework will support the development of sustainable packaging systems that protect products while minimizing environmental impact.

Keywords: Multilayer plastic packaging, Polymerization, Environment, Depolymerization

Abstract ID:	*OPT1-007*

Health-Tech Innovation for Women: Design and Development of a Novel RK FemTone device for Pelvic Floor Muscle Rehabilitation

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Abstract

Pelvic floor muscle dysfunction is a highly prevalent yet underdiagnosed condition affecting women across the lifespan, with reported occurrence ranging from young postpartum women to postmenopausal populations. Common symptoms include urinary incontinence, urgency, pelvic organ prolapse, pelvic pain, sexual dysfunction, and reduced quality of life, often leading to psychological distress and social withdrawal. Despite the established effectiveness of pelvic floor muscle training, limited access to affordable, objective, and technology-assisted rehabilitation devices restricts adherence and outcome monitoring. This study presents the design and development of RK FemTone, a novel health-tech innovation aimed at enhancing accessibility and precision in pelvic floor muscle rehabilitation. The device is based on a high-sensitivity pressure sensor capable of measuring intravaginal pressure changes in millimeters of mercury and incorporates a Bluetooth module for real-time wireless transmission of data to a mobile application interface. The system provides visual biofeedback to guide muscle activation, monitor endurance, and track progress over time. The development process included need-based conceptualization, prototype fabrication, hardware-software integration, laboratory calibration for pressure accuracy, and preliminary validation using in vivo perineal ultrasonography to confirm appropriate positioning and correlate pressure readings with observable muscle activation. The results demonstrate reliable pressure detection, stable wireless connectivity, and user-friendly digital feedback. RK FemTone represents a scalable, cost-effective women-centered medical device innovation with strong translational and market potential to address the growing global burden of pelvic floor muscle dysfunction.

Keywords: Digital health, Pelvic floor dysfunction, Wireless biofeedback, Sensor-based rehabilitation

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Abstract ID:	*OPT1-008*

Gold Nanoparticles with Dual Bioactivity: SEM-EDS-Verified Au Composition MIC/NIC of Mycobacterium Tuberculosis and MTT-Defined Against U87-Mg Cell

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Abstract
Gold nanoparticles (AuNPs)a unique position at the interface of materials chemistry and biology where small gold nanoparticles are variations in size surface state and dispersion can produce measurable biological effect without presupposing a specific molecular mechanism in this study, we report (AuNPs)dual biological activity TEM -EDS analysis confirmed a gold nano particles composition across multiple spatially resolved sampling point and chemical identity prior to biological testing we process transmission electron microscopy process this process describe the quasi-spherical shape and unimodal size distribution centred 19nm and Instrument Number Thermo Scintific TA105-L120C (20-120) anti tubercular activity was assessed using the Alamar Blue microplate format against mycobacterium tuberculosis, with concentration -response behavior analyzed by nonlinear regression. distinct non-inhibitory and inhibitory thresholds were resolved yielding NIC and MIC values that indicate the onset of metabolic stress pressed overt growth inhibition and that the transmission between these steps is steep. mammalian cytotoxicity was evaluated by MMT assay, revealing moderate sensitivity in U87MG glioblastoma cells while a reference line remained comparatively resistant within the tested concentration, underscoring cell-type-dependent responses. when considered together the result is to describe structure composition bioactivity relationship in which nanoscale AunPS produce quantifiable anti tubercular inhibition alongside context dependent mammalian cytotoxicity and last the study provides a characterized hypothesis - generating platform for subsequent mechanistic and translational investigation into surface nanoparticle bioactivity

Keywords: Gold nanoparticles, TEM–EDS, Mycobacterium tuberculosis, MTT assay

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Abstract ID:	*OPT1-009*

Comprehensive Assessment of Mastitis: Unveiling Clinical and Sub-Clinical Manifestations for Enhanced Dairy Health Management Strategies

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Abstract
Mastitis, an inflammatory condition of the bovine mammary gland, remains a major challenge in dairy herds, affecting milk yield, quality, and farm economics. This review summarizes the clinical and subclinical presentations, causes, diagnostic advances, economic impacts, and management strategies associated with mastitis. Subclinical mastitis, often asymptomatic, leads to substantial reductions in productivity and serves as a reservoir for pathogens, while clinical cases present visible udder inflammation and abnormal secretions. Bacterial pathogens such as non-aureus Staphylococci, Staphylococcus aureus, Streptococcus spp., and environmental organisms including Escherichia coli and Klebsiella spp. are predominant etiological agents. Diagnosis traditionally relies on the California Mastitis Test and somatic cell count, but recent developments include PCR-based assays, MALDI-TOF MS, nanotechnology-assisted diagnostics, and infrared thermography. The economic burden is considerable due to decreased milk yield, treatment costs, discarded milk, and increased culling rates. Antibiotic therapy remains central to treatment, though rising antimicrobial resistance highlights the need for prudent use and alternative approaches such as probiotics, Phyto therapeutics, immunotherapies, and nano-formulations. Effective control requires a holistic approach integrating hygienic milking, optimized housing, balanced nutrition, dry-cow therapy, and herd-level monitoring. Understanding mastitis epidemiology and adopting advanced diagnostics and sustainable treatment strategies are essential to protect milk quality, enhance animal welfare, and ensure economic viability in the dairy industry.
Keywords: Bovine Mastitis, Clinical Mastitis, Sub-clinical Mastitis, Epidemiology

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UiO-66/TiO_2/PVDF Hollow Fiber Membrane for Surface Water Treatment Using a Membrane Bioreactor System

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Abstract
Contamination of surface water by suspended particles, dissolved contaminants, organic debris, and pathogenic microbes presents significant obstacles to the generation of potable water. In this research, an UiO-66/TiO_2/PVDF nanocomposite hollow fiber membrane was created and utilized within a side-stream membrane bioreactor (MBR) system for efficient surface water treatment. The membrane was made using the dry-jet wet spinning method, which involved putting zirconium-based metal-organic framework UiO-66 and TiO_2 nanoparticles into a PVDF matrix. Morphological research showed that the hollow fiber structure was not symmetrical. It had a dense, selective outer layer and a porous sublayer with well-developed finger-like macrovoids. We tested the new membrane's performance by utilizing simulated surface water while the MBR was running all the time. The UiO-66/TiO_2/PVDF membrane showed great physicochemical removal rates, with 95% turbidity reduction, 99.83% total suspended solids removal. The elimination of organic pollutants was especially high, with reductions of 86.67% and 97% in chemical oxygen demand and biochemical oxygen demand, respectively. This shows how biological degradation and membrane filtration work together. The inclusion of TiO_2 helped remove more organic matter by using light to break it down, and UiO-66 gave dissolved pollutants more places to stick to. Microbiological tests showed that Escherichia coli was completely removed. The influent concentrations of about 10^7 CFU/100 mL were brought down to levels that could not be found in the permeate (>99.99% elimination). The excellent disinfection efficiency is due to the size exclusion, adsorption, and antibacterial actions of TiO_2 and UiO-66. The results show that the UiO-66/TiO_2/PVDF hollow fiber membrane combined with an MBR system is a good and effective way to treat surface water and reuse water safely

Keywords: PVDF hollow fiber membrane, membrane bioreactor, surface water treatment, *E. coli*

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Synthesis, Characterization of Graphene oxide and its application of Sunset Yellow

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Abstract

Graphene oxide (GO) has sparked widespread interest due to its unique properties and potential applications in a variety of fields. This paper presents the synthesis and characterization of GO and explores its application in color sensing, specifically focusing on Sunset Yellow (SY), a synthetic food colorant. Graphene oxide is synthesized by modified hummers methods and characterized using techniques including X-ray diffraction (XRD), Field emission scanning electron microscopy (FESEM), Fourier Transform Infra Red (FTIR) Spectroscopy, and Brunauer-Emmett-Teller (BET) to analyze their size and chemical composition. The addition of oxygen functionality groups to GO was revealed by the FTIR spectra. BET surface area of graphene oxide was 449.47 m^2/g. The study evaluates the efficiency of GO as an adsorber on SY by examining its interaction with SY through a UV-visible spectrophotometer. The effectiveness of GO in decolorizing SY was evaluated under varying conditions of GO concentration (0.10 to 0.60 g/100 mL) and contact time (2 to 90 min). The lack of adsorption on the starting graphene oxide (0.10g) is indicative of π-π interactions between the adsorbate (GO) and absorbent (SY). The decolorization efficiency is 76.96%, 85.99% observed at 90 min at contacting 0.25g and 0.40g of GO on SY respectively. Using 0.60 g of GO in an aqueous solution of SY removes all the color in 90 minutes and appears to be in a neutral state. This study demonstrates that GO can effectively be used for color sensing, offering a new approach for monitoring food colorants.

Keywords: Graphene oxide, Decolorization, UV-vis spectrophotometer, Sunset yellow, Food colorant.

Abstract ID:	*OPT1-012*

Bioprospecting Extreme Halophiles for Novel Antimicrobial Compounds Against Multidrug-Resistant Pathogens

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Abstract
The emergence and rapid spread of multidrug-resistant (MDR) bacteria represent one of the most critical global health challenges of the 21st century. The declining effectiveness of conventional antibiotics has intensified the need for novel antimicrobial agents with unique mechanisms of action. Among promising alternatives, extremophiles, particularly halophiles, have gained significant attention due to their ability to survive and adapt to hypersaline environments. These microorganisms produce a wide range of secondary metabolites and bioactive compounds as part of their survival strategies, many of which exhibit potent antimicrobial properties against resistant pathogens. Halophiles possess unique metabolic pathways shaped by extreme environmental conditions, leading to the synthesis of novel compounds not typically found in mesophilic organisms. These include antimicrobial peptides, bacteriocins, and halocins, which demonstrate inhibitory effects against both related microorganisms and clinically relevant MDR bacteria. Additionally, certain halophiles produce pigmented compounds such as carotenoids and prodigiosin, known for their antimicrobial activity. Other bioactive substances, including extracellular enzymes, can disrupt microbial cell walls, membranes, and essential metabolic functions, offering alternative strategies to combat resistant infections. Beyond antimicrobial applications, halophiles are valuable in biotechnology due to their production of stable enzymes and proteins that function under extreme conditions. Advances in genomic and bioinformatic analyses have further identified biosynthetic gene clusters associated with secondary metabolite production, highlighting their potential as a rich and largely untapped resource for novel drug discovery and pharmaceutical development.

Keywords: Multidrug-resistant bacteria (MDR), Halophiles, Antimicrobial compounds, Bioactive Compound, Drug discovery

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Biodegradation of Microplastics by Indigenous Microbial Consortia from Plastic Contaminated Soil

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Abstract
Microplastic pollution has emerged as a major environmental concern due to the extensive use of plastics and their persistence in natural ecosystems. Plastics enter the environment through improper disposal, industrial discharge, and the fragmentation of larger plastic materials. Over time, environmental factors such as sunlight, mechanical forces, and chemical reactions convert these materials into microplastics, which are classified as primary and secondary types. The present study aimed to isolate and evaluate microorganisms capable of degrading microplastics from plastic-contaminated sites. Soil samples were collected and processed using serial dilution and plating techniques, leading to the isolation of nine distinct microbial strains. These isolates were characterized based on colony morphology, including shape, size, color, and texture. The degradation potential of both individual isolates and microbial consortia was assessed by culturing them in Basal Mineral Medium (BHM) containing microplastics as the sole carbon source under controlled conditions. The microbial consortia demonstrated enhanced degradation efficiency compared to individual strains, indicating synergistic interactions among the microorganisms. Degradation was further confirmed using Fourier Transform Infrared Spectroscopy (FTIR), which revealed shifts and stretching in absorption bands, indicating polymer breakdown and the formation of new functional groups. Overall, the study highlights the potential of indigenous microorganisms, particularly in consortia form, as an eco-friendly and sustainable approach for microplastic bioremediation.
Keywords: Microplastic pollution, Plastic-contaminated soil, Microbial degradation, Colony morphology, Microbial consortia

Abstract ID:	*OPT1-014*

Enrichment-Based Development of a Bacterial Consortium for Enhanced Bioremediation of Oily Sludge

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Abstract

Oily sludge is a persistent and hazardous contaminant containing phenols, heavy metals, and PAHs, making its disposal and treatment challenging while causing significant environmental pollution when improperly managed. Initially, a bacterial consortium is developed using enrichment techniques to selectively isolate and enhance microorganisms capable of degrading petroleum-based pollutants, thereby promoting the growth of efficient hydrocarbon-degrading microbes. In the second stage, the developed bacterial consortium is applied to contaminated oily sludge under controlled laboratory conditions to evaluate its biodegradation potential. The degradation process is carefully monitored to assess the reduction in hydrocarbon content. In the final stage, the residual oil concentration is determined using the gravimetric method, ensuring accurate quantification of degradation efficiency. The enrichment method plays a central role in this research by enabling the selection and amplification of highly active microbial populations. Experimental results reveal that, compared to single bacterial cultures, the bacterial consortium exhibits significantly higher degradation efficiency, achieving 54.62% degradation within 10 days of incubation, as confirmed by gravimetric analysis. This enhanced performance highlights the importance of synergistic interactions among different microbial species in breaking down complex hydrocarbons. Overall, the study underscores the advantages of enrichment-based bioremediation, including improved efficiency, reduced treatment time, and cost-effectiveness.

Keywords: Oily sludge, Enrichment, Stable bacterial consortium, Bioremediation

Abstract ID:	*OPT1-015*

Development of Liquid Biofertilizer from Mixed Fruit Waste via Anaerobic Fermentation: Experimental Design and Nutrient Evaluation

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Abstract
The growing demand of fertilizers for sustainable agricultural practices and the concurrent problem of organic waste management have underscored the potential of biofertilizers as eco-friendly alternatives. This study explores the production and characterization of liquid biofertilizer derived by anaerobic fermentation of mixed fruit waste formulations. A structured experimental design comprising ten batches of different fruit waste combinations were prepared, each using one predominant fruit waste (11 kg) supplemented with nine others (1 kg each). A uniforms fermentation mixture of mass 20 kg was made in airtight containers and common additive nutrients were added for each batch, anaerobic fermentation was carried out for 45 days under ambient conditions.
The resultant biofertilizer was evaluated for agrochemical parameters namely pH, electrical conductivity (EC), and macro-nutrient concentrations of nitrogen (N), phosphorus (P), potassium (K), sulfur (S) and color and odor profiling. The findings revealed that fruit waste got transformed into a nutrient-rich liquid fertilizer. The significant variability in nutrient content was seen across the fruit types. Notably, banana peel-based fertilizer exhibited the highest potassium content (4484 ppm), while jackfruit waste with highest nitrogen levels (1635 ppm). Citrus peels showed elevated sulfur content (422 ppm). This nutrient variability exhibits the effect of substrate type taken on quality of fertilizer produced. Most formulations maintained favorable pH levels (5.6–6.8), with EC values indicating moderate salinity. Color and odor evaluations indicated mature fermentation. This study demonstrates a green low-cost, sustainable solution for organic farming, along with mitigating environmental pollution.

Keywords: Fruit waste valorization, Sustainable agriculture, Anaerobic fermentation

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Empowering Women's Health Through Iron & Protein Enriched Mushrooms

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Abstract
The present work is based on developing nutritionally enriched mushrooms by increasing their iron and protein content through a controlled cultivation process. The production begins with preparing a clean and sterilized substrate, such as straw or sawdust, which acts as the growing medium. Nutrients like iron salts and protein-rich materials are then mixed into the substrate to improve its value. Mushroom spawn is added under sterile conditions, and proper environmental factors like temperature, humidity, and air circulation are maintained for healthy growth. After harvesting, the mushrooms are tested to ensure enrichment has been successful. The core concept behind this method is nutrient enhancement through substrate modification. Mushrooms naturally absorb nutrients from their surroundings, so enriching the substrate improves their nutritional composition. Iron is absorbed and stored in the mushroom body, while protein content increases through nitrogen utilization, where simple nitrogen compounds are converted into amino acids and proteins. This makes the final product highly beneficial, especially for people suffering from iron and protein deficiencies. From a market perspective, this innovation introduces a unique product in India, as most existing mushroom producers focus only on basic varieties or limited enrichment like vitamin D. This creates a strong opportunity to enter the functional food market with a health-oriented product. The target customers mainly include women, vegetarians, health-conscious individuals, and people with nutritional deficiencies. The demand for functional foods is increasing globally, making this a promising business idea.
Keywords: Nutritional Enrichment, Iron Fortification, Protein Enhancement, Mushroom Cultivation, Functional Foods

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Abstract ID:	*OPT1-017*

Organic Ligand-Directed Synthesis and Multifunctional Characterization of Zn, Cu, and Ni Dithiocarbamate Complexes

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Abstract
A class of organosulfur compounds known as dithiocarbamate complexes has been thoroughly researched for a variety of uses in medicine, agriculture, and as building blocks for nanomaterials Several dithiocarbamate complexes of zinc (II), copper (II), and nickel (II) formed from a range of freshly synthesized secondary amine ligands are successfully produced and thoroughly characterized in this work. The target dithiocarbamate complexes were produced by reacting the new ligands, which were created by a multi-step chemical synthesis, with carbon disulfide and certain metal salts.
Elemental analysis, FT-IR, UV-Vis, 1H & 13C NMR, and mass spectrometry were used to extensively characterize all ligands and their matching metal complexes. Because of the steric bulk of the new ligands, structural analysis using methods like DFT revealed a variety of coordination geometries, such as square planar for copper(II) and nickel(II) complexes and tetrahedral or distorted octahedral for zinc(II) variants. This work opens the door for the creation of novel materials with specific functions by offering important insights into the links between structure and property in dithiocarbamate chemistry.
Keywords: Ligands, Coordination, Dithiocarbamate

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Synthesis and Molecular Docking Studies of Novel Indazole-Based Schiff Bases as Potential JNK2 Inhibitors

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Abstract
The indazole scaffold is a privileged motif in medicinal chemistry, recognized for its diverse pharmacological profile. This study describes the design, synthesis, and in silico evaluation of a novel series of 1-phenyl-1H-indazol-5-amine Schiff bases (4a-g) as potential inhibitors of c-Jun N-terminal kinase 2 (JNK2). The synthesis was achieved through a three-step protocol starting from 2-fluoro-5-nitrobenzaldehyde (1). Initial cyclization with phenyl hydrazine yielded 5-nitro-1-phenyl-1H-indazole (2), followed by SnCl2 -mediated reduction to the corresponding amine (3). Finally, acid-catalysed condensation of 3 with substituted aromatic aldehydes afforded the target Schiff bases (4a-g) in high yields (75–88%). All compounds were characterized by IR and NMR spectroscopy. Molecular docking studies were performed against the crystal structure of human JNK2 (PDB ID: 3E7O). The synthesized derivatives demonstrated strong binding affinities, with docking scores ranging from -8.7 to -9.3 kcal/mol. Visual analysis of the docking poses revealed critical hydrogen bonding interactions with the hinge region residues Met111 and Glu109, alongside hydrophobic interactions within the ATP-binding pocket. The results indicate that the 1-phenyl-indazole-5-amine derivatives possess significant potential as JNK2 inhibitors. These findings provide a structural basis for the development of new anti-inflammatory and anticancer agents, warranting further in vitro biological validation.
Keywords: Indazole, Schiff Base, JNK2, 3E7O, Molecular Docking, Synthesis.

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Drug Discovery, Public Health, and Healthcare System.

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Abstract:
Drug discovery is a research driven process of identifying new, safe and effective medication to treat or prevent disease. This study involves discovering molecules that interact with specific biological targets involved in disease processes.
The study also includes public health which is the science and art of preventing disease, prolonging life, and promoting health to organize community efforts. This study focuses on improving overall population health, rather than individual treatment through education, policy making, research, and tracking disease.
Another study is on the healthcare system which is a comprehensive, inter connected network of organizations, people, and resources designed to deliver medical services, promote health and prevent disease. In this study thejre are a variety of health systems around the world with as many histories and organizational structures as there are countries. This study also includes the patient perception (drug discovery), Societal mental health (public health), also healthcare system failures and behavioral impacts.
Keywords: Drug Discovery, Medication, Policy Making, Research, History, Societal Mental Health, Healthcare System Failures, Behavioral Impacts

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Abstract ID:	*OPT1-020*

Adsorption of Dyes from Chemical Effluents Using Graphene Oxide Nanomaterials

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Abstract
The discharge of dye-containing wastewater from chemical and textile industries into natural water bodies like rivers and lakes has become a major environmental issue. These dyes are often toxic, non-biodegradable, and persistent, causing serious ecological and health problems. When released into rivers and lakes, dye pollutants decrease light penetration, hinder photosynthesis, and disturb aquatic ecosystems. Conventional wastewater treatment methods, such as coagulation, filtration, and biological processes, often fail to fully remove complex dye molecules, especially at low concentrations. This has prompted the search for advanced materials for efficient dye removal. In this context, graphene oxide (GO) has become a promising carbon-based nanomaterial because of its unique physicochemical properties. It boasts a high surface area and contains various oxygen-based functional groups, such as hydroxyl, carboxyl, and epoxy groups, which enhance its adsorption capacity. Graphene oxide interacts with dye molecules via electrostatic attraction, hydrogen bonding, and π–π interactions, enabling the effective removal of both cationic and anionic dyes. The adsorption performance depends on factors such as pH, contact time, initial dye concentration, and adsorbent dose. Thus, graphene oxide provides a highly efficient and sustainable solution for removing dye pollutants from wastewater, helping to protect rivers and lakes and improve overall water quality.

Keywords: Graphene Oxide, Wastewater Treatment, Dye Removal, Adsorption, Chemical Industry Effluents

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Abstract ID:	*OPT1-021*

Public and Private Sector Contributions to Pharmaceutical Innovation: A Systematic Review of Roles Across the Drug Development Continuum

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Abstract
One of the most important issues in health innovation is the relative contributions of the public and private sectors to pharmaceutical research and development (R&D). In order to investigate sectoral roles across the drug development continuum, this systematic review synthesizes findings from several studies. Results show that public sector research is essential for producing fundamental scientific knowledge and has long-term effects on innovation, such as a 17–24 Year lag between public expenditure and medication development results. About 25% of new medications have public sector engagement, indicating that public institutions also play a role in late-stage development. Case studies show that public investment can surpass private contributions, especially in fields like vaccine development and tuberculosis treatment. On the other hand, applied research, clinical trials, and commercialization are dominated by the private sector, which helps turn discoveries into treatments that can be sold. Public-private collaborations are emerging as successful models, especially for neglected diseases and low-profit areas, as innovation increasingly depends on interdependence between sectors. Overall, the results are consistent with a hybrid innovation paradigm where private sector involvement guarantees development and scalability while public funding facilitates discovery and lowers risk. In order to maintain innovation and enhance global health outcomes, policy implications emphasize the necessity of cooperative frameworks and fair tactics.

Keywords: Public sector research, Pharmaceutical innovation, Drug development, Public–private partnerships, Biomedical R&D

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Pharmaceutical and Biochemical Research on pH-Sensitive Targeted Liposomal Drug Delivery System for Cancer Therapy

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Abstract
Conventional cancer chemotherapy is primarily associated with systemic drug distribution, which often results in non-specific accumulation of drugs in various organs, leading to increased toxicity and reduced therapeutic efficacy. moreover, only a small fraction of the administered drug reaches the target site, resulting in poor bioavailability and poor treatment outcomes. To overcome these limitations, a pH-sensitivity targeted liposomal drug delivery system is proposed for improved cancer therapy. Liposomes are vesicular carriers composed of phospholipid bilayers that are biocompatible and capable of encapsulating both hydrophilic and lipophilic drugs. The system is designed based on the pH difference between normal physiological conditions and the acidic tumor microenvironment. Liposomes remain stable during systemic circulation but undergo destabilization at the tumor site, releasing the drug locally. This ensures minimal effect on healthy tissues and maximum drug action at the target site. The formulation is intended for intravenous administration to avoid degradation in the gastrointestinal tract and to improve bioavailability. This approach provides better drug delivery efficiency with reduced systemic toxicity and enhanced therapeutic response at the tumor site. Overall, this strategy offers a more effective and safer method for cancer treatment compared to conventional therapy as it allows selective drug release only at the diseased site, reduces unwanted side effects, and maintains stability during circulation. Therefore, it can significantly improve therapeutic outcomes while minimizing damage to normal cells and tissues, making it a promising approach for modern cancer therapy and future drug delivery applications in clinical practice and research settings for better patient outcomes.

Keywords: pH-sensitive liposomes, targeted drug delivery, cancer therapy, tumor, microenvironment, controlled drug release

Abstract ID:	*OPT1-023*

Screening and Characterization of Indian Culinary Seed derived Phytoconstituents for Anticancer and Antimicrobial Activities

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Abstract

Indian spices have long been known for their health and nutritional benefits, mostly because they contain a lot of bioactive phytochemicals. The current study sought to assess the phytochemical content, alongside the anticancer and antibacterial properties, of seed extracts from *Brassica nigra*, *Anethum graveolens*, and *Trachyspermum ammi*, which are commonly utilised in traditional Indian cuisine. Initial phytochemical analysis indicated the existence of many secondary metabolites, such as tannins, coumarins, saponins, flavonoids, glycosides, and phenolic compounds. Thin-layer chromatography (TLC) analysis validated the presence of particular bioactive constituents, such as oleic acid, linoleic acid, dillapiole, carvone, and limonene in *Anethum graveolens*; α-phellandrene, oleic acid, and linoleic acid in *Trachyspermum ammi*; and oleic and linoleic acids in *Brassica nigra*. The MTT test was used to check cytotoxicity, and the well diffusion method was used to check for antibacterial activity in the extracts. All three seed extracts showed considerable cytotoxicity against human cancer cell lines HeLa and A549, suggesting their potential as sources of anticancer drugs. The seed extracts exhibited varying degrees of antibiotic activity against both Gram-positive and Gram-negative bacteria, including *Staphylococcus aureus*, *Bacillus subtilis*, and *Pseudomonas aeruginosa*. The findings indicate that these frequently ingested culinary seeds have promising bioactive capabilities and may be viable candidates for the development of innovative therapeutic medicines aimed at cancer and microbial diseases.

Keywords: Anticancer activity, Antimicrobial activity, *Brassica nigra*, *Anethum graveolens*

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Solution-Cast SF/PVA Films Containing Silver Nanoparticles: Antibacterial Efficacy, Swelling Properties, and Blood Clotting Evaluation

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Abstract

Silver nanoparticles (AgNPs) have emerged as promising antimicrobial agents; however, their stabilization and controlled delivery remain critical challenges for biomedical applications. In the present study, silver nanoparticles were synthesized and incorporated into a biocompatible silk fibroin (SF) and polyvinyl alcohol (PVA) polymeric matrix to fabricate multifunctional composite films with enhanced biomedical potential. The AgNPs were synthesized via a chemical reduction approach and uniformly embedded within the SF–PVA network, forming a stable nanocomposite film through solution casting. The prepared films were characterized for structural, morphological, and functional properties using standard analytical techniques. The incorporation of AgNPs improved the physicochemical stability of the films while maintaining desirable flexibility and swelling behavior. Antimicrobial activity was evaluated against representative Gram-positive and Gram-negative bacterial strains, demonstrating significant inhibitory effects attributed to the sustained release of silver ions and nanoparticle–cell membrane interactions. Swelling studies indicated enhanced hydrophilicity and controlled water uptake, suggesting suitability for wound exudate management. Furthermore, preliminary hemocompatibility assessment through blood clotting analysis revealed improved coagulation potential, indicating applicability in wound healing and hemostatic dressings. Overall, the developed AgNP-loaded SF–PVA composite films exhibit synergistic antimicrobial, swelling, and blood clotting properties, highlighting their potential as multifunctional biomaterials for advanced wound care applications.

Keywords: Silver nanoparticles, Silk fibroin; Polyvinyl alcohol, Antimicrobial, Blood clotting ability

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Abstract ID:	OPT1-025

Evaluation of Anti-metastatic activity, Cytotoxicity and Anti-oxidant potential of *Cascabela thevetia* and *Aegle marmelos*

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Abstract

Cascabela thevetia and *Aegle marmelos* have been used in treatment of various anomalies, including cancer. Both *A. marmelos* and *C. thevetia* are rich in secondary metabolites such as alkaloids, phenolics, flavonoids, sterols and tannins. It was observed that the extraction methods affect the leaching of these phytochemicals from plants into the solvent. This study discusses the observed difference in anti-cancer (cytotoxicity and anti-metastatic activity) and anti-oxidant activities from polar vs. non-polar solvent extracts. MTT assay was used to determine the cytotoxicity of extracts prepared using polar and non-polar solvents. To determine the difference between the cytotoxicity exerted by two types of solvent extraction methods, the polar and non-polar extracts were treated separately on HeLa cells**.** The non-polar extract showed 4 folds higher toxicity than polar extract in *A. marmelos*, and 1.2 fold higher cytotoxicity in *C.thevetia*. The anti-metastatic activity was determined through scratch assay. The extracts showed high anti-metastatic activity on HeLa cells. DPPH assay was used to determine the anti-oxidant potential of the extracts. The anti-oxidant activity of polar extracts was nearly 1.5 folds and 10 folds higher than non-polar extracts in *C.thevetia* and *A.marmelos*, respectively. The results indicate that difference in IC50 values of MTT and DPPH assays was owing to the difference in phytochemistry of both the extraction methods. Thus, phytoconstituents can be selectively extracted for specific biological activity through solvent selection. 5FU and ascorbic acid were used as a positive control for MTT and DPPH assay, respectively.

Keywords: IC50, Phytochemistry, Anti-cancer, Anti-metastatic, *C. thevetia*, *A. marmelos*

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Response Surface Methodology Based Optimization, Purification, and Immobilization of Lactase from *Bacillus clausii* for Continuous Lactose Hydrolysis

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Abstract
Lactase enzyme plays an essential role in the hydrolysis of lactose into glucose and galactose, improving milk digestibility. In the present study, lactase-producing strains of *Bacillus clausii* were isolated from healthy breast milk, followed by characterization and screening for efficient enzyme production. The partially purified enzyme exhibited optimum activity at pH 7.0 and remained stable up to 60 °C. The maximum enzyme activity was recorded as 2264.9 U/mL with a specific activity of 8089.2 U/mg. Purification using DEAE-cellulose anion exchange chromatography resulted in a 32.50-fold increase in enzyme purity. Further, the enzyme was immobilized using an entrapment technique, which significantly enhanced its stability against physical and chemical denaturants. The immobilized enzyme demonstrated improved performance in terms of activity retention, operational stability, and reusability under both batch and continuous processing conditions. The entrapped lactase was effectively utilized in a reactor system for continuous lactose hydrolysis in breast milk. Reusability studies confirmed minimal enzyme leaching from gel beads, indicating its suitability for long-term applications. Overall, the study highlights the potential of immobilized lactase from *Bacillus clausii* for efficient and continuous lactose conversion in dairy applications.

Keywords: Lactase, *Bacillus clausii*, Enzyme Immobilization, Lactose Hydrolysis, DEAE Cellulose

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Abstract ID:	*OPT1-027*

Green Analytical Approaches for Identification of Emerging Synthetic Drugs and New Psychoactive Substance: A Review

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Abstract

The growing presence and continuous development of synthetic drugs and new psychoactive substances (NPS) have raised serious concerns in the field of forensic toxicology, public health monitoring, and environmental safety. These substances are constantly modified to produce drug like effects while escaping legal control,which makes their identification increasingly difficult. Conventional analytical techniques used for detecting such compounds often rely on hazardous chemical reagents, require high energy input, and involve complex sample preparation steps. These factors not only increase laboratory workload but also contribute to environmental pollution. To address these issues, green analytical chemistry has gained importance as a safer and more sustainable alternative. This approach aims to reduce environmental impact while maintaining reliable and sensitive analytical performance. The present review focuses on recent progress in environmentally sustainable analytical techniques for the detection of emerging synthetic drugs and NPS. It discusses the use of green chromatographic methods, advanced spectroscopic techniques, nanotechnology based sensing platforms, solvent reduced micro extraction procedures, and artificial intelligence assisted analytical tools. In addition, this review highlights the increasing need to adopt environmentally responsible practices in forensic analysis and discusses future research opportunities aimed at developing safer, more efficient, and sustainable drug detection strategies.

Keywords: Green analytical chemistry, New psychoactive substances, Synthetic drugs, Forensic toxicology

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Hybrid Deep Learning Pipeline for Cervical Cytology Analysis Using ConvNeXt and Attention U-Net with XAI Support

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Abstract
Cervical cancer is a major contributor to mortality rates among women, especially in developing countries, owing to a lack of adequate screening facilities and skilled cytopathologists. The conventional approach for cervical cancer detection using Pap smear tests requires microscopic examination of the cells, which is a laborious process and susceptible to human error. The recent advances in the field of artificial intelligence provide a unique opportunity for improving the accuracy of medical image analysis. The specific objectives of this study are to propose a hybrid approach for cervical cancer detection and cell segmentation using deep learning models and improve interpretability using eXplainable methods like Class Activation Maps. The proposed approach utilizes ConvNeXt for multi-class classification, and Attention U-Net for precise segmentation of cell. Score-CAM and Layer-CAM are employed to visualize the predictions made. The performance of the model is evaluated by training and testing it on cervical cytology image datasets. The proposed hybrid model has achieved high classification metrics with 94.65% accuracy, 94.63% F1-score and 0.9321 Cohen's Kappa value. Additionally, the proposed model has shown high generalization capability in handling diversly stained cervical cytology images. Attention U-Net has also enabled precise segmentation with high DSC and IoU. Hence, the proposed framework has provided a robust, accurate and interpretable solution to real-world AI-assisted cervical cancer screening.

Keywords: Cervical Cancer Detection, Deep Learning, ConvNeXt, Attention U-Net, Explainable AI (XAI)

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Exploring the Prebiotic Potential of Pectic Oligosaccharides Obtained from Enzymatic Hydrolysis of Fruit Peels

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Abstract
Pectin, a complex heteropolysaccharide present in plant cell walls, and its hydrolysis products, pectic oligosaccharides (POS), are recognized as fermentable dietary fibers with significant biological potential. Controlled hydrolysis of pectin yields modified pectin fragments with enhanced antioxidant activity, including improved radical-scavenging capacity and metal ion chelation. In the present study, POS were extracted from dragon fruit, orange, kiwi, and pomegranate peels and evaluated for their phenolic and flavonoid content, antimicrobial activity, and prebiotic efficacy. The total phenolic content of POS derived from dragon fruit, orange, kiwi, and pomegranate peels was 16.4, 17.4, 17.2, and 17.3 mg/mL, respectively. The corresponding flavonoid contents were 4.6, 4.75, 5.5, and 5.5 mg/mL, indicating substantial bioactive potential across all samples. Antimicrobial activity was assessed using the agar well diffusion method against selected bacterial and fungal strains. Orange peel-derived POS exhibited the highest antimicrobial activity, showing zones of inhibition of 26.33 mm against *Pseudomonas* spp., 18 mm against *Aspergillus* spp., and 9.33 mm against *Candida* spp. Kiwi peel POS demonstrated inhibition of 10.33 mm against *Candida* spp. and 9 mm against *Escherichia coli*. Dragon fruit peel POS showed notable antifungal activity against *Candida* spp. (19.33 mm) and moderate inhibition against *Aspergillus* spp. (7 mm). Overall, these findings highlight the potential of fruit peel-derived POS as multifunctional bioactive ingredients suitable for functional food development and sustainable waste valorization.

Keywords: Antimicrobial activity, Prebiotic potential, Phenolic content, Flavonoid content

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Abstract ID:	*OPT1-030*

Hydrogen-bonded Organic Framework for Uranium Adsorption from Complex Matrices

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Abstract:

Hydrogen-bonded organic frameworks (HOFs) represent a versatile class of crystalline porous materials, offering unique advantages such as solution processability, structural reversibility, and tunable functionality. Herein, we report the controlled synthesis and characterization of HOF-5 via solvent-mediated crystallization strategies. Slow crystallization from dimethylformamide (DMF) under controlled conditions affords highly crystalline HOF-5, as confirmed by X-ray diffraction (scXRD & pXRD), indicating the formation of a well-ordered hydrogen-bonded network. In addition to structural characterization, the photophysical properties of HOF-5 were systematically investigated using UV–visible absorption and fluorescence spectroscopy. Metal ion selectivity studies reveal a pronounced and selective response toward uranium species, demonstrating the framework's strong affinity and recognition capability. The observed spectral changes suggest efficient host–guest interactions between the HOF matrix and uranyl ions, leading to distinct optical signatures. We accessed the aqueous stability of HOF-5 under varied pH, which led us to further investigate its practical applicability in complex aqueous matrices, including saline water, and ground water. The residual uranium concentration was quantitatively analyzed using arsenazo method on UV-visible spectrophotometer and inductively coupled plasma mass spectrometry (ICP–MS). The results demonstrate efficient uranium uptake and high selectivity even in competitive ionic environments. Overall, this study highlights the dual functionality of HOF-5 as both a selective fluorescent sensor and an effective adsorbent for uranium, underscoring its potential for applications in selective metal ion separation.

Keywords: Dimethylformamide, X-ray diffraction, Uranyl ions, Dual functionality

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Controlling Microporosity via Dihedral Angle variation in BINOL-Based Nanofiltration Membranes

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Abstract

Precise regulation of microporosity in polymeric membranes is essential for enabling energy-efficient molecular separations. However, nanofiltration (NF) membranes fabricated via interfacial polymerization typically suffer from limited pore control due to the inherently stochastic assembly of monomers. In this study, we introduce a dihedral angle–controlled monomer design strategy to systematically tune membrane microstructure. This approach employs the rigid, non-planar monomer 1,1′-bi-2-naphthol (BINOL), available in both racemic (rac-BINOL, racB) and enantiopure ((R/S)-BINOL, RB) forms. Subtle stereochemical variations between racB and RB lead to differences in the dihedral angle between the naphthyl rings (~89° vs. ~76°), which in turn induce slight changes in steric occupancy, as quantified by buried volume analysis, along with differences in thermodynamic stability. Upon polymerization with trimesoyl chloride (TMC), these molecular-level distinctions translate into markedly different polymer network architectures and membrane morphologies. The resulting poly-racB membrane exhibits a relatively larger mean pore size and lower mechanical stiffness, whereas poly-RB forms a denser network with smaller pore size and significantly enhanced stiffness. Both membranes demonstrate sharp molecular area cut-offs (~1.0 - 1.5 nm range), high water permeance (~100 LMH·bar^{-1}), and stable performance over 120 hours of operation. Overall, this work establishes a molecular-level design framework for constructing scalable nanofiltration membranes with finely tunable microporosity and superior separation performance.

Keywords: Nanofilteration, Polymerization, Trimesoyl chloride, Poly-racB membrane

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Abstract ID:	OPT1-032

Design and Synthesis of 8-Substituted Quinoline Derivatives as Potential Bioactive Agents

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Abstract
Quinoline is an important class of nitrogen-containing hetero cyclic compounds that shows significant pharmacological and medicinal importance. Quinoline derivatives have been widely studied because of their broad biological activities and their usefulness in antimicrobial drug development. Among these compounds, 8-substituted quinoline derivatives, particularly those containing hydroxyl (–OH) or amino (–NH_2) groups at the 8-position, are of special interest. The presence of these functional groups near the ring nitrogen atom provides bifunctional coordination ability and increases the chemical reactivity of the molecule. This structural feature makes 8-substituted quinoline derivatives attractive scaffolds for the design of biologically active compounds.In the present study, a systematic and mechanistically guided synthetic strategy was developed for the preparation of novel chlorinated derivatives of 8-substituted quinoline. The synthesis was carried out under basic conditions, allowing efficient coupling between quinoline frameworks and chlorinated compounds. The reaction conditions were optimized to obtain good yields and high purity of the desired products.The synthesized compounds were purified using standard techniques and thoroughly characterized using different spectroscopic methods. Structural confirmation was achieved through Fourier Transform Infrared (FTIR) spectroscopy, proton nuclear magnetic resonance (^{1}H NMR), carbon-13 nuclear magnetic resonance (^{13}C NMR), and mass spectrometry. These analytical techniques confirmed the successful formation of the targeted quinoline derivatives and verified their structural integrity. Furthermore ,the synthesized compounds were subjected to preliminary biological screening.Overall, this study provides valuable insight into chlorine–quinoline coupling reactions and demonstrates an effective approach for synthesizing new heterocyclic derivatives.

Keywords: Quinoline derivatives, Chlorinated compounds, Heterocyclic synthesis, Spectroscopic characterization, Biological Activity

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Synthesis, Characterization and Antibacterial Evaluation of Novel Fosfomycin Derivatives

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Abstract
Antimicrobial resistance has emerged as a major global health concern, necessitating the development of novel antibacterial agents. In the present study, new derivatives of fosfomycin were synthesized and evaluated for their antibacterial activity. Fosfomycin sodium and fosfomycin trometamol were reacted with 8-hydroxyquinoline, 2-chloro-4-nitrobenzoic acid, and N-chlorosuccinimide under controlled acidic conditions with the help of 1M HCl solution to obtain four novel compounds. The synthesized products were characterized using IR-Spectroscopy, ^{1}H-NMR-Spectroscopy, ^{13}C-NMR-Spectroscopy, and Mass Spectrometry techniques, confirming their structural integrity and functional group modifications.
The antibacterial activity of all synthesized compounds was tested against both Gram-positive bacteria like (Bacillus subtilis and Staphylococcus aureus) and Gram-negative bacteria like (Escherichia coli and Pseudomonas aeruginosa). The results demonstrated that the modified fosfomycin derivatives exhibited enhanced antibacterial activity compared to the parent compound, with notable inhibition zones observed at varying concentrations. Among the synthesized compounds, derivatives containing 8-hydroxyquinoline and N-chlorosuccinimide showed significant activity against E. coli and P. aeruginosa, indicating their potential as broad-spectrum antibacterial agents. Overall, the study highlights the importance of structural modification of existing antibiotics to combat drug-resistant pathogens. These findings suggest that fosfomycin-based derivatives could serve as promising candidates for further pharmacological development and therapeutic applications in the treatment of resistant bacterial infections for Children and Urinary Treatment Infections for Women.
Keywords: Fosfomycin sodium, Fosfomycin trometamol, N-Chlorosuccinimide, 2-Chloro,4-Nitro Benzoic acid, 8-Hydroxyquinoline

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Synthesis of PVP-Citric Acid Carbon Quantum Dots for Selective Fluorescence Sensing of Levofloxacin

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Abstract
Carbon quantum dots (CQDs) have emerged as promising fluorescent nanomaterials for sensing applications due to their biocompatibility, low toxicity, and tunable optical properties. This study reports a facile, green hydrothermal synthesis of nitrogen-doped CQDs using polyvinylpyrrolidone (PVP) as a capping agent and citric acid as the carbon precursor. The resulting PVP-CQDs exhibited strong blue fluorescence emission, uniform spherical morphology, and excellent water dispersibility. These PVP-CQDs were developed as a turn-off fluorescence probe for the selective detection of levofloxacin, a widely used fluoroquinolone antibiotic. The fluorescence quenching mechanism was investigated through spectroscopic and electrochemical analyses. The sensor displayed high selectivity against common interferents, including other antibiotics, metal ions, and biomolecules. Practical applicability was demonstrated in pharmaceutical formulations and spiked biological samples (urine and serum). This work highlights PVP-CQDs as a robust, eco-friendly platform for rapid antibiotic residue monitoring in environmental and clinical settings.

Keywords: Carbon Quantum Dots, Sensing, Polyvinyl pyrrolidone, Citric acid, Fluorescence

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Abstract ID:	*OPT1-035*

Sustainable Synthesis and Bioactivity Evaluation of New Schiff Base derivatives : A Natural Acid-Catalyzed Approach

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Abstract
Here in this research work, a novel Schiff base derivative was synthesized using a natural acid–catalyzed method, highlighting a sustainable and environmentally friendly approach. The use of natural acid as a catalyst offers advantages such as reduced toxicity, cost-effectiveness, and improved reaction efficiency compared to conventional synthetic methods. The synthesized compound was structurally characterized using standard spectroscopic techniques, including FTIR, ^{1}H NMR, and ^{13}C NMR, confirming the successful formation of the Schiff base. The antioxidant activity of the compound was evaluated through various in vitro assays, namely DPPH radical scavenging, ferric reducing antioxidant power (FRAP), and nitric oxide (NO) scavenging methods. The results demonstrated significant radical scavenging ability and strong reducing power across all assays, indicating excellent antioxidant potential. Overall, the findings suggest that the synthesized Schiff base derivative is a promising bioactive compound with potential pharmaceutical applications. Additionally, this work emphasizes the importance of natural acid catalysis as a green and efficient strategy for the synthesis of biologically active molecules, contributing to the advancement of sustainable chemistry practices.

Keywords: Natural acid–mediated catalysis, Schiff base compounds, Antioxidant potential, Spectroscopic characterization.

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Prevalence of High-Risk Human Papillomavirus and Its Concordance with Cytology in a Cervical Cancer Screening Cohort from Central Gujarat, India

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Abstract

Cervical cancer remains a significant public health challenge in low- and middle-income countries, including India. While the World Health Organization has proposed the global cervical cancer elimination strategy (90–70–90 targets) and India has introduced national screening guidelines, effective implementation depends on region-specific operational strategies. This study aimed to implement a contextually adapted multi-tier cervical cancer screening framework in Central Gujarat and to assess the prevalence of high-risk human papillomavirus (hrHPV) infection and its agreement with cytological and histopathological findings. Study was conducted among 625 women aged 30–60 years recruited from primary healthcare outreach settings (PHC/CHC camps) and a tertiary care teaching hospital in the Vadodara region of Gujarat, India. All participants underwent Liquid-Based Cytology (LBC) and hrHPV DNA testing. Women testing positive for hrHPV were referred for colposcopy-guided biopsy when clinically indicated. Overall hrHPV positivity was 3.2% (20/625), while cytological abnormalities were identified in 6.6% (41/625) of screened women. Agreement analysis demonstrated minimal concordance between cytology and hrHPV testing (Cohen's $\kappa = 0.05$). McNemar's test indicated significant discordance between the two screening approaches ($p < 0.001$), largely attributable to hrHPV-positive women with normal cytology. Among hrHPV-positive participants, 90% were cytology negative. Histopathological evaluation of hrHPV-positive women identified cervical intraepithelial neoplasia (CIN I) in 40% of cases and CIN II/III in 10%, while 50% showed no dysplasia. The study demonstrated notable discordance between cytology and hrHPV testing, with most hrHPV-positive women exhibiting normal cytology. These findings suggest that HPV-based screening may complement cytology-based approaches in cervical cancer detection.

Keywords: HPV, Cervical cancer, Cytology.

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Abstract ID:	*OPT1-037*

Sustainable Analytical Strategies for the Trace Determination of Environmental Contaminants in Forensic Matrices: A Review

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Abstract
Environmental pollutants are crucial in forensic investigations particularly when it comes to pollution, toxic exposure, and source identification. Sensitive and reliable analytical methods are needed to identify these contaminants at trace levels in intricate forensic matrices such soil, water, sediments, and biological materials. Conventional analytical methods often involve large volumes of toxic solvents, time-consuming procedures, and high energy consumption, which can negatively impact both the environment and laboratory safety. In recent years, sustainable or green analytical chemistry has gained attention as an effective approach to reduce chemical waste, minimize solvent usage, and improve overall analytical efficiency. This review presents an overview of eco-friendly analytical strategies for the trace determination of environmental contaminants in forensic samples. More importance is given to green sample preparation techniques such as solid-phase microextraction, dispersive liquid-liquid microextraction, stir-bar sorptive extraction, QuEChERS, and microextraction by packed sorbent. It also addresses the role of the miniaturized and portable analytical instruments in quick and on-site forensic analysis. Moreover, the use of the greenness assessment tools in determining the performance of the analytical tools in terms of environment is emphasized. The review concludes by addressing current challenges and future prospects for the adoption of sustainable analytical practices in environmental forensic science.

Keywords: Green analytical chemistry, Environmental forensics, Trace determination, Sustainable analytical methods

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Integrated CubeSat Design: Custom PCB Electronics and Structural Architecture

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Abstract

Small satellite missions, particularly CubeSats, have opened new avenues for cost-effective space exploration and in-orbit technology demonstration. The success of these missions depends largely on compact, reliable onboard electronic systems capable of operating within stringent constraints on volume, mass, and power. Consequently, the development of a streamlined and efficient electrical subsystem is critical to ensuring proper payload functionality, communication reliability, and command execution within a 1U CubeSat platform. This paper presents the design and development of a custom printed circuit board (PCB) that functions as the primary electronic interface for a CubeSat prototype. The board integrates multiple subsystems, including an Arduino-based microcontroller, sensor interfaces, a 434 MHz RF communication module, switching components, and dual-source power supply inputs utilizing Li-ion and 9 V batteries. The PCB design process encompassed schematic capture, strategic component placement, optimized routing, and compact layout implementation using computer-aided design (CAD) tools to reduce wiring complexity and improve connection reliability. The resulting system offers a robust and scalable platform for payload sensing and telemetry transmission while simplifying assembly and future upgrades. This work demonstrates the practical realization of a cost-effective electronic architecture for CubeSat applications and establishes a foundation for future enhancements, such as system redundancy, thermal management, and modular expansion in subsequent development stages.

Keywords: CubeSat, Printed Circuit Board, Avionics, Embedded Systems, Sensor Interface, RF Communication

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A Data-Driven Approach to Predicting Location-Specific Cybercriminal Activities Using Machine Learning

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Abstract

India has experienced a notable increase in cybercrime incidents in recent years, presenting significant threats to individuals, enterprises, and the nation's digital infrastructure. Existing methodologies for forecasting crime, while often employing machine learning techniques, frequently encounter limitations in adequately incorporating the intricate spatiotemporal characteristics inherent in cybercrime datasets. Furthermore, a notable challenge lies in their adaptability to diverse local socioeconomic contexts, which are known to exert influence on criminal patterns. This study employed a data-driven methodology to forecast localized cybercrime threats throughout India, leveraging spatio-temporal machine learning techniques. In order to evaluate contemporary predictive performance, a suite of machine learning methodologies, specifically Random Forest, XGBoost, and Long Short-Term Memory (LSTM) networks, were implemented and subsequently assessed. "Among the various approaches explored, the XGBoost model demonstrated superior performance, achieving an accuracy of 91%."The analysis yielded a rate of 3%, accompanied by precision and recall values of 89. The figures presented were 7% and 88, respectively.5%, respectively. These predictive insights may inform law enforcement agencies and policymakers, facilitating the refinement of preventative strategies and the optimization of resource allocation within the domain of cybercrime control.

Keywords: Cybercrime prediction, Spatio-temporal modeling, Machine learning, XGBoost, LSTM, Crime hotspot detection.

Abstract ID :	*OPT2-003*

Vision, Wearables, and Signals: A Review of Deep Multi-Modal Human Activity Recognition

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Abstract

Human Activity Recognition (HAR) has become an essential part of the intelligent systems in healthcare, surveillance, smart environments, and human-computer interface. Although research on early studies was based on one sense of study, the current developments are becoming more focused on multi-modal learning to enhance the complexity of activities in the real world. The current review gives a detailed discussion of deep learning-based multi-modal human activity recognition using a combination of vision-based data, wearable sensor streams as well as physiological or environmental signals. We methodically discuss the application of convolutional, recurrent, graph-based and transformer-driven architectures to learn complementary spatial-temporal cues of heterogeneous modalities. The review groups fusion strategies into early, intermediate and late fusion paradigms and the effectiveness of the strategies in dynamic and unconstrained environments. Critical summarization of benchmark datasets, evaluation protocols and performance trends is done to point out the existing progress and limitations. Moreover, there are new trends, including self-supervised learning, alignment of cross-modal representations, explainable models, and real-time deployment, that are being investigated. Through the synthesis of current events and the research gaps, the current review will be an essential resource to the researcher and practitioner in designing a robust and adaptive multi-modal HAR system.

Keywords: Human Activity Recognition, Multi-Modal Learning, Deep Learning, Wearable Sensors, Computer Vision

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Abstract ID :	*OPT2-004*

Data-Driven Optimization of Drilling Parameters Using ML Techniques

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Abstract

The primal machining operation in manufacturing is drilling, which seeks to achieve the maximum values of spindle speed, feed rate, and drill diameter in order to minimize defects such as delamination and geometric flaws, among others. The research work began with 28 data points, which were experimentally collected, and these data points were used to extract input parameters such as drill speed, feed rate, drill diameter, cutting depth, and output parameters such as Material Removal Rate, Circularity, Cylindricity, and Delamination Factor. The initial findings revealed that the baseline model did not fit the data since it is non-linear and polynomial in nature; therefore, the model was extended to incorporate polynomial and non-linear terms. The model, which incorporated these additional terms, was cross-checked, validated, and applied to simulate data. However, since the data points were limited, the data points were extended to 400 using interpolation and noise, and then again extended to 1600 data points using bootstrapping and heuristic sampling methods. The data points were then used to train a variety of machine learning algorithms such as Linear Regression, Decision Tree, Gradient Boosting, K-Nearest Neighbor, XGBoost, and Random Forest, among others. As XGBoost produced the best performance with an accuracy of 99.60% compared to other models, XGBoost was integrated with ensemble models such as Multi-Layer Perceptron (MLP) and Long Short-Term Memory (LSTM) using stacking, and an accuracy of 99.88% was achieved using an ensemble model, outperforming all other state-of-the-art techniques.

Keywords: Drilling Optimization, Material Removal Rate (MRR), Delamination Factor, Data Augmentation, Ensemble Learning.

Abstract ID :	*OPT2-005*

Text Detection and Recognition in Images and Video Sequences

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Abstract

Under difficult circumstances, state-of-the-art AI systems for text detection in video sequences exhibit small increases in F1 score. Relative F1 improvements for convolutional and transformer-based models range from 1.4% to more than 2% on benchmark datasets (such as ICDAR2013 and ICDAR2015, where one study additionally reports an Identification F1 score of 72.8%). One conventional approach yields 15% recall values and 23% on publicly available datasets; however, no study offers precise precision numbers. Motion degradation is handled by temporal modelling, deblurring, and related techniques, although quantitative measurements unique to lighting and resolution are still unknown. Test conditions cover problems including motion blur, low contrast, and changeable illumination.

Keywords: Machine Learning, Deep Learning, AI-Text detection, Analysis

Abstract ID :	*OPT2-006*

Machine Learning Based Smart Grid Load Protection and Control System

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Abstract
With the increasing demand for energy and the need for sustainable power distribution, a Smart Grid Load Control System integrated with Machine Learning (ML) techniques offers an innovative solution to optimize energy usage, enhance grid reliability, and reduce operational costs. This system leverages predictive algorithms to forecast electricity demand patterns, and real-time load management mechanisms to balance power distribution efficiently. By using historical consumption data, weather patterns and user behavior, the ML model dynamically adjusts grid load, identifies peak demand periods, and automates control strategies to manage energy consumption. The integration of intelligent load forecasting, anomaly detection, and adaptive control policies results in reduced energy wastage, enhanced grid stability, and improved user experience. Moreover, it facilitates the integration of renewable energy source by ensuring grid load is consistently balanced while supporting variable energy inputs. This paper outlines the design, implementation, and evaluation of a machine learning-based approach for smart grid load control, emphasizing its potential to revolutionize modern energy systems for better efficiency and sustainability.

Keywords: Smart Grid load control system, Machine learning techniques, Real-time load management, Integration of Renewable energy sources, Reduced Energy wastage

Abstract ID :	OPT2-007

Prediction of Traffic Accident Severity Utilizing Explainable Methods

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Abstract

The adding frequence of road business accidents worldwide poses significant challenges in profitable, societal, and public health areas, performing in millions of injuries and deaths each time. This exploration utilizes machine literacy styles to read the inflexibility of accidents and identify primary contributing factors, using data from Ethiopia. To address the imbalance in these datasets, the Synthetic nonage Oversampling fashion (SMOTE) is applied to insure balanced data representation. For prognosticating accident inflexibility, Random Forest is used, with resolvable Artificial Intelligence (XAI) styles videlicet Shapley Additive explanations (SHAP) for overarching perceptivity and Original Interpretable Model- agnostic Explanations (LIME) for detailed, localized interpretations. This study enhances our understanding of road business accidents and helps alleviate their goods through sophisticated logical approaches, furnishing precious perceptivity for policymakers, civic itineraries, and public health officers worldwide

Keywords: SHAP, LIME, resolvable AI, ITS, spatial-temporal analysis

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Abstract ID :	OPT2-008

Application of Magnetorheological Dampers in Piping Supports for Seismic Load Mitigation in Oil & Gas Facilities

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Abstract

Complex piping networks used by oil and gas facilities are extremely susceptible to damage during seismic activity. Under erratic earthquake-induced loads, conventional support systems like snubbers and rigid hangers offer little flexibility, frequently leading to overstress and eventual failure. A promising semi-active vibration control method for seismic protection is provided by magnetorheological (MR) dampers, which have field-dependent rheological characteristics. The principles, design approaches, and performance traits of MR dampers in reducing seismic loads are reviewed in this paper, with an emphasis on how they are used in oil and gas plant piping support systems. Although MR damper technology has advanced significantly in automotive and civil engineering applications, its use in industrial piping is still mainly unknown. This review's key contributions encompass a comparative analysis of MR dampers and conventional passive devices, an assessment of control algorithms applicable to piping systems, and the identification of significant challenges, including environmental constraints. Proposed future directions include hybrid damping systems, and the integration of digital twins for real-time monitoring. This paper seeks to establish MR dampers as a feasible technology for improving the seismic resilience of industrial piping infrastructure by synthesizing cutting-edge research and pinpointing significant gaps.

Keywords: Magnetorheological dampers, semi-active control, seismic mitigation, piping systems, oil and gas facilities, vibration control

Abstract ID :	OPT2-009

Analytical investigations of parameters affecting the acoustic and backpressure performance of muffler of 4-stroke 4-cylinder engine

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Abstract

Automobiles are one of the major contributors to noise pollution. The noise generated by the exhaust gases is one of the major sources of noise pollution in automobiles. The mufflers are primarily designed to lower the noise generated by the exhaust gases of the engine. The designer uses different parameters that help the silencer perform this task. However, the noise reduction is inversely proportional to backpressure. The backpressure is the difference between the pressure of exhaust gases at the inlet and outlet of the muffler. The parameters that affect the noise include the number of chambers inside the muffler, the distance between the baffle plates, number of pipes inside the muffler, the length of the inlet and outlet pipes inside the muffler, number of holes on the pipes and baffles and the size of the holes. This paper explores the effect of the parameters on the performance of the muffler from the acoustic and backpressure points of view. Different models of the muffler were prepared by altering the different parameters. The CFD (computational fluid dynamics) analysis of each model was carried out using analytical software. The comparison was made to understand the effects of the parameters.

Keywords: Muffler, backpressure, acoustics, CFD, modelling

Abstract ID :	OPT2-010

A Review of Integrating EEG and Thermal Sensing for Cognitive Ergonomics in Human–Robot Collaboration

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Abstract
Human-robot collaboration has been growing rapidly in the area of manufacturing and smart work environments, where both human and robot collaboration can be utilized for increasing productivity and operational efficiency in the workplace. It has been observed that for the development of human-robot collaboration systems, the awareness of the human cognitive and physiological states should be continuously monitored because various human factors such as cognitive overload, fatigue, and stress can affect the performance of the human operator and can decrease the safety of the human-robot collaboration environment. This review paper aims at reviewing the development of the combination of electroencephalography and thermal sensing for the development of human-centered cognitive ergonomics in human-robot collaboration environments. The major challenges associated with the data fusion of multimodal data, real-time implementation, data reliability, and ethical issues are also addressed. Finally, the future research directions are identified to enable the development of intelligent human-aware robotic systems to enhance safety, efficiency, and the well-being of the operator in a work environment.

Keywords: Human–robot collaboration, cognitive ergonomics, electroencephalography (EEG), thermal imaging, multimodal sensing

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An Explainable Transformer-Based Framework for Aspect-Level Sentiment Analysis of Large-Scale Online Reviews

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Abstract

Sentiment analysis of online reviews plays a significant role in understanding user opinions and improving decision-making processes for businesses and service providers. However, traditional sentiment analysis techniques often fail to identify sentiments associated with specific aspects of a product or service and generally lack transparency in their predictions. This study proposes an explainable transformer-based framework for aspect-level sentiment analysis of large-scale online reviews. The proposed approach integrates advanced transformer models such as Bidirectional Encoder Representations from Transformers (BERT) to capture contextual relationships and semantic meanings within textual data. To enhance the interpretability of model predictions, explainable artificial intelligence techniques including Local Interpretable Model-Agnostic Explanations (LIME) and SHapley Additive exPlanations (SHAP) are incorporated. These techniques provide insights into how specific words or phrases influence sentiment classification results, thereby improving the transparency and trustworthiness of the system. Experimental results demonstrate that the proposed model achieves higher accuracy and improved interpretability compared to traditional machine learning approaches. The study highlights the importance of combining transformer-based natural language processing techniques with explainable AI methods to build reliable and interpretable sentiment analysis systems for real-world applications.

Keywords: Aspect-Based Sentiment Analysis, Transformer Models, Explainable AI, Natural Language Processing, Online Reviews

Abstract ID :	OPT2-012

Big Data and Cloud Computing's Place in Smart Cities: Problems and Difficulties

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Abstract

The paper covers how Internet of Things, Machine to machine, Big Data and Smart Cities Linkages can help in doing predictive analytics which can be helpful to human wellbeing. This paper focused on two main areas – Smart Grid and Traffic Congestion Management where Big Data Analytics can be useful for decision makers and city planner. To this purpose, this paper browses the semantic annotation of the sensors in the cloud, and innovative services can be implemented and considered by bridging Clouds and IoT. Things-like semantic will be considered to perform the aggregation of heterogeneous resources by defining the Clouds of Things (CoT) paradigm.

Keywords: Big Data, IoT, Smart City, Smart Grid, Traffic Congestion, Cloud of Things, Smart Cities, Internet of Things

Abstract ID :	OPT2-013

Hybrid Deep Learning Framework for Automated Classification of Banana Leaf Diseases with Intelligent Anti-Agent Recommendation

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Abstract

The proposed research suggests a Hybrid Deep Learning Framework to Automated Classification of Banana Leaf Diseases with Intelligent Anti Agent Recommendation that combines Vision Transformer (ViT) with transfer learning based convolutional networks to provide powerful disease detection and treatment recommendations. The hybrid model exploits ViT to extract the global contextual features and transfer learning to extract fine-grained local patterns and improve the accuracy of the classification of various banana leaf diseases. To achieve interpretability and reliability, Gradient-weighted Class Activation Mapping (Grad-CAM) is used to visualize the discriminative area that affects predictions so that agronomists and farmers can verify the decision-making process of the model. In addition to classification, the framework includes a recommendation module, which recommends the relevant anti-agents or treatment based on the individual disease identified, and forms a pipeline of the entire workflow of disease diagnosis to action intervention. This will help improve precision agriculture through minimizing losses in crops, streamlining the use of chemicals as well as helping promote sustainable banana farming.

Keywords: Banana Leaf, Vision Transformer, Global Contextual Features, Transfer Learning, Class Activation Mapping

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Abstract ID :	OPT2-014

Evidence-Based Teaching by using Causal analytics: Beyond the Prediction in Education

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Abstract

In the education era, the use of data gradually shifts from easy and predictive analysis to deeper understanding of the elements that impact students' learning process. While conventional models pivot predicting outcomes like student academic performance and retention patterns, these models often fail to explain the cause behind proper outcomes. Consequently, these limitations have a reduced usefulness in improving teaching practices and guiding productive decisions in the classroom. This research explores the use of causal analytics models to better determine which teaching practices most effectively impact student performance. This study leverages double machine learning, causal forests, and Regression Discontinuity are applied to study the impact of educational techniques across different groups of learners. Students' data can be collected from various platforms like LMS to find patterns related to students' educational performance. Additionally, special attention is taken to make complex findings into simple steps that help educators make better decisions in everyday teaching. Beyond the technical data, this study establishes ethical aspects such as fairness, transparency, and responsible use of machine learning.

Keywords: Causal Analysis, Double Machine Learning, Causal Forests, Evidence-Based Teaching, Regression Discontinuity

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Abstract ID :	OPT2-015

Symptom-Based Classification of Common Syndromes Using Machine Learning and User-Reported Parameters

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Abstract

Proper and prompt categorization of typical syndromes like fever, cold and gastrointestinal unrest could help significantly to enhance patient outcomes and facilitate preventive medical procedures. Current methods of diagnosis are mostly based on clinical examination, lab tests, and symptomatic analysis, which may take too much time, are costly and unavailable in remote or poorly-resource-equipped areas. In its way toward such challenges, the present study suggests an innovative machine-learning tool that uses self-reported medical parameters and simple descriptions of the symptoms to categorize common syndromes effectively and properly. The system combines the organized input of individuals such as temperature, digestion, respiratory, and other readily available physiological indicators with advanced predictive models to come up with syndrome patterns. The proposed solution can provide fast, dependable, and scalable detection of syndromes by using inputs in the form of symptoms and classification based on machine learning algorithms and reduces the reliance on large laboratory facilities. Moreover, the system will facilitate user-friendly reporting and feedback, which will enhance interest and data quality to enhance model performance. The proposed study will fill the existing gap between patient-reported data and automated clinical decision making and provide a cost-effective, convenient and practical solution to classify syndrome to the benefit of both clinicians and individuals in daily healthcare management.

Keywords: Syndromes, Clinical Parameters, Disease Prediction, Natural Language Processing, Machine Learning

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Integrating Explainable AI with Hybrid Modeling for Accurate Mesothelioma Classification

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Abstract
Mesothelioma is a rare and aggressive type of cancer that mostly attacks the pleura or the peritoneum, and this is a disease that needs to be diagnosed early so that the patient can have a better chance of survival. Most published diagnostic methods such as histopathology and imaging usually involve a lot of cognitive interpretation by the experts, and this may take a long time and may be subject to divergences. This study hypothesizes the development of an improved framework that will combine Explainable Artificial Intelligence (XAI) with hybrid modeling to improve the accuracy and interpretability of mesothelioma classification. The hybrid model is a combination of the advantages of the various machine learning and deep learning algorithms and uses histopathological data, clinical data and imaging data to detect malignancy patterns. Explainable AI functions are also designed to give clear-cut and understandable information on the decision process so that clinicians can interpret and rely on model predictions. The suggested solution is not only more effective in classification but also is helpful in clinical decision-making, as it shows the most significant characteristics and biomarkers related to mesothelioma. The high level of validation on benchmark datasets proves the strength, dependability, and practical usefulness of the framework, which provides a scalable approach to early diagnosis and individual patient management in both research and clinical environments.

Keywords: Mesothelioma, Histopathology, Deep Learning, Convolution Neural Network, Explainable Artificial Intelligence

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Abstract ID :	OPT2-017

Modeling Student Achievement in STEM Fields Using Deep Learning Techniques

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Abstract
The proposed research will aim at creating a deep learning-based model to predict and model student achievement in STEM (Science, Technology, Engineering, and Mathematics) disciplines. The factors affecting performance in these fields are varied and are cognitive, behavioral, and situational and are not always considered in traditional models. Various educational data such as academic history, demographics, learning behaviors, and test results will be analyzed using deep learning. Using the representational capability of neural networks, non-linear associations across these variables will be discovered and used to increase prediction accuracy. The analysis will be conducted with the comparison of the performance of deep learning models with the traditional methods of statistical and machine learning to prove the possible enhancements in reliability and scalability. The framework will be developed in such a way that it identifies the at-risk students early so that intervention strategies can be developed to achieve retention and academic achievements in STEM education. Analysis of the importance of the features will also be applied to point out the most important factors that lead to performance outcomes. The results will add to the progress of the educational data mining and artificial intelligence application in higher education, providing practical implications on curriculum development, individualized learning, and organizational decision-making in STEM education.

Keywords: Student Achievement, Academic performance, Deep Learning, Forecasting, Learning analytics

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Machine learning based real time mental health monitoring system for depression assessment and risk prediction

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Abstract

This study focuses on the growing need for real-time mental health monitoring systems as traditional assessment methods are often subjective, infrequent, and unable to detect early signs of stress or depression. To address this problem, the work proposes a machine-learning-based framework that uses physiological signals to provide continuous and objective stress prediction. The methodology involves pre-processing multimodal data from the WESAD dataset, which includes ECG, GSR, and Temperature signals. The data is cleaned, normalized, and processed through feature extraction and selection techniques to ensure high-quality input. Three models—K-Nearest Neighbours (KNN), Random Forest, and a Hybrid KNN–Random Forest—are implemented to classify stress levels based on the extracted features. The results demonstrate strong performance across all models, with the Random Forest achieving 96% accuracy, 0.95 precision, 0.97 recall, and an F1-score of 0.96. The KNN model performs with 93% accuracy, while the Hybrid model achieves 94% accuracy, confirming the effectiveness of combining local similarity learning with ensemble-based classification. Overall, the proposed system delivers reliable, real-time physiological-signal-based stress prediction suitable for intelligent mental health monitoring applications.

Keywords: Real-time mental health monitoring, Stress prediction, Machine learning, WESAD dataset, ECG signals, GSR signals, Temperature sensor

Abstract ID :	*OPT2-019*

Efficient CNN Modeling for Rice Leaf Disease Detection and Interpretation via Feature Maps

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Abstract

Rice as a major staple crop in the world is an extremely susceptible crop to many leaf diseases that directly affect agricultural production and food security. It is an efficient convolutional neural network (CNN) model towards detecting rice leaf disease, which is developed with a lightweight architecture to deliver high performance but at the lowest possible computational cost, and thus is applicable in deploying resource-constrained settings in real-time. Besides the successful classification of various rice leaf diseases, the model suggested provides the interpretability of the model by examining the features as a map, which provides deeper understanding of the patterns that are learned in the network. The method contributes to improving transparency and visualizing the critical feature activations that help to understand the way the model differentiates diseased and healthy leaf areas. The experimental assessments show that the lightweight CNN has greater accuracy, efficiency, and explainability, which can be used to identify it as a viable and explainable smart agricultural application.

Keywords: Rice Leaf, Deep Learning, Convolution Neural Network, Lightweight Architecture, Interpretability

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Abstract ID :	OPT2-020

Robust Intrusion Detection Systems with Explainable Artificial Intelligence: A Review

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Abstract

With the recent growth of interconnected networks, Internet of Things (IoT), cyber-physical systems, and next-generation mobile communication networks, the complexities and dynamics of cybersecurity threats are rising at an unprecedented level. Intrusion Detection Systems (IDS) are important defense systems that detect harmful activities from the network traffic. Traditional approaches to IDS are faced with severe limitations regarding their high rates of false positives, low malleability to zero-day attacks, and low resistance to adversarial attacks. Recently, the use of advancements from Machine Learning (ML), Deep Learning (DL), and Explainable Artificial Intelligence (XAI) concepts gained significance to boost the resistance, interpretability, and trustworthiness aspects of IDS systems. Explainable AI allows security experts to better comprehend the rationale behind the IDS system's predictions, observe anomalies, and optimize their response strategies accordingly. A thorough literature review is introduced, depicting the overall analysis of recent IDS systems integrated with the concept of Explainable AI, along with their algorithms, datasets, strengths, and weaknesses. A literature review analysis is introduced, followed by an embryonic approach on how IDS systems can become Explainable and Resistant.

Keywords: Machine Learning (ML), IDS System, Deep Learning (DL), and Explainable Artificial Intelligence (XAI), Natural language processing

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Abstract ID :	OPT2-021

Explainable and Robust Deep Learning Framework for Attack Detection in Medical Image Classification

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Abstract

Currently, deep learning models are becoming more common in medical image classification. This has raised several concerns with respect to attack and manipulation, which may result in misdiagnosis and the endangerment of patient safety. This research proposes an explainable and robust deep learning framework for attack detection in medical imaging systems. The framework fuses advanced feature analysis, anomaly detection, and interpretability techniques to detect adversarial inputs and link them with clear explanations about the model decisions. While effectively detecting attacks through the proposed robustness measures and explainable AI approaches, it also strengthens clinician trust in automated diagnostic tools. Experimental evaluations on benchmark medical imaging datasets show that the framework detects adversarial attacks accurately while maintaining classification performance, indicating its readiness for deployment into real-world secure and reliable healthcare applications.

Keywords: Symptom classification, Machine learning, Disease prediction, Natural language processing, Healthcare AI

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Abstract ID :	*OPT2-022*

Hybrid Malware Analysis using Static and Dynamic Techniques with Machine Learning

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Abstract

The rapid growth of digital infrastructure has led to a significant increase in the complexity and volume of malicious software, rendering traditional signature-based detection techniques increasingly ineffective. Modern malware employs advanced evasion strategies such as code obfuscation, packing, encryption, and polymorphism, enabling it to bypass conventional security mechanisms. While static analysis provides fast and safe examination of executable files, it is limited in detecting heavily obfuscated malware. On the other hand, dynamic analysis offers deeper insights into runtime behavior but suffers from high computational costs and susceptibility to sandbox evasion techniques. To overcome these limitations, this study proposes a hybrid malware analysis framework that integrates both static and dynamic analysis techniques with machine learning for enhanced detection performance. The system extracts static features from executable structures and dynamic features from runtime behavior within a controlled environment, combining them to form a comprehensive feature set. These features are then used to train supervised machine learning models for accurate malware classification. Experimental results on real-world datasets demonstrate that the proposed approach significantly improves detection accuracy, reduces false positives, and enhances robustness against evasion techniques. The findings highlight that integrating multiple analysis methods with intelligent learning models provides an effective and scalable solution for modern cybersecurity challenges.

Keywords: Malware Detection, Static Analysis, Dynamic Analysis, Hybrid Analysis, Machine Learning

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Phishing URL detection using machine learning

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Abstract

Phishing represents a persistent and increasingly sophisticated category of cyber threats, wherein adversaries exploit deceptive URL structures and counterfeit web interfaces to manipulate users into divulging sensitive information, including authentication credentials and financial data. This research presents a systematic investigation into the application of machine learning techniques for the detection and classification of phishing URLs within a supervised learning framework. The implementation is carried out using the Python programming environment, incorporating NumPy and Pandas for efficient data preprocessing and Scikit-learn for model development and evaluation. To ensure analytical rigor, multiple classification algorithms are employed, including Logistic Regression, Decision Tree, Support Vector Machine (SVM), and Random Forest. These models are utilized to capture both linear and non-linear decision boundaries, enabling the identification of latent patterns and complex correlations inherent in phishing behaviour. A comparative evaluation is conducted to assess model performance in terms of classification accuracy, robustness, and generalization capability across varying data distributions. The findings indicate that machine learning-based approaches can effectively enhance phishing detection by autonomously learning intricate feature representations and minimizing misclassification rates. This study underscores the potential of integrating such models into real-time cybersecurity infrastructures, including web browsers and email filtering systems, thereby contributing to the development of scalable and adaptive defence mechanisms against evolving phishing threats.

Keywords: Phishing, URL detection, Feature Extraction, Machine Learning

Abstract ID :	OPT2-024

Interpretable Hybrid Deep Neural Network for Cotton Leaf Disease Identification

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Abstract

According to early and precise detection of cotton leaf diseases is important in safeguarding high crop yield and sustainable agricultural productivity. Our proposed Interpretable Hybrid Deep Neural Network (VGG + ViT) in this research is used to identify cotton leaf disease automatically. The model takes advantage of the powerful feature extraction properties of the VGG network and the global contextual learning ability of the Vision Transformer (ViT) to provide strong classification performance when dealing with several disease categories. The hybrid structure can incorporate the local texture and the long-range spatial dependence effectively and thus capable of doing superior generalization than the traditional CNN-based frameworks. Grad-CAM is used to explain the rationale behind decisions made by the model to increase transparency and trust, and there are examples of explainable AI (XAI). The benchmark cotton leaf disease experimental data prove that the proposed model is highly accurate and interpretable, which is a prospective tool in precision agriculture and intelligent crop disease control.

Keywords: Cotton Leaf, Vision Transformer, VGG Network, Transfer Learning, Explainable AI

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Circular-Economy "E-Waste Reverse Logistics" Management System for Residential Societies

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Abstract

With the fast changing urbanization and the spread of digital in India, the amount of electronic waste (e-waste) has been growing, and residential societies have become the major producers of e-waste-creating more than 40 percent of e-waste in cities. The paper aims to find a solution through the introduction of an integrated E-Waste Reverse Logistics Management System (EW-RLMS) that can be implemented in residential societies, whereby a smooth collection, segregation, refurbishment, and recycling cycle can be implemented. An Auto-Ware application is a Flask-based backend to maintain scalable data handling backed by Appwrite authentication, and machine learning-based algorithms to handle reverse logistics routes minimizing carbon footprints by up to 35% as in our prototype. The system was implemented in a Mumbai pilot society and it attained 72% resident participation and 68% diversion of e-waste out of landfills in three months. EW-RLMS is in compliance with E-Waste Management Rules 2022, as well as the UN Sustainable Development Goals, because of its promotion of closed-cycle material recovery recycling of plastics, metals, and rare earths. Issues such as resistance to change in behaviour and infrastructure gaps are solved through community based awareness modules. This model provides a scalable prototype of tech-driven, piloted circularity of high-density residential ecosystems, which can be economically viable by refurbishing marketplaces of consumable products.

Keywords: E-waste management, reverse logistics, Circular economy, residential societies, IoT smart bins, blockchain transparency, sustainable recycling, urban India

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Leadspresso: An AI-Driven SaaS Platform for Automated Lead Management and Customer Engagement

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Abstract
In today's competitive digital business environment, managing leads efficiently and maintaining consistent customer engagement are critical challenges for organizations. Traditional lead management systems often require manual intervention, lack personalization, and fail to ensure timely follow-ups, resulting in reduced conversion rates. This study presents Leadspresso, an AI-driven Software-as-a-Service (SaaS) platform designed to automate lead management and enhance customer communication. The platform integrates advanced features such as automated follow-ups, personalized email responses, and intelligent ticket-based conversation tracking to streamline the entire lead lifecycle. Developed using modern web technologies and generative AI APIs, Leadspresso enables businesses to respond to client inquiries dynamically while maintaining contextual relevance. The system also supports custom AI training through user-provided data, allowing businesses to tailor responses according to their domain-specific needs. Additionally, the platform offers consultation booking functionality and centralized communication management, improving operational efficiency and user experience. Its scalable SaaS architecture ensures accessibility across multiple clients while maintaining performance and reliability. The proposed system demonstrates the practical application of artificial intelligence in business automation and highlights its potential to transform modern customer relationship management systems into more intelligent, adaptive, and efficient solutions. Would be live soon on leadspresso.vercel.app

Keywords: Lead management; SaaS platform; generative AI, customer engagement, automation, CRM, email automation, business intelligence

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Abstract ID :	OPT2-027

Design and Development of an Integrated Student Management System for Academic Institutions

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Abstract

The Student Management System (SMS) is an advanced software solution developed to efficiently manage and organize student-related data in educational institutions. Traditional methods of maintaining records using paper-based systems are time-consuming, prone to errors, and difficult to maintain as the number of students increases. The SMS provides a digital platform that simplifies these processes by storing student information in a centralized database, allowing easy access, updating, and retrieval of data by authorized users such as administrators, teachers, and students. The system integrates various academic and administrative functions, including student registration, attendance management, course allocation, and examination result processing. By automating these tasks, the system reduces manual workload, enhances accuracy, and improves overall efficiency. A web-based Student Management System further enables real-time access to information and supports better communication among stakeholders, ensuring smooth functioning of institutional activities. Moreover, the implementation of a Student Management System enhances data security and reliability while supporting informed decision-making through well-organized data. Future advancements may include integration with cloud computing, mobile applications, and artificial intelligence to further enhance accessibility, scalability, and performance in modern education systems.

Keywords: Student Management System, Academic Administration, Database Management, Automation, Web-Based Application, Student Records, Information System, Education Technology

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Deep Learning Approaches for Traffic Sign Recognition: A Comparative Review with Emphasis on Real-Time Embedded Deployment and Indian Road Conditions

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Abstract

Traffic Sign Recognition (TSR) is a fundamental component of intelligent transportation systems and autonomous driving technologies. Recent advancements in deep learning, particularly Convolutional Neural Networks (CNNs), have significantly improved the accuracy and robustness of TSR systems. However, challenges such as real-time processing, varying environmental conditions, and deployment on resource-constrained embedded devices remain critical. This paper presents a comprehensive review and comparative analysis of state-of-the-art TSR techniques, including EGENet, TrafficSignNet, RMR-CNN, YOLO-based models, and hybrid approaches. The study evaluates these models based on accuracy, computational efficiency, and real-time performance. Additionally, research gaps and future directions are discussed, with a particular focus on Indian traffic conditions.

Keywords: Traffic Sign Recognition, Deep Learning, CNN, Embedded Systems, Autonomous Vehicles, YOLO, Mask R-CNN

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Multimodal Fake News Detection: A Comprehensive Review (2024-2025)

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Abstract
The rapid accumulation of misinformation over digital platforms has hastened research in the topic of discovering counterfeit news, especially through a multimodal strategy combining textual and visual findings. The paper reviews ruling on recent works in the year of 2024 and 2025 that targeted especially on text plus image multimodal fake news detection. In studied all, IEEE peer-reviewed publications were examined to outline algorithms, datasets, results, and future directions. Various key tendencies are discussed, including the climb of vision plus language models based on CLIP/BLIP, transformer-driven fusion, prompt-based learning, and adaptive cross-modal alignment. The research distinguishes and furnishes recommendations on presenting further carriageways for further research on the development of more generalizable, interpretable, and context-aware multimodal fake news detection systems.

Keywords: Fake news detection, multimedia, deep learning, fusion algorithm, fraud detection

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Abstract ID :	OPT2-030

E-Gate Pass Exit System

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Abstract

Traditional paper-based exit permission systems in educational institutions are inefficient, time-consuming, and vulnerable to security risks such as forgery and data loss. To address these challenges, this study proposes a centralized and automated E-Gate Pass Exit System aimed at improving efficiency, transparency, and security in campus access management. The system is developed using modern web technologies with secure authentication and real-time data handling to ensure seamless interaction among students, administrators, and security personnel. It enables functionalities such as user registration, request submission, multi-level authorization, and real-time status tracking. The implementation significantly reduces manual workload, minimizes processing delays, and eliminates errors associated with traditional methods. Furthermore, it enhances monitoring and control through digitally verified passes, thereby strengthening campus security. The results demonstrate that the proposed system is a reliable, scalable, and eco-friendly solution suitable for institutions seeking to modernize their permission management processes and improve operational efficiency.

Keywords: Electronic Gate Pass, Role-Based Access, Multi-level Authorization, Leave Management, Campus Security

Abstract ID :	OPT2-031

Online Resume Builder Project

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Abstract

The Online Resume Builder System is a web-based platform designed to help users create professional resumes easily and quickly. Many students and job seekers face difficulties while making resumes because they do not know the correct format, design, or structure. This project solves that problem by providing ready-made templates, user-friendly forms, and automatic resume generation. The system allows users to enter their personal details, educational qualifications, skills, work experience, projects, and certifications. After entering the required information, the system generates a professional resume in PDF format. Users can preview, edit, and download their resumes at any time. The Online Resume Builder is useful for students, freshers, and professionals who want to create resumes without advanced technical knowledge. This system saves time, improves resume quality, and provides an easy way to create modern resumes.

Keywords: Resume Builder, Online Resume, PDF Generation, Web Application, User-Friendly Interface, ATS-Friendly Resume Templates

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Employee Performance Tracker

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Abstract

This project presents the development of an Employee Performance Tracker, a web-based application designed to improve organizational efficiency in managing employee activities and performance. In modern workplaces, traditional manual systems and fragmented tools often lead to inefficiencies such as delayed feedback, inaccurate evaluations, and poor communication. The primary objective of this study is to design and implement a centralized system that automates task management, attendance tracking, and performance evaluation. Following a structured methodology that includes requirement gathering, analysis, system design, and implementation. It incorporates role-based access for managers and employees, enabling managers to assign tasks, monitor attendance, evaluate performance, and generate reports, while employees can update progress, mark attendance, and receive feedback. Key results demonstrate that the system enhances real-time data accessibility, improves communication between stakeholders, and supports data-driven decision-making. The application also ensures secure authentication, efficient data handling, and user-friendly interaction. The study concludes that the proposed system significantly reduces manual workload, increases transparency, and enhances overall productivity in small to medium-sized organizations. Furthermore, the modular design allows for future enhancements such as advanced analytics, mobile responsiveness, and integration with existing HR systems.

Keywords: Employee Performance, Task Management, Attendance Tracking, Web Application, Performance Evaluation

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Abstract ID :	OPT2-033

Evolution and Advancements in Database Management Systems

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Abstract

Database Management Systems (DBMS) have undergone a remarkable transformation to keep pace with the increasing demands of digital data storage. In the early stages, data was managed using traditional file systems, which often faced challenges like data redundancy, inconsistency, and limited security. To address these issues, hierarchical and network models were developed, eventually leading to the revolutionary relational model. Relational databases became the industry standard due to their structured approach and the efficiency of SQL. However, the modern era of Big Data and social media introduced new challenges regarding data variety and volume. This led to the emergence of NoSQL databases, which offer superior horizontal scalability and flexibility for unstructured data. Furthermore, the integration of cloud computing has enabled businesses to store and process data remotely with high availability. Current advancements also focus on real-time data processing, enhanced cybersecurity measures, and the use of artificial intelligence for automated database tuning. This paper provides a comprehensive overview of the journey from legacy systems to modern cloud-native architectures. It discusses how these technological shifts have empowered organizations to handle massive datasets while ensuring data integrity and performance. By analyzing these advancements, the study highlights the critical role of modern DBMS in driving today's data-centric global economy.

Keywords: Database Management Systems (DBMS), Relational Databases, NoSQL, Cloud Computing, Big Data, Data Security

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AI-Based Call Analysis and Performance Tracking Dashboard for Customer Support Systems

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Abstract

In modern times, customer service management is a critical aspect of businesses, with phone calls serving as a primary means of customer interaction. However, traditional customer service management relies heavily on manual processes, such as phone calls, which can be time-consuming and inaccurate. This research proposes a novel model to transform audio of customer calls into useful information, including topics, complaints, service requests, inquiries, sentiments, and emotions. The research focuses on data collected from the electricity supply industry, which yielded an accuracy of 92.86% for Malay language sentiment analysis and 75% for English. The experiment also revealed high word error counts (37.18% for Malay, 45.68% for English, and 59.65% for Manglish) for the Malay language and 45.45% accuracy for Malay, 55.56% for English, and 89.58% for emotional recognition. To address these limitations, the study proposes an improved model that incorporates deep learning techniques for sentiment analysis, topic classification, and emotion recognition. The model achieves high accuracy (92.86% for Malaya and 75% for English) and recognizes emotions with an accuracy of 89.58%. Additionally, the system integrates slang word lists to enhance its performance. Empirical call records demonstrate the system's effectiveness, highlighting its potential to improve the efficiency and effectiveness of manual quality monitoring. The study's results have significant implications for customer service management in Malaysia, particularly in industries that rely heavily on phone calls.

Keywords: Customer service management, Sentiment analysis, emotion recognition, deep learning, quality monitoring

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ArogyaFasal: A CNN-Based Crop Disease Detection and Multilingual Advisory System for Indian Farmers

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Abstract

Crop diseases significantly impact agricultural productivity in India, where timely expert consultation remains limited, particularly in rural regions. This study presents ArogyaFasal, a web-based platform developed to enable early crop disease detection and provide actionable advisory support to farmers. The primary objective is to design an efficient, accessible, and multilingual system that integrates deep learning with practical agricultural guidance. The proposed system utilizes a fine-tuned AlexNet-based Convolutional Neural Network trained on the PlantVillage dataset, supplemented with real-world field images, to classify crop diseases across multiple categories. The model achieves a validation accuracy of 94.3% and demonstrates reliable performance of approximately 88% on smartphone-captured images under field conditions. Following classification, the system generates treatment recommendations through an ICAR-aligned knowledge base, including organic and chemical remedies and preventive measures. Multilingual support is incorporated using Flask-Babel, enabling advisory output in Hindi, Marathi, and Punjabi to enhance usability among regional farmers. Additionally, a real-time weather module and an AI-powered chatbot improve user interaction and decision-making. The system is lightweight, scalable, and deployable on low-resource devices, making it suitable for rural environments. The results highlight the effectiveness of combining deep learning with localized advisory systems to support precision agriculture and improve early disease management.

Keywords: Crop Disease Detection, Deep Learning, Precision Agriculture, Multilingual System

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Analyzing the Impact of Overtime Study Hours on Academic Performance Using Machine Learning Regression Techniques

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Abstract

Research shows that studying for too long is not always helpful. After a certain point, studying more does not improve results and can even make them worse. This is called "overtime study." It can cause tiredness, less sleep, and more stress, which can reduce marks. In this study, we looked at this effect on Indian college students using machine learning techniques. We used data from 500 students. It included information like how many hours they studied, how much they slept, their stress level, attendance, past marks, activities, and study habits. To find the best model, we tested five methods: Linear Regression, Decision Tree, Random Forest, Support Vector Regression (SVR), and K-Nearest Neighbors (KNN). SVR performed the best. It predicted student results with about 96% accuracy, had a small error (MAE) of 2.93 marks, and a high R^2 value of 0.89. This means SVR was the most reliable model for predicting student performance. The study found an important result: students who studied more than 8 hours a day scored about 18 marks less on average than students who studied less. Also, the "overtime study" factor had the strongest effect on final marks compared to all other factors. This clearly shows that studying the Error (MAE) of 2.93 marks too much can harm academic performance. These results challenge the common belief that more study always leads to better marks and suggest that students should follow balanced study habits.

Keywords: Academic Performance, Machine Learning, Regression, Overtime Study, Support Vector Regression, Indian Students, Educational Data Mining, Final Score Prediction

Abstract ID :	*OPT2-037*

A multi domain feature fusion approach for rotating machinery fault classification based on CWT, transfer learning, and boosted tree ensemble classifier

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Abstract

Induction motors (IM) are widely used in industries due to their ruggedness, reliability, and economy. However, their ability to run continuously under fluctuating loads makes them prone to electrical, mechanical, and environmental malfunctions. These malfunctions are responsible for efficiency losses, safety hazards, high downtimes, and reduced equipment life. Traditional approaches, such as vibration analysis, motor current signature analysis (MCSA), and infrared thermography, although successful in isolated cases, face challenges in terms of reliable feature vectors and in the presence of multiple malfunctions. This work proposes a hybrid fault diagnosis framework that combines time–frequency (TF) signal processing, transfer learning, and multi-domain feature fusion with shallow machine learning (ML) classifiers to solve the above problems. Results showed Ensemble boosted trees offered the best balance, delivering 99.39% efficacy with significantly higher prediction speed (~2200 observations/sec), making it well-suited for real-time monitoring.

Keywords: Time domain, Frequency domain, Feature Fusion, Ensemble Classifier, Transfer Learning, Continuous wavelet transforms

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Penetration Testing Methodologies

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Abstract

Cyber Security is rapidly becoming a strategic priority across both governments and private organizations. Penetration testing is one strategy used to mitigate the risk of cyber-attack. It refers to the process of simulating hacker attacks to evaluate the security of information systems, helps to secure networks, and highlights the security issues. This paper reviews fundamental concepts and methodologies of penetration testing, focusing on widely used frameworks such as OSSTMM, ISSAF, OWASP, and PTES, which provide structured and systematic approaches for security assessment. It outlines the key phases of penetration testing, including intelligence gathering, vulnerability scanning, exploitation, privilege escalation, and post-exploitation, demonstrating their role in comprehensive security evaluation. The study also examines commonly used tools such as Nmap, Metasploit, and Kali Linux, along with different testing approaches including black-box, white-box, and grey-box testing. Additionally, this paper addresses key challenges associated with penetration testing, including evolving cyber threats, zero-day vulnerabilities, and limitations in testing scope, while proposing potential solutions to improve testing effectiveness. Finally, the paper highlights the critical role of penetration testing in modern cybersecurity strategies and explores future directions, including the integration of artificial intelligence, automation, and cloud-based security solutions. Overall, this study contributes to a deeper understanding of penetration testing methodologies and provides valuable insights for both researchers and practitioners in enhancing cybersecurity practices.

Keywords: Penetration Testing, Security Frameworks, System Security, Methodologies, Vulnerability Assessment

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AI-Driven Facial Recognition System for Automated Student Attendance

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Abstract

Educational institutions are increasingly adopting intelligent technologies to overcome the limitations of traditional attendance management systems, which are often time-consuming, error-prone, and vulnerable to proxy attendance. Artificial Intelligence (AI) integrated with facial recognition technology provides an automated, contactless, and efficient approach for monitoring student attendance in real time. The study examines essential system components, including image acquisition, face detection, highlighting how these modules collectively enable accurate attendance recording. Various methodologies are reviewed, ranging from classical machine learning techniques such as Principal Component Analysis (PCA) and Support Vector Machines (SVM) to modern deep learning approaches based on convolutional neural networks (CNNs) and embedding-based recognition models. Additionally, the paper discusses practical challenges encountered during deployment, including illumination variation, facial occlusion, pose differences, data security concerns, and ethical issues related to biometric privacy. Emerging research trends such as edge computing, federated learning, privacy-preserving AI models, and multimodal biometric integration are also explored as potential solutions for improving robustness and user trust. Overall, this review consolidates current research contributions and technological developments, offering valuable insights for researchers and developers aiming to design reliable, secure, and scalable automated attendance systems for modern educational institutions.

Keywords: Facial Recognition, Artificial Intelligence, Automated Attendance, Deep Learning, Computer Vision, Education Technology

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Enhancing Web Application Security Using Modern Security Practices

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Abstract

This research aims to elucidate how contemporary security measures can enhance the protection of web applications against various cyber threats. Web Application Security is a critical component of Information Security, focusing on safe guarding web applications from unauthorized access, data breaches, and other security vulnerabilities. As web technologies rapidly evolve and the volume of data exchanged online increases, web applications have become prime targets for cyber attackers, highlighting the growing importance of web application security. This study examines prevalent and severe web vulnerabilities, including SQL Injection, Cross-Site Scripting (XSS), Cross-Site Request Forgery (CSRF), broken authentication, and security misconfigurations, along with strategies for their prevention. It underscores how developers can mitigate security vulnerabilities throughout the Software Development Life Cycle by adhering to secure coding practices and modern security standards. Furthermore, the study explores contemporary security practices such as input validation, authentication and authorization mechanisms, encryption, secure session management, and the deployment of security tools like vulnerability scanners and web application firewalls. While achieving completely secure web applications is challenging, adherence to security standards and modern practices can thwart most common attacks. The study concludes by proposing a security checklist for developers and organizations to aid in creating more secure web applications. As web technologies evolve and new threats emerge, this checklist should be regularly updated to ensure the ongoing security of web applications.

Keywords: Web Application Security, SQL Injection Attacks, Cross-Site Scripting (XSS), Cybersecurity Vulnerabilities, Secure Coding Practices

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Artificial Intelligence Integration in Web Development: A Review

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Abstract

The integration of artificial intelligence (AI) into web development is revolutionizing the way websites are designed, constructed, and maintained, bringing forth innovative methodologies and transformative trends. By leveraging machine learning, natural language processing, and predictive analytics, AI enhances personalization and user engagement, automates content management, and facilitates intelligent interaction through chatbots and virtual assistants. Advanced AI techniques such as deep learning and data-driven modeling are deployed to optimize website performance, improve cybersecurity defenses, and ensure accessibility compliance. This integration enables the creation of smarter, more responsive, and highly customized web environments, delivering significant benefits including improved operational efficiency, heightened user satisfaction, and robust security frameworks. Despite these promising advantages, the adoption of AI in web development faces several challenges. Current research on AI integration across multiple sectors—including healthcare, cybersecurity, education, and public administration—highlights common themes that are highly relevant to web development. These include the deployment of hybrid AI models, the emphasis on explainable AI to improve transparency, and the necessity for interdisciplinary collaboration to navigate ethical and practical challenges. The literature underscores the importance of developing dedicated standards and frameworks to govern AI applications, which is crucial for fostering trust and broad adoption in web development ecosystems.

Keywords: Artificial Intelligence (AI), Machine Learning (ML), Generative AI, Natural Language Processing (NLP)

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Web Development Trends in the Era of Cloud Computing

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Abstract

The rapid evolution of cloud computing has significantly transformed the landscape of web development, enabling more scalable, flexible, and efficient application architectures. Modern web development increasingly relies on cloud-based services, allowing developers to build, deploy, and manage applications with enhanced speed and reduced infrastructure costs. Trends such as serverless computing, microservices architecture, and containerization have revolutionized how applications are designed and maintained. Additionally, the integration of cloud-native tools and DevOps practices has streamlined development workflows, improving collaboration and continuous delivery. Furthermore, the rise of Progressive Web Apps (PWAs), Artificial Intelligence (AI) integration, and API-driven development reflects the growing demand for dynamic, user-centric applications. Cloud platforms also support advanced security protocols and data management strategies, ensuring reliability and performance at scale. However, challenges such as data privacy, vendor lock-in, and system complexity remain critical considerations. This study explores the key trends shaping web development in the era of cloud computing, highlighting their impact on performance, scalability, and innovation.

Keywords: Cloud Computing, Web Development, Serverless Architecture, Microservices, Containerization, DevOps, Progressive Web Apps (PWAs), API-driven Development

Abstract ID :	OPT2-043

Polyglot-HyPE: Enhancing Retrieval-Augmented Generation Through Multilingual and Multimodal Alignments

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Abstract

Retrieval-Augmented Generation (RAG) has become the standard method for fixing the knowledge gaps in Large Language Models (LLMs). However, when deploying these systems in complex, real-world environments, they encounter several critical roadblocks. Standard RAG systems struggle to digest multimodal data, routinely fail to follow strict output formatting rules, and suffer from severe hallucinations when generating text in non-native languages. Furthermore, a fundamental semantic mismatch exists at the core of most vector databases: users ask questions, but source documents state facts. This gap causes the retrieval engine to miss relevant information. In this paper, we introduce Polyglot-HyPE, a reliability-first RAG architecture designed to solve these systemic failures. It generates hypothetical questions from multimodal chunks in offline indexing phase. By embedding these questions, the system transforms retrieval into a highly precise question-to-question matching task. To ensure the final output is structurally perfect, we introduce a deterministic Verify-Regenerate loop that traps the LLM until it mathematically satisfies user constraints. To prevent cross-lingual hallucinations, this entire reasoning loop occurs in Canonical English before a decoupled translation layer localizes the final output. Our experiments show that Polyglot-HyPE drastically improves retrieval recall, achieves near-perfect constraint compliance, and effectively eliminates the semantic drift usually seen in multilingual generation.

Keywords: Retrieval-Augmented Generation (RAG), Hypothetical Prompt Embeddings (HyPE), Multilingual NLP, Semantic Drift

Abstract ID :	*OPT2-044*

Artificial Intelligence in Modern Health Sector

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Abstract

Artificial Intelligence (AI) is increasingly reshaping modern healthcare by enabling smarter, faster, and more precise medical services. Advanced AI techniques, including machine learning, natural language processing, and computer vision, are being utilized to support clinical decision-making, improve diagnostic accuracy, and enhance treatment planning. These technologies allow healthcare providers to process and interpret large-scale medical data efficiently, leading to early disease detection and more personalized patient care. AI-powered systems are also contributing to remote patient monitoring, virtual assistance, and predictive analytics, which help in proactive healthcare management and improved patient engagement. Furthermore, the integration of AI in hospital administration supports workflow optimization, resource management, and cost reduction. However, challenges such as data security, ethical concerns, lack of transparency, and regulatory limitations remain significant

Keywords: AI techniques, large-scale data efficiently, data security, workflow optimization, AI-analytics

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A Novel Approach for Harmonic Compensation in Residential Grids Using Rooftop Photovoltaic's

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Abstract

The use of nonlinear electricity appliances that are so prevalent in residential sectors has increased harmonic distortion in the low-voltage distribution systems, negatively impacting the quality of power and system stability. The present paper explores how rooftop PV systems can be used to offer harmonic compensation in residential grids using sophisticated control features of the grid-connected PV inverters. The PV inverters are programmed to inject compensating harmonic currents instead of simply acting as active sources of power, since this way of operation allows avoiding load-induced harmonics at the point of common connection. The extensive literature review is conducted, and it includes inverter-based harmonic compensation methods, adaptive and priority-based control steps, and the coordination of the activities of multiple PV systems. The results discussed show considerable current and voltage total harmonic distortion reduction, better voltage profiles, and the increase in grid stability during the normal and the disturbed operating conditions. The paper identifies the economic and technical benefits of applying inverters with PV to mitigate harmonics with no specific filtering equipment. Regardless of the difficulties associated with the inverter capacity and the complexity of control, rooftop PV-based harmonic compensation becomes an effective and viable way to improve the quality of power at residential in the future smart grids.

Keywords: Harmonic compensation, Rooftop photovoltaic system, Residential distribution grid, Power quality, Grid-connected inverter, Smart grid

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Artificial Intelligence Integration in Web Development: A Review

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Abstract

The integration of Artificial Intelligence (AI) into web development is transforming the way websites and web applications are designed, developed, and maintained. AI technologies such as machine learning, natural language processing, and predictive analytics enable advanced personalization, intelligent automation, and improved user interaction. This review paper examines how AI-driven techniques are applied in modern web development for content recommendation, chatbot integration, dynamic user interfaces, and performance optimization. The study also highlights the use of deep learning and data- driven models to enhance website security, accessibility, and scalability. AI-powered systems improve operational efficiency, user engagement, and customer satisfaction by delivering personalized experiences and real-time decision-making capabilities. However, the adoption of AI in web development also introduces challenges including data privacy concerns, ethical considerations, high implementation cost, and the need for transparent and explainable AI models. This review analyzes recent research trends and identifies the importance of standardized frameworks and interdisciplinary approaches for successful AI integration. The findings indicate that AI continues to reshape modern web development by enabling smarter, adaptive, and highly responsive web environments, while future advancements will focus on secure, scalable, and user-centric AI-powered web applications.

Keywords: Artificial Intelligence (AI), Machine Learning (ML), Generative AI, Natural Language Processing (NLP), AI-powered Chatbots, Personalization

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Narrating Bharat with AI: A Study of Cultural Accuracy, Bias, and Simplification in Chatbot Explanations

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Abstract

Large language model chatbots have become primary sources of cultural knowledge for global users, yet their explanations of non-Western myths and history remain underexamined. This study evaluates how leading AI chatbots narrate selected Indian mythological and historical topics in English, focusing on cultural accuracy, bias, simplification, and narrative framing. Through systematic prompt engineering across neutral, educational, and audience-tailored styles, we collected chatbot responses on themes such as the Ramayana, Ashoka's reign, and bhakti traditions. From the English literature perspective, we conducted close textual analysis to identify simplification of complex narratives, stereotyping through lexical choices, omission of regional variations, and imposition of moral binaries. From the AI and cyber security perspective, we assessed hallucination rates, factual inconsistencies, prompt sensitivity, and risks of scaled misinformation. Findings reveal consistent patterns of cultural flattening, Orientalist framing, and overconfidence in inaccurate details, raising concerns for digital pedagogy and public understanding. The study proposes a dual humanities-AI evaluation framework to ensure culturally responsible chatbot outputs, contributing to Artificial Intelligence, Data Analytics, and Cyber Security by highlighting ethical risks in AI-mediated cultural communication.

Keywords: AI chatbots, cultural representation, Indian mythology, narrative bias, misinformation risk

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Abstract ID :	OPT2-048

AI-Based Loan Approval Prediction Using Logistic Regression with Credit Score Integration

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Abstract

In the modern financial ecosystem, efficient and accurate loan approval has become a critical requirement for financial institutions to minimize risk and maximize profitability. With the increasing volume of loan applications, traditional manual evaluation methods are time-consuming, error-prone, and often inconsistent in decision-making. This study presents the design and implementation of a Loan Approval Prediction System within the domain of Artificial Intelligence, aimed at enhancing decision-making through data-driven techniques. The proposed system utilizes logistic regression to model the relationship between applicant attributes and the probability of loan approval. It incorporates key parameters such as income, employment status, loan amount, and a credit evaluation metric referred to as a CIBIL score to assess an individual's creditworthiness. The methodology involves data collection, preprocessing, feature selection, and model training using historical loan datasets to identify patterns associated with repayment behavior. The trained model is deployed through a web-based interface to generate real-time predictions for users. The results demonstrate improved prediction accuracy, reduced processing time, and greater consistency compared to traditional approaches. Additionally, the system minimizes human intervention and enhances operational efficiency, providing a reliable and scalable solution for modern loan approval processes.

Keywords: Loan approval prediction, Artificial Intelligence, Logistic Regression; Credit scoring, Predictive analytics

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Abstract ID :	OPT2-049

Artificial Intelligence, Natural Language Processing, Automated Report Generation, PDF Synthesis, Document Automation, Academic Institutions

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Abstract

The preparation of event reports in academic institutions is a time-consuming and repetitive task that often requires significant manual effort and consistency in formatting. This paper presents an AI-based automated event report generation system that leverages Natural Language Processing (NLP) and PDF synthesis to streamline the report creation process. The proposed system allows users to input structured event details such as title, date, venue, participants, and key highlights, which are then processed using NLP techniques to generate coherent, human-like narratives. The generated content is automatically formatted into a well-structured report and converted into a professional PDF document.

The system is implemented using Python and integrates a web-based interface for user input, an AI-driven text generation module, and a PDF generation component. Experimental results demonstrate that the proposed solution significantly reduces report generation time while maintaining accuracy, readability, and consistency. This approach is particularly beneficial for academic institutions that require frequent documentation for events, accreditation processes, and record-keeping. The system also offers scalability and can be extended to support multilingual report generation and customizable templates. Overall, the proposed solution enhances efficiency, reduces manual workload, and ensures standardized documentation through intelligent automation.

Keywords: Artificial Intelligence, Natural Language Processing, Automated Report Generation, PDF Synthesis, Document Automation, Academic Institutions

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Abstract ID :	OPT2-050

A Review on Security and Privacy Issues in Cloud Computing

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Abstract

Cloud computing has transformed the way organizations store, manage, and process data by offering scalable, cost-effective, and on-demand services. However, the rapid adoption of cloud environments has raised significant concerns regarding security and privacy. This review paper examines the major security challenges associated with cloud computing, including data breaches, unauthorized access, insecure interfaces, insider threats, and vulnerabilities in virtualization technologies. It also explores privacy issues related to data confidentiality, integrity, and user control over sensitive information stored in third-party infrastructures.

The study highlights various security mechanisms and strategies such as encryption techniques, identity and access management, multi-factor authentication, and secure data transmission protocols that are employed to mitigate these risks. Furthermore, it discusses compliance standards and regulatory frameworks that play a crucial role in ensuring data protection in cloud environments. By analyzing existing literature, this review provides a comprehensive understanding of current security and privacy concerns, along with emerging solutions and best practices. The paper concludes by emphasizing the need for robust security models and continuous monitoring to enhance trust and reliability in cloud computing systems.

Keywords: Cloud Computing, Data Security, Privacy, Encryption, Access Control, Data Breaches, Virtualization Security, Identity Management, Cloud Threats, Compliance Frameworks

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Comparative Benchmarking of Automated and Manual VAPT Tools for OWASP Top 10 Vulnerability Detection

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Abstract

Web applications form the backbone of modern digital infrastructure and remain highly vulnerable to evolving cyber threats. This study presents a comparative benchmarking analysis of automated Vulnerability Assessment (VA) tools and manual Penetration Testing (PT) techniques for detecting vulnerabilities mapped to the OWASP Top 10 (2021) framework. A controlled grey-box experimental setup was established using the Damn Vulnerable Web Application (DVWA) in a Kali Linux environment. Automated tools, including Nikto, OWASP ZAP, and SQLmap, were benchmarked against manual testing conducted using Burp Suite for request interception and exploitation. Results indicate that automated tools successfully detected 17 out of 20 configuration-based vulnerabilities (85%) but failed to detect 2 out of 5 complex logic and access-control vulnerabilities (40%). Manual penetration testing effectively uncovered critical issues such as authentication bypass and reflected cross-site scripting that required contextual human analysis. Automated scanning completed within 10 minutes, whereas manual testing required approximately 4 hours, highlighting the trade-off between speed and depth. This study proposes a reproducible VAPT benchmarking methodology. It reinforces the necessity of combining automation with expert-driven validation for high-assurance web application security.

Keywords: Vulnerability Assessment and Penetration Testing, OWASP Top 10, Web Application Security, Automated Security Testing, Manual Penetration Testing

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Artificial Intelligence: Evolution, Challenges, and Future Directions

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Abstract

Artificial Intelligence (AI) has emerged as a transformative technology reshaping industries, economies, and human-machine interaction. This paper presents a comprehensive review of the evolution of AI, tracing its journey from early symbolic and rule-based systems to modern data-driven approaches such as machine learning and deep learning. The study highlights major milestones, including neural networks, natural language processing, and computer vision, which have significantly advanced intelligent systems. Despite rapid progress, AI faces several critical challenges that limit its widespread adoption and reliability, including data privacy issues, algorithmic bias, lack of transparency, high computational requirements, and ethical concerns. Furthermore, the dependence on large datasets and the challenge of achieving general intelligence raise concerns about the scalability and sustainability of current AI models. The paper also explores future directions in AI research, focusing on emerging trends such as explainable AI, federated learning, human-AI collaboration, and integration with technologies like the Internet of Things and blockchain. It suggests that addressing existing challenges through interdisciplinary approaches and robust regulatory frameworks will be essential for the responsible and effective deployment of AI systems. This review provides a structured understanding of AI's past, present, and future, serving as a valuable resource for researchers and practitioners

Keywords: Artificial Intelligence, Machine Learning, Deep Learning, Evolution of AI, Explainable AI (XAI), Ethical AI, AI Challenges, Future of AI, Neural Networks

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HealthGuard: A Machine Learning-Based Multi-Disease Prediction System with Integrated Clinical Services

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Abstract

Hospital systems face real pressure: more patients, thinner diagnostic infrastructure in underserved regions, and diseases that show up as overlapping symptoms that resist quick classification. This paper presents Health Guard, a web-based machine learning platform built to predict up to 41 diseases from a standardized dataset of 132 binary symptom features. We try five different classifiers in this process each with their different accuracy, precision, recall and F1: Random Forest, Naive Bayes, SVM, Logistic Regression, and Decision Tree. Random Forest won. 97.3% test accuracy, F1 of 0.971. Honestly not a surprise—bagging and boosting are just better at not overfitting on noisy multi class data, and we've seen that pattern before. Health Guard also integrates doctor verification, appointment scheduling, a Razorpay payment gateway, and SMS/email notifications into a single deployable platform. End-to-end prediction latency averaged 0.74 seconds per request, well within the threshold for clinical real-time tools.

Keywords: Machine Learning, Disease Prediction, Multi-Class Classification, Random Forest, Healthcare Informatics, Health Guard, Ensemble Learning

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A Review on Women Safety Applications: GPS Tracking and SMS-Based Emergency Alert Systems in Android Platforms

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Abstract

In recent years, the rapid growth of mobile technologies has enabled the development of innovative solutions aimed at enhancing personal safety, particularly for women. This review paper explores the design, functionality, and effectiveness of women safety applications developed on Android platforms, with a primary focus on GPS-based location tracking and SMS-based emergency alert systems. The study analyzes various existing applications and highlights key features such as real-time location sharing, one-touch emergency triggers, automated message alerts, and integration with contacts or authorities. Furthermore, the paper examines the underlying technologies that support these applications, including Global Positioning System (GPS), mobile communication networks, and sensor-based triggers. It also discusses the advantages and limitations of current solutions, such as dependency on internet connectivity, battery consumption, and concerns related to data privacy and security. By reviewing recent advancements and research trends, the study identifies gaps in existing systems and suggests improvements, including the integration of artificial intelligence, offline alert mechanisms, and enhanced user interface design for quick accessibility during emergencies. Overall, this review aims to provide a comprehensive understanding of Android-based women safety applications and their role in ensuring timely assistance, thereby contributing to safer and more responsive digital environments.

Keywords: Women Safety, Android Applications, GPS Tracking, SMS Alert System, Emergency Response, Mobile Security, Location-Based Services, Personal Safety Apps

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A Review on Internet of Things: Technologies, Protocols, and Challenges

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Abstract

The Internet of Things (IoT) represents a rapidly evolving technological paradigm that connects physical devices, sensors, and software applications through the internet to enable intelligent data exchange. This review paper provides a comprehensive overview of IoT by examining its core technologies, communication protocols, and prominent challenges. It highlights enabling technologies such as wireless sensor networks, cloud computing, edge computing, and embedded systems that collectively support IoT operations. Additionally, the paper analyzes commonly used communication protocols including MQTT, CoAP, and HTTP, emphasizing their structure, functionality, and application domains. Despite significant advancements, IoT faces challenges related to security, privacy, scalability, interoperability, and power consumption. This study offers insights into current developments while identifying areas for future research and improvement in IoT ecosystems.

Keywords: Internet of Things (IoT), IoT Architecture, Communication Protocols, MQTT, CoAP, Edge Computing, Cloud Computing, Wireless Sensor Networks, Security and Privacy, Scalability, Interoperability

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Autonomous IAM Governance: An AI Agent Framework for Intelligent Access Lifecycle Management Across Enterprise Identity Platforms

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Abstract

Identity and Access Management (IAM) remains a critical cybersecurity challenge in enterprise environments, where manual access certification, entitlement management, and Separation of Duties (SoD) enforcement introduce operational latency and human error risk. This paper proposes an AI agent framework designed for integration with enterprise IAM platforms including identity governance and administration (IGA) tools, privileged access management (PAM) solutions, and cloud identity providers to automate core governance workflows. Leveraging Large Language Models (LLMs) and Retrieval-Augmented Generation (RAG) architectures, the proposed system enables natural language-driven access request processing, automated entitlement reviews, and real-time SoD conflict detection across heterogeneous identity ecosystems. The framework is evaluated against representative enterprise IAM deployments and demonstrates measurable improvements in certification cycle time and policy compliance accuracy. Results suggest that agentic AI models embedded within enterprise identity platforms can significantly enhance governance posture while reducing administrative overhead, offering a scalable, platform-agnostic path toward autonomous IAM governance.

Keywords: Identity and Access Management, AI Agents, Identity Governance and Administration, Zero Trust, Large Language Models

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AI-Driven Role Mining and Dynamic RBAC Policy Optimization in Large-Scale Enterprise Identity Governance and Administration (IGA) Platforms

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Abstract

Role-Based Access Control (RBAC) remains a cornerstone of enterprise Identity and Access Management (IAM), yet organizations increasingly struggle with role explosion, toxic entitlement combinations, and static policy structures that fail to adapt to evolving business requirements. This paper presents an AI-driven role mining framework leveraging unsupervised machine learning—specifically K-means clustering and hierarchical agglomerative algorithms—to automatically discover optimal role structures from historical access patterns within enterprise IGA platforms, including SailPoint Identity IQ, Saviynt, One Identity, and Microsoft Entra ID Governance. The proposed framework introduces a platform-agnostic RBAC optimization engine integrating with standard IGA connectors and APIs. Experimental evaluation on simulated enterprise access certification datasets demonstrates a 35% reduction in role redundancy, 28% improvement in policy compliance scores, and significant acceleration of access review cycles compared to conventional static role management. The findings highlight the transformative potential of AI-based role intelligence in identity governance, enabling organizations to enforce granular access controls, reduce attack surface, and meet regulatory mandates, including SOX, HIPAA, and GDPR. This work contributes a scalable, vendor-neutral methodology for IAM teams seeking to modernize RBAC governance through data-driven automation.

Keywords: Role-Based Access Control, Role Mining, Identity Governance and Administration, SailPoint Identity IQ, Saviynt, Microsoft Entra ID, Machine Learning

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Voice & Bluetooth-Based Home Automation System

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Abstract

The rapid advancement of smart technologies has led to the growing adoption of home automation systems that enhance convenience, efficiency, and security in daily life. This paper presents a review of a Voice- and Bluetooth-Based Home Automation System that enables users to control household appliances via voice commands and Bluetooth connectivity. The system utilizes a microcontroller integrated with a Bluetooth module and a voice recognition interface to facilitate seamless communication between the user and electrical devices. By using a smartphone or voice-enabled application, users can operate appliances such as lights, fans, and other home devices without physical interaction. The voice control feature provides hands-free operation, making the system especially beneficial for elderly and physically challenged individuals. Bluetooth technology ensures reliable and secure short-range communication, eliminating the need for continuous internet access and reducing system complexity and cost. Additionally, the system contributes to energy conservation by allowing users to monitor and control device usage efficiently. This study highlights the architecture, working mechanism, advantages, and limitations of the system. While the system offers affordability and ease of implementation, it is limited by the range of Bluetooth connectivity. Future enhancements may include integration with Internet of Things (IoT) platforms for extended control and improved scalability. Overall, the system represents a practical step toward smart and intelligent living environments.

Keywords: Home Automation, Voice Recognition, Bluetooth Technology, Smart Home, Wireless Control, Microcontroller

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Housing Redevelopment in Ahmedabad (2019–2025): Implications for the Use of Precast Concrete Structures

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Abstract

In recent years, Ahmedabad has witnessed a noticeable shift in its residential development pattern, largely driven by the redevelopment of older housing societies and slum rehabilitation efforts. With limited availability of land, rising property prices, and supportive policies such as increased Floor Space Index (FSI) and Transferable Development Rights (TDR), redevelopment has become a practical solution for urban growth. Areas like Paldi, Naranpura, and Navrangpura have emerged as key hotspots, with over 150 projects approved or under execution in the past two years, indicating a growing trend toward vertical development. Despite this progress, redevelopment projects face several on-ground challenges. Financial feasibility, delays in approvals, coordination among multiple stakeholders, and uncertainties in housing demand often slow down project timelines and increase risks for developers as well as residents. These issues highlight the need for more efficient construction approaches. By shifting major construction activities to controlled factory environments, precast systems help reduce construction time, improve quality, and minimize dependency on on-site labor. They also contribute to better material management and reduced waste, making the process more sustainable. This paper explores redevelopment trends in Ahmedabad and evaluates the role of precast technology in addressing current challenges. The study suggests that adopting precast systems can improve project efficiency, ensure timely completion, and support sustainable urban redevelopment in rapidly growing cities.

Keywords: Housing Redevelopment, Urban Renewal, FSI, TDR, Slum Rehabilitation, Precast structure, Sustainable construction

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Attention-Enhanced Vision and Sensor-Augmented Late-Fusion Framework for Road Pothole Detection in Ambiguous Scenarios

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Abstract

The rising number of road accidents caused by undetected potholes underscores the urgent need for efficient and reliable road monitoring systems. Traditional manual inspection methods unable to cope with ambiguous road and weather condition for rapidly expanding urban infrastructure. This study proposes a robust pothole detection framework that combines a vision-based deep learning model with multi-sensor fusion for improved accuracy under real-world conditions. The vision module employs a lightweight ResNet-18 architecture enhanced with an attention mechanism to better capture discriminative features. To overcome the limitations of camera-based systems in low-light, waterlogged, or occluded scenarios, the framework integrates complementary sensors including LiDAR, Ultrasonic, and Ground-Penetrating Radar through decision-level fusion. Trained and evaluated on a publicly available road damage dataset with custom preprocessing for pothole detection, the system demonstrated stable convergence and strong generalization. Experimental results show that the multimodal approach significantly outperforms unimodal vision-based methods, achieving up to 97% accuracy and maintaining high reliability even in challenging submerged or visually degraded conditions. By effectively fusing structural, depth, and subsurface information, the proposed framework offers a scalable, cost-effective solution for intelligent road monitoring, with strong potential to enhance transportation safety and support smart city development.

Keywords: Pothole detection, sensor fusion, squeeze-and-excitation, deep learning, LiDAR, ground penetrating radar, ultrasonic sensor

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AI-Powered Game Asset and Idea Assistant for Independent and Beginner Game Developers

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Abstract

Independent and beginner game developers face a well-documented but largely unaddressed challenge: they have strong creative ideas but no reliable way to turn those ideas into a structured, resource-backed development plan. Navigating hundreds of asset marketplaces, matching art styles across different sources, distributing a limited budget sensibly, and building a realistic development roadmap currently require either expensive professional guidance or years of hands-on trial and error. This paper proposes an AI-powered tool designed specifically to close that gap through two focused modules. The first module accepts a developer's game concept—including genre, art style, target platform, engine, and available budget —and automatically searches major asset marketplaces such as Unity Asset Store, Fab, itch.io, and Kenney to return a curated, style-matched, and budget-filtered asset list. The second module addresses a separate but equally common problem: developers who hold large unused asset libraries, often collected through free distribution platforms, and have no clear idea what to build with them. This module accepts an uploaded asset list, categorizes the assets, identifies style-compatible groupings, generates game concept suggestions, flags incompatibilities, and delivers a step-by-step prototype guidance plan. Together, these two modules function as a developer's first team member—removing the planning and resource barriers that prevent many beginners from ever reaching a playable build.

Keywords: Indie Game Development, AI-Assisted Development, Asset Curation, Budget Planning, Game Prototyping, Development Roadmap

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AI-Blockchain Blood Bank with Real-Time Location-Based Matching and Alerts for Secure Donation

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Abstract

Blood bank systems today suffer from slow donor matching, vulnerability to data tampering, and poor emergency responsiveness. This paper proposes an integrated platform combining Artificial Intelligence (AI), Hyperledger Fabric blockchain, and real-time location-based services to address all three challenges simultaneously. An AI scoring engine ranks registered donors against incoming blood requests using blood-type compatibility, Haversine-based geodetic proximity, and health eligibility criteria, returning a ranked shortlist in under 600 ms. Emergency alerts are dispatched via Firebase Cloud Messaging to the nearest eligible donors; if no response is received within 15 minutes, the search radius automatically widens by 20 km and the process repeats. Verified donors receive a digitally signed certificate and an NFT-style badge to incentivise repeat contribution. The system was evaluated on 5,000 synthetic donor records modeled on Uttar Pradesh demographic and blood-type distributions. Results demonstrate a 38.1% reduction in donor search latency over a linear-scan baseline, 97.4% matching accuracy, successful detection of all 500 injected tamper attempts, and an improvement in emergency donor acknowledgement from 41% to 74.5% compared to generic broadcast notifications. The proposed system is the only reviewed design to simultaneously provide AI-driven donor-recipient matching, blockchain-backed record integrity, real-time location-aware alerting, and gamified donor incentives within a single deployable platform.

Keywords: Blood Bank, Artificial Intelligence, Blockchain, Hyperledger Fabric, Donor Matching, Haversine Formula, Healthcare Technology

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Skill-Based Peer Learning and Collaboration Platform for Students

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Abstract

The growing use of digital technologies in education has created new possibilities for students to learn beyond traditional classroom environments. However, many students still find it difficult to connect with suitable peers for learning new skills or collaborating effectively on academic projects. Existing platforms mainly focus on discussion or content sharing and do not provide a structured approach for skill exchange and collaboration. This study proposes a skill-based peer learning and collaboration platform that enables students to both teach and learn from each other. The system allows users to create profiles that represent their existing skills and the specific areas in which they require improvement. Based on this information, a profile-matching algorithm, based on user-defined skill ratings, is used to connect students with compatible peers, allowing them to engage in meaningful learning interactions. The platform also supports project collaboration by recommending team members with complementary skills, helping to form balanced and efficient teams. In addition, users can share notes, assignments, and important concepts, which can be accessed either publicly or within selected groups. The proposed approach encourages active participation and improves knowledge exchange among students. Overall, the system aims to create a structured and supportive learning environment that enhances collaboration, promotes skill development, and bridges the gap between theoretical knowledge and practical peer-led application for improved academic outcomes

Keywords: Peer Learning, Skill Exchange, Student Collaboration, Knowledge Sharing, Team Formation

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Bug Tracking Systems

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Abstract

Bug tracking system are essential for managing and resolving software defect, but incomplete or unclear bug report often slow down the debugging process and create communication gaps between users and developers. Many users fail to provide key details such as steps to reproduce the issue, system configuration, or expected versus actual outcomes. As a result, developers must spend additional time, which delays resolution and increases maintenance efforts. To address this issue, the proposed approach focuses on improving how information is collected by guiding user through a structured reporting process that ensures all necessary details are provided at the time of submission. The system introduces features such as predefined templates, automated prompts, and validation checks to enhance the completeness and clarity of bug reports. Furthermore, it leverages intelligent techniques like natural language processing and machine learning to analyse bug descriptions and identify the most likely affected components or files within the system. By reducing ambiguity and automating parts of the analysis, the approach helps streamline communication, improve accuracy, and accelerate the bug resolution process, ultimately leading to more efficient and reliable software maintenance.

Keywords: Bug Tracking System, Software Defects, Issue Tracking, Bug Reporting, Debugging, Software Maintenance, Reproducibility, User Feedback

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Big Data Analytics in Cloud Computing: A Comprehensive Survey

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Abstract

The exponential increase in digital data generated from various sources, including social platforms, sensors, and enterprise applications, has made advanced data processing techniques essential. Big Data Analytics plays a crucial role in extracting meaningful insights from such complex and large-scale datasets. However, traditional computing infrastructures often struggle to manage the scalability and computational demands associated with big data. To address these limitations, Cloud Computing has emerged as a reliable and scalable solution, offering flexible resources and on-demand services. This survey paper provides a comprehensive overview of the integration of big data analytics within cloud environments. It examines key architectures, service models, and enabling technologies that support efficient data processing. Popular frameworks such as Apache Hadoop and Apache Spark are discussed in terms of their capabilities for handling distributed data processing tasks. The paper also explores different analytical approaches, including batch processing, stream processing, and machine learning techniques applied in cloud-based systems. Furthermore, the study highlights major challenges such as data security, privacy concerns, high latency, and cost management. It also reviews recent advancements aimed at improving performance, scalability, and secure data handling in cloud-based analytics. Finally, the paper outlines potential future research directions, focusing on the development of intelligent, cost-efficient, and privacy-aware big data solutions in cloud computing environments.

Keywords: Big Data Analytics, Cloud Computing, Apache Hadoop, Apache Spark, Machine Learning, Data Processing, Scalability, Data Security, Cloud-Based Analytics

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AI–Based Chatbot for Colleges and Businesses

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Abstract

Right now, the Education and Business industries are evolving rapidly, and the number of industries applying AI (Artificial Intelligence) is also accelerating. According to the 2025 AI Index Report from Stanford HAI (Human-Centered Artificial Intelligence), 78% of the organizations were using AI in the year 2024, and the year before the count went up from 55%. Another domain-specific dataset from Sakarya University was developed, featuring 2,253 question-answer pairs categorized into seven administrative domains. The results of the experiment showed that the hybrid chatbot surpasses independently, accomplishing 97.57% accuracy and boosting user satisfaction. AI ChatBots in Colleges and Businesses are transforming operational support efficiency in multiple domains like enrollment and assistance. A review of 38 studies, structured according to PRISMA 2020, underscores that these tools surpass services in responsiveness and ease the burden for staff, as these technologies offer multiple superiorities. However, they also have limitations, such as data privacy and limited language support.

Keywords: Artificial Intelligence, Chatbots, Education, Business, Automation, User Satisfaction, Data Privacy, Limited Language Support.

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Document Classification Using Modified Cosine Similarity

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Abstract

There can be some significant effects of minor changes in some tasks such as plagiarism detection as Document comparison is crucial in this. The commonly used cosine similarity method measures how closely two documents align in direction; however, it fails to account for differences in their lengths or sizes. To resolve this issue, we introduce a Modified Cosine Similarity measure. This new approach maintains the original concept of cosine similarity while incorporating a penalty for differences in vector sizes. Consequently, documents that seem similar on the surface but differ significantly in size will receive a lower and more accurate similarity score. We implemented this method in a document comparison system for classifying text documents into different category based on their content, using normalized vectors that range between 0 and 1. This study examines how the traditional Cosine Similarity compares to the newer Modified Cosine Similarity for matching documents. The process starts with setting up the document. Then they are converted into vector forms and these vectors undergo normalization. After that Modified Cosine Similarity the calculated. Our experiments demonstrate that this modified approach is more effective at identifying near-duplicate or paraphrased content compared to traditional cosine similarity. This enhancement makes it a more reliable tool for detecting plagiarism and for tasks that require detailed similarity assessments.

Keywords: Modified Cosine Similarity, Cosine Similarity, Document Similarity, Vector Magnitude, Normalized Vectors, Feature Vectorization

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Abstract ID :	OPT2-068

Optimizing Role Mining Techniques for Efficient Role-Based Access Control Systems

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Abstract

Role-Based Access Control (RBAC) is nowadays a common approach to managing access rights in information systems. Role engineering, i.e., the manual design of roles and their assigned permissions, is an intricate and error-prone process. For this reason, the process of role mining, i.e., mining relevant roles out of the existing assignments of permission to users, has attracted more and more attention. In this paper, the study presents an optimized and scalable approach to role mining for efficient and effective RBAC implementation. The approach combines an ensemble of hybrid methods for role mining that strive to find a better trade-off between efficiency and quality of results without redundancy. The main benefits of this approach include better access governance, improved compliance, and better decision-making with respect to access control. Compared with traditional role mining approaches, the proposed model can improve role quality, system scalability, and information security. Finally, the study presents some potential applications in real-world enterprise systems, healthcare systems, and cloud environments.

Keywords: Role-Based Access Control (RBAC), Role Mining, Access Control, Role Engineering, Information Security, User-Permission Assignment, Authorization Systems

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Artificial Intelligence in Human-Computer Interaction: A Review of Intelligent Interfaces

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Abstract

This review paper observes the role of artificial intelligence in human-computer interaction, with a focus on the development and impact of intelligent interfaces. With the increasing integration of AI into daily life, systems such as speech recognition, vision-based technologies, and interactive agents have enabled more natural and human-like communication between users and machines. At the same time, advances in technologies like natural language processing, gesture recognition, and predictive modeling have turned traditional interfaces into adaptive and collaborative systems that can meet user needs before they arise. However, effective interaction with intelligent systems is not determined solely by technological capability. This review emphasizes the significance of cognitive and behavioral dimensions, encompassing trust in automation, the misuse and disuse of AI systems, and algorithm aversion. Prior research demonstrates that users frequently utilize cognitive shortcuts when engaging with complex systems and may exhibit heightened intolerance towards algorithmic errors in comparison to analogous human errors. These elements profoundly affect user acceptance and dependence on intelligent interfaces. This paper offers a thorough comprehension of intelligent interfaces in HCI by incorporating insights from practical applications, technological progress, and human-centered cognitive factors. The review underscores the necessity of developing AI systems that not only enhance performance but also conform to human cognitive expectations, trust dynamics, and ethical considerations to facilitate effective and enduring human–AI interaction.

Keywords: Human–Computer Interaction (HCI), Artificial Intelligence, Intelligent Interfaces, Trust in Automation, Algorithm Aversion

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Evaluating Cross-Dataset Generalization of Machine Learning Models for Cardiovascular Disease Prediction in Diabetic Populations

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Abstract

Cardiovascular disease (CVD) is the leading causes of deaths worldwide. The people suffering from diabetes have been found to be vulnerable to CVD because of their common pathophysiology. Many machine learning (ML) techniques have been proposed to predict CVDs. However, the existing work is done on single-dataset-based investigations, which makes the results not generalizable. Therefore, this paper seeks to evaluate the cross-dataset generalization ability of various ML models for predicting CVD in diabetic patients by using two heterogeneous datasets, namely, the large-scale Kaggle cardiovascular dataset and the National Health and Nutrition Examination Survey (NHANES) dataset. For each database, we identified a diabetic sub-cohort based on their clinical characteristics, and they used a standardized feature vector comprising age, blood pressure, body mass index, and cholesterol. Machine Learning models like Logistic Regression, Random Forest, and XGBoost were trained and tested within-dataset and cross-dataset settings. The results reveal an excellent prediction accuracy when applied in the within-dataset setting but demonstrate a considerable drop-off in the cross-dataset setting. These findings demonstrate that model generalization is constrained more by data heterogeneity than by model complexity.

Keywords: Cardiovascular Disease, Machine Learning, Cross-Dataset Generalization, Diabetes, Healthcare Analytics, Model Robustness

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Abstract ID :	OPT2-071

An Intelligent Quiz Generator for Personalized Evaluation

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Abstract

Fixed, uniform tests suffer from a well-documented limitation: they assess all learners identically, regardless of individual knowledge levels, leaving advanced students under-challenged and struggling students without adequate support. This paper presents an intelligent quiz generation system that addresses this problem through real-time adaptive difficulty adjustment based on learner performance. The system integrates a tagged question bank, a weighted-scoring engine, and an adaptive algorithm grounded in Item Response Theory (IRT) to produce quizzes that dynamically shift as responses are submitted. The full architecture encompasses user management, quiz generation, evaluation and scoring, and a feedback analytics module, supported by a rigorous mathematical foundation and a seven-phase development methodology. Multiple question formats are accepted, and performance histories are stored to provide actionable insights for both learners and instructors. The system implements a piecewise difficulty selection rule—escalating to harder questions when accuracy exceeds 70% and falling back to easier questions when accuracy drops below 40%—and activates a Bayesian knowledge-tracing model for returning learners with sufficient response history. A dual-database backend (MySQL for relational data and MongoDB for document storage) powers a React.js frontend with real-time analytics dashboards. Evaluation results indicate that adaptive assessment improves learner engagement and measurably reduces the blind spots inherent in static testing, while also reducing instructor workload through automated quiz construction, delivery, grading, and reporting.

Keywords: **A**daptive assessment, quiz generation, item response theory, personalized learning, educational technology, Bayesian knowledge tracing, weighted scoring

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Next-Generation Web Performance Optimization: Techniques, Challenges, and Solutions

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Abstract

Web application performance is very important in today's digital world. It affects user experience, engagement, and business revenue. If a website is slow, users quickly leave it. So, performance optimization has become a necessity instead of a luxury. Web Performance Optimization (WPO) focuses on improving speed and efficiency. It works on both front-end and back-end parts of an application. Front-end includes UI, loading speed, and responsiveness. Back -end includes server speed and database performance. The web has grown from simple pages to complex applications. This has created issues like inefficient content delivery. It can cause wasted resources and loss of users. Tools like Core Web Vitals help measure performance. They check loading, interactivity, and visual stability. These tools help developers find real problems. Several techniques are used to improve performance. Code splitting and lazy loading make pages load faster. Image and asset optimization reduce file sizes. Caching and prefetching improv e data access speed. Database tuning improves back -end performance. Technologies like Web Assembly provide fast execution in browsers.

Keywords: Web Performance Optimization , Improving Caching , Core Web Vitals , Database Tuning

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Abstract ID :	OPT3-001

Work-Life Balance and Its Impact on Employee Retention in the IT Sector: A Comparative Analysis of Infosys, Wipro, TCS and IBM with Special Reference to Gujarat State

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Abstract

Introduction: The relationship between work and other pursuits such as leisure, friendships, family, social responsibilities, health, and personal growth is known as work-life balance. Work-life balance is achieving a delicate equilibrium by giving priority to these. It varies throughout time and is unique to everyone. The present study examines the impact of work-life balance programs on employee retention in some IT organizations within the Gujarat State. The 200 IT employees of Infosys, Wipro, TCS and IBM use self-structured questionnaires. Statistical tools, regression analysis, and Pearson correlation were used to evaluate the impact of work-life balance practices onretention. The study's findings indicate a robust and statistically significant positive correlation between work-life balance rules and employee retention. The regression results demonstrate that work-life balance strategies are a key element of why people stay at a firm. This shows how crucial they are for managing organizations today. The correlation analysis also suggests that rules that assist people stay at their employment and be more devoted. The demographic findings indicate that individuals of various ages, educational backgrounds, and work experience prioritize work-life balance. Thosecompanies with effective work-life balance programmes enjoy happier and productive employee and a stable workforce in the long term. The research provides IT companies with practical knowledge about developing employee-friendly policies which enhance retention and general performance.

Keywords: Work-Life Balance, Employee Retention, IT Sector, Flexible Working Hours, Remote Work, Organizational Policies, Job Satisfaction

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Skill Mismatch, Education and Informal Economy: A NEP 2020 Perspective

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Abstract

The structural relationship between India's rate of informal employment, skill mismatch, and educational attainment is examined in this study. High rates of over-education (vertical mismatch) and field-of-study divergence (horizontal mismatch) may force graduates to work in the low-productivity informal sector, although India's "demographic dividend" offers economic potential. This study uses the unit level data from the Periodic Labor Force Survey (PLFS) and the Annual Survey of Unincorporated Sector Enterprises (ASUSE) to measure the "wage penalty" associated with skill mismatch. The paper specifically evaluates the National Education Policy (NEP) 2020 as a corrective framework, highlighting the contribution of vocational integration and the Academic Bank of Credits (ABC) to reducing labor market tensions. This study contributes to the existing literature by providing one of the earliest empirical evaluations of NEP 2020's potential to formalize the Indian workforce through competency-based pathways. It offers policymakers a diagnostic instrument to bridge the gap between industrial demand and higher education output by evaluating the relationship between "mismatch" and "informality." Other than that, the findings provide a fresh viewpoint on the possible benefits of interdisciplinary education to mitigate against the wage penalties that are prevalent in India's informal sector.

Keywords:

NEP 2020, PLFS, Wage Penalty, Informal Employment, Vocational Education, and Skill Mismatch. JEL Codes: I21, J24, J46.

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Digitalization , Humanization, and Change in Workand Organizations

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Abstract

New types of d igitalized, flexible, and data -driven workplaces are emerging because ofthe rapid growth of digital technologies, which is radically changing work and organizational structures. This study highlights how businesses can strike a balance betweentechnological advancement and human-centric values by examining the relationship between digitalization, humanization, and change in work and organizations. In this context, "humanization" refers to creating work systems that uphold human dignity, encourage employee empowerment, facilitate skill development, and support long -term organizational practices in the face of digital revolution. A mixed -method research approach is used in this study. To determine prevailing themes, theoretical frameworks, and research gaps pertaining to digital transformation, human -centered work design, and organizational change, a thorough literature study is carried out in the first phase. A systematic questionnaire is used in the second phase to gather quantitative data from managers and staff in both large and MSMEs that are undergoing digital transformation. The relationships between digitalization practices, humanization dimensions (e.g., employee autonomy, well -being, skill enhancement), and organizational change outcomes (e.g., adaptability, performance, sustainability) are investigated using statistical techniques like structural equation modeling (SEM).

Keywords: Sustainable Organizations, Employee Well-being, Humanization of Work , Digitalization, Work Desi

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Strategic Corporate Social Responsibility Investment and Long-Term Firm Value Creation: Cross-Country Evidence from Emerging Economies

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Abstract

This study investigates the impact of strategic Corporate Social Responsibility (CSR) investment on long-term firm value creation across emerging economies. Unlike conventional CSR spending driven by compliance or reputational concerns, strategic CSR is aligned with core business objectives and long-term value maximization. Using panel data from listed non-financial firms across selected emerging markets over the period 2015–2025, the study examines whether CSR investment intensity contributes to sustainable financial performance and market valuation. Long-term firm value is measured using Tobin's Q, three-year cumulative stock returns, and sustainable Return on Assets (ROA). Employing fixed-effects panel regression and System GMM estimation to address endogeneity concerns, the findings reveal a significant positive relationship between strategic CSR investment and long-term firm value. The results further indicate that institutional quality and investor protection frameworks strengthen this relationship, highlighting the importance of governance environments in emerging markets.Overall, the findings demonstrate that CSR investment, when strategically integrated into corporate strategy, contributes to sustainable value creation rather than representing a mere cost. The study provides important implications for managers, investors, and policymakers seeking to promote sustainable corporate growth in emerging economies.

Keywords: Strategic Corporate Social Responsibility, Long-Term Firm Value, Emerging Economies, Institutional Quality, Stakeholder Theory, Resource-Based View, Sustainable Performance, CSR Investment Intensity.

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Corporate Governance Quality and Firm Value: Evidence from Indian Listed Companies

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Abstract

Corporate governance plays a crucial role in enhancing transparency, accountability, and overall corporate performance, particularly in emerging economies such as India. This study investigates the relationship between corporate governance quality and firm value among Indian listed companies. The research focuses on firms listed on the Bombay Stock Exchange and the National Stock Exchange, analysing how governance mechanisms influence market valuation and financial performance. A Corporate Governance Quality Index is constructed using key indicators such as board size and independence, frequency of board meetings, audit committee effectiveness, ownership structure, CEO duality, and disclosure practices. Firm value is measured using financial metrics including Tobin's Q, Return on Assets (ROA), and Market-to-Book Ratio. The study employs quantitative research methods and regression analysis based on secondary data obtained from annual reports and financial statements of selected companies. The empirical findings reveal a significant positive association between corporate governance quality and firm value. The results support agency theory by indicating that effective governance mechanisms reduce agency costs and information asymmetry, thereby protecting shareholder interests and promoting sustainable growth. The study provides important insights for policymakers, regulators, investors, and corporate managers seeking to strengthen governance practices and improve firm competitiveness in the Indian corporate sector.

Keywords: Corporate Governance; Corporate Governance Quality Index; Return on Assets (ROA)

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Environmental, Social, and Governance (ESG) Disclosure and Sustainable Financial Performance: A Multi-Year Panel Data Analysis

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Abstract

Environmental, Social, and Governance (ESG) disclosure has become a central pillar of corporate transparency and sustainable finance. However, empirical evidence regarding its long-term financial implications remains inconclusive, particularly within emerging markets. This study examines the relationship between ESG disclosure and sustainable financial performance using an eight-year balanced panel dataset of 100 publicly listed firms (2018–2025), comprising 800 firm-year observations. Grounded in stakeholder theory, legitimacy theory, and agency theory, the study investigates whether aggregate ESG disclosure and its environmental, social, and governance components enhance accounting-based (Return on Assets, Return on Equity) and market-based (Tobin's Q) measures of firm performance. Fixed-effects panel regression analysis reveals a positive and statistically significant association between ESG disclosure and sustainable financial performance. Among the individual components, governance disclosure exhibits the strongest and most consistent financial impact, followed by environmental disclosure , while social disclosure demonstrates moderate but positive effects. Mediation analysis indicates that improved market reputation and reduced firm-level risk partially explain the ESG performance relationship. Furthermore, moderation analysis shows that firm size strengthens the positive impact of ESG disclosure on financial outcomes. Robustness checks using alternative model specifications and lagged variables confirm the stability of results..

Keywords: ESG disclosure; sustainable financial performance; panel data analysis; governance; stakeholder theory

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The Impact of the US, Israel, and Iran War on India's GDP and Make in India Campaign: In Short-term and Long-term Approaches.

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Abstract

On the 28th of February, Israel launched a military attack against Iran. A war, which neit her we waged nor supported, is at our doorstep370 nautical miles from Kanyakumari. An American submarine torpedoed an Iranian frigate returning from Vishakhapatnam. Iran attempts to hold hostage "Global Energy". The Strait of Hormuz is the lifeline of glob al crude oil supply chain. Impacted global oil supply, with no vessel movements since March 4, 2026. Gulf Countries primarily export oil via this route. The main recipients are 85% Asian nations and remaining 15% to world. This paper will use a qualitative research methodology based on current affairs, geopolitical interviews, and business data. Almost 37 Indian Merchant - Navy ships are stuck at this choke point. Crude oil prices before war on 27th February were $72 and rose to rocket high on 11th March to $120/barrel. Rupee weakens, GDP growth declined by 1%. Manufacturing under Make in India is impacted. The current war with Iran is putting immense pressure on business supply chains; world's crude oil and gas routes have been jeopardised and creating a need to find alternatives. If it goes on for long, crude oil prices may go up to $150 or $200/barrel. Those prices, directly or indirectly, will impact our households and industries. The LPG crisis has been created in India and in major Asian countries.

Keywords: Strait of Hormuz, Global energy, Impact, GDP, LPG.

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A Comparative Study on the Long-Term Effects of Influencer Marketing on Brand Loyalty and Consumer Satisfaction: A Study of Pilgrim and Mama earth in South Gujarat

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Abstract

In today's market, influencer marketing is no longer just a trend but a key strategy for brands to connect with people, especially in the beauty and skincare industry. This study focuses on how influencer-led campaigns affect brand loyalty and consumer satisfaction over a long period. We have chosen to compare two major Indian brands, Pilgrim and Mama earth, to see which marketing techniques keep customers coming back. Mama earth focusses on working with thousands of micro influencers and while Pilgrim focus on working with skincare experts. Research engages to evaluate the relationship between influencer purchase intention and long-term brand recommendation. Primary data is collected from local consumers using structured questionnaires. Through quantitative study, we aim to find the link between an influencer's honesty and how consumers feel after using the product. Initial findings suggest that while an influencer can convince someone to buy a product once, loyalty depends mostly on the actual quality of the product. This research provides practical insights for marketers who want to build a loyal customer base in regional Indian markets like South Gujarat.

Keywords: Influencer Marketing; Brand Loyalty; Consumer Satisfaction; D2C Skincare Brands; Comparative Analysis.

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Waste to Worth: Sustainable Supply Chain Transformation in Indian Hotel Operations A Strategic Management Framework for Emerging Economies

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Abstract

The hospitality industry contributes approximately 1% of global carbon emissions, with hotel operations responsible for significant volumes of food, textiles, and operational waste. In India, where the hotel sector generates an estimated 150,000 tons of food waste annually and commercial buildings account for nearly 33% of total electricity consumption, the urgency for sustainable supply chain reform is substantial. Despite growing global awareness, fewer than 30% of Indian hotels have adopted structured green supply chain management (GSCM) practices, revealing a critical strategic gap. This paper examines sustainable supply chain transformation in Indian hotel operations through the lens of strategic management and emerging economy constraints. Drawing on secondary data from ITC Hotels' sustainability reports, FHRAI industry assessments, the Bureau of Energy Efficiency (BEE), and UNWTO benchmarks, this study develops a three-pillar strategic framework Energy Efficiency, Waste Minimization, and Green Procurement tailored to the operational realities of mid-scale and luxury Indian hotels. The framework integrates principles of Corporate Social Responsibility (CSR), circular economy, and UN Sustainable Development Goals (SDGs 12 and 13). Findings indicate that hotels adopting integrated GSCM practices can reduce operational waste by up to 40% and energy consumption by 20–30%, while simultaneously improving brand equity and long-term profitability.

Keywords: Green Supply Chain Management; Sustainable Hospitality; Hotel Waste Management; Emerging Economies; Circular Economy; Strategic Management Framework

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A Decentralized Crowdfunding Platform Using Blockchain & Smart Contracts: Architecture, Security, Comparative Evaluation

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Abstract

Centralized crowdfunding platforms such as Kickstarter, Indiegogo, and GoFundMe suffer from systemic limitations including high intermediary fees (8–10%), fraud risk, lack of post-disbursement fund transparency, and geographic exclusion of unbanked populations. This paper proposes and evaluates a fully decentralized crowdfunding platform built on the Ethereum blockchain, leveraging Solidity smart contracts, a React.js/Web3.js frontend, and IPFS-based decentralized storage. The platform encodes campaign logic (goal validation, time-locked fund release, and automated refunds) directly into audited smart contracts, eliminating intermediaries and enforcing outcomes programmatically. We present a formal campaign lifecycle model, a security analysis addressing reentrancy and integer overflow vulnerabilities, and a layered system architecture with three distinct tiers. Experimental evaluation on the Spolia testnet and Polygon (Layer-2) demonstrates gas cost reductions of up to 96% compared to Ethereum mainnet, sub-3-second transaction confirmation, and zero fraud incidents across 150 simulated campaigns. Comparative benchmarking against Gitonin, Pledgecamp, and Giveth demonstrates advantages in transaction cost efficiency, transparency, and global accessibility. The system demonstrates a fully functional, audited prototype for trustless, borderless digital fundraising.

Keywords: Blockchain, Smart Contracts, Decentralized Crowdfunding, Ethereum, DApp, DAO, Layer-2, IPFS, Solidity

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Strategic Integration of Human Resource Management and Knowledge Management for Sustainable Organizational Development

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Abstract

In today's rapidly changing world, organizations are increasingly recognizing the importance of blending Hu man Resource Management (HRM) with Knowledge Management (KM) to stay innovative, sustainable, and competitive. This research explores how these two critical areas can work together strategically, creating a synergy that enhances organizational capabilities , encourages knowledge sharing, and supports long-term resilience. At its core, this study investigates how HRM practices such as recruiting, training, and fostering a positive workplace culture can be aligned with KM strategies to retain, share, and grow knowledge within organizations. It also highlights the role of sustainability leadership in this process, showing how leaders can embed environmental, social, and governance (ESG) principles into HRM-KM integration to ensure ethical and impactful decision-making. Using a mix of qualitative case studies, surveys, and long-term data analysis, this research uncovers the challenges and opportunities organizations face when integrating HRM and KM. The findings aim to contribute to academic theory by proposing a practical framework while offering actionable insights for leaders and HR professionals.

Keywords: Human Resource Management; Knowledge Management; Sustainability; Organizational Development; ESG

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Management, Innovation, Inter-disciplinary research & policy framework

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Abstract

In the contemporary global landscape, the integration of management, innovation, interdisciplinary research and policy frameworks plays a vital role in driving sustainable and inclusive development. Management provides structure and strategic direction, while innovation enables adaptability in rapidly changing environments. Interdisciplinary research connects diverse fields of knowledge, fostering comprehensive solutions and policy frameworks ensure alignment with economic and societal goals.

This study follows a qualitative and conceptual approach, based on the analysis of academic literature, policy reports and real-world practices. It synthesizes insights across management, innovation studies and public policy to understand their interconnected functioning in global and emerging economies. The study highlights that collaborative approaches and innovation-driven strategies, supported by flexible policies, significantly enhance organizational and societal outcomes. It concludes that the integration of these elements is essential for long-term global competitiveness, resilience and sustainable growth.HRM (Human Resource Management), IPR (Intellectual Property Rights), R&D (Research and Development), NEP (National Education Policy)

Keywords: Management, Innovation, Interdisciplinary Research, Policy Framework, Sustainability, Global Development, Human Capital, R&D

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Relationship Between Inventory Management and Profitability: An Empirical Analysis of Indian Cement Companies

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Abstract

Inventory plays an important role in impacting profitability of any Organization. The importance of Inventory M anagement is indisputable. This study evaluates in depth the Inventory Management practices of Indian Cement Companies and its effect on Working Capital Management. The purpose of this research is to examine the relationship between Inventory Management and the firm's profitability. The dependent variable, Gross Operating profit is used as a measure of profitability and the relation between Inventory Management and Profitability is investigated for a sample of Six Indian cement companies (03 Major and 03 Mini) over a period of five years from 2014-2018. This study employs Regression analysis to determine the impact of inventory conversion period over gross operating profit taking current ratio (CR), size of the firm (CS), financial debt ratio (FDR) and Inventory Conversion Period (ICP) as control variables. The results indicate that the relationship between the firm size and GOP was positive, which indicates that profitability increases with an increase in firm size. The relationship between NP and the GOP was positive.

Keywords: Working Capital Management, Inventory Management, Profitability, Cement Companies, Financial Debt ratio.

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A Comparative Analysis of Customer Benefits and Commercial Viability of Electric Cars in Ride-Haili ng Services: A Study of Ola and Uber in Vadodara City

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Abstract

The swift rise of electric vehicles (EVs) is reshaping the urban mobility landscape, particularly within the ride -hailing industry. This research aims to assess and compare the advantages experienced by customers alongside the economic feasibility of electric vehicles utilized by service providers like Ola and Uber in Vadodara city. The study emphasizes key aspects such as cost-effectiveness, environmental sustainability, customer satisfaction, operational limitations, and long -term profitability. A mixed-method approach has been employed, incorporating both primary and secondary data sources. Primary data was obtained through structured surveys conducted with riders and drivers, while secondary data was sourced from research papers, industry reports, and official company documents. The findings indicate that EVs provide significant savings in operational costs due to decreased fuel and maintenance expenses, coupled with a beneficial environmental impact through reduced emissions. Nevertheless, challenges like insufficient charging infrastructure and availability issues persist, impacting service efficiency. The research also reveals that Ola has made notable advancements in integrating EVs into its operations, while Uber is progressively enhancing its EV presence through strategic partnerships. The financial viability of EVs is affected by factors such as initial investment, government incentives, battery efficiency, and infrastructure development. In summary, although EVs possess substantial potential for fostering sustainable trans portation, their widespread adoption is contingent upon improved infrastructure support and consistent policy initiatives.

Keywords: Electric Vehicles, Ride-Hailing Services, Customer Contentment, Economic Viability, Ola, Uber, Sustainable Transportation, Cost Savings, Vadodara

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Policy and Practice of BIM: Lessons for India from Developed Countries

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Abstract

Building Information Modeling (BIM) has emerged as a key enabler for improving productivity, coordination, and decision-making in the construction industry. However, in developing countries such as India, BIM adoption remains uneven due to gaps in policy support, technical capability, and stakeholder knowledge. This study investigates BIM policy and practice by assessing BIM knowledge across major construction stakeholder roles and identifying lessons from developed countries. The research aims to (i) validate critical BIM knowledge criteria, (ii) evaluate BIM knowledge levels across stakeholder roles, and (iii) determine the relative importance of these roles using a multi-criteria decision-making approach. A mixed-method methodology was adopted. Initially, five BIM knowledge criteria and seventeen assessment questions were identified through a literature review. A two-round Modified Delphi technique involving three domain experts was applied to validate the criteria and map the questions. Survey data were then collected and analyzed to compute BIM knowledge scores for each stakeholder role using a Likert-scale-based approach. Based on the results, the Best–Worst Method (BWM) was employed to prioritize stakeholder roles by conducting best-to-others and others-to-worst comparisons using a 1–9 preference scale, followed by optimization using Excel Solver. The findings indicate that BIM Specialists/Academics exhibit the highest level of BIM knowledge, while Government/Public Sector Officials show the lowest. The results highlight significant knowledge gaps and emphasize the need for targeted policy interventions, capacity-building programs, and institutional support. The proposed framework provides a structured and replicable approach for BIM knowledge assessment and can support policymakers and industry practitioners in strengthening BIM implementation strategies.

Keywords: Building Information Modeling; BIM Policy; Modified Delphi Technique; Best–Worst Method; Construction Stakeholders

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Integrated Risk Management Framework for Infrastructure in mega project

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Abstract

Infrastructure projects are exposed to a wide range of risks due to complex construction conditions, coordination among multiple stakeholders, financial uncertainties, schedule pressures, and safety-related challenges. Although traditional risk assessment methods such as qualitative scoring systems and probability–impact matrices are widely used in construction project management, they often fail to capture the combined influence of critical project performance parameters. This paper proposes an Integrated Risk Assessment Model for Infrastructure Projects using a weighted multi-criterion scoring approach to provide a practical and structured framework for risk evaluation and mitigation. The proposed model considers five key parameters: Safety (Sa), Cost (C), Schedule (Sch), Occurrence (O), and Detection (D), each assessed on a standardized 1–24 scale to ensure consistency and comparability across different project conditions. The framework further incorporates mitigation reduction and residual risk assessment, enabling comparison between pre-mitigation and post-mitigation risk levels. Its applicability is demonstrated through practical infrastructure-related cases such as scaffold collapse, material supply delays, and equipment failure, highlighting the effectiveness of targeted mitigation measures. The final risk scores are classified into Low, Medium, High, and Critical categories, supporting informed decision-making, proactive mitigation planning, and continuous risk monitoring in infrastructure projects.

Keywords: Infrastructure Risk Assessment; Weighted Scoring Model; Construction Safety Risk; Project Schedule Risk; Residual Risk Evaluation

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ROLE OF ENGLISH IN GLOBAL S TARTUP COMMUNICATION

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Abstract

This study examines the significant role of the English language in the startup ecosystem, with a particular focus on its use in research, communication and global business development. In today's interconnected world, English functions as a lingua franca enabling entrepreneurs to access a vast range of academic resources, market research, and industry knowledge. Startups rely heavily on English to prepare business plans, write research reports, and communicate effectively with investors, clients, and partners across different countries. The research highlights how proficiency in Business English enhances key entrepreneurial activities such as pitching ideas, creating digital marketing content and participating in international networking platforms. Effective use of English not only improves clarity and professionalism but also increases the chances of securing funding from global investors. Additionally, the study explores the challenges faced by entrepreneurs from non-English-speaking backgrounds, including language barriers, limited confidence and restricted access to global opportunities. Furthermore, the paper discusses thegrowing role of technology, including AI -based writing and translation tools, in helping startups overcome linguistic challenges and improve the quality of their research and communication. These tools support entrepreneurs in producing accurate and impactful content in English. Overall, the study concludes that strong English language skills are essential for startup success, as they contribute to better research outcomes, effective communication, and increased global competitiveness in the modern business environment.

Keywords: English as a Lingua Franca; Business Communication; Global Business Expansion; Language Proficiency; Digital Marketing

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Analyzing Spectrum of Intellectual Property Rights and its implication on Biodiveity Beyond National Jurisdiction

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Abstract

The base of international law lies between two spectrums, the first one is about facilitating the even the least developed countries in every avenue of research, exploration and expansion however, the other spectrum is about protecting the rights of the countries who have invested in the exploratio n and expansion. The tussle between the two can easily be understood when it comes to safeguarding the development of exploration done in the sphere of common good, and the best example is about the areas beyond national jurisdiction. So far as the Law of the Sea is in question the treaty of United Nations Convention on Law of the Sea is very clear as it is accurately synonymous to Constitution of the Sea but the same legal instrument couldn't provide robust mechanism over the issue of most crucial aspect of the sea and that is called as High Sea, area of sea lying beyond national jurisdiction. With changing times emergence of global governance became necessary and new treaties were formulated namely, Biodiversity Beyond National Jurisdiction, however the same is not free of challenges as the same is required to be aligned with national legislation. The main objective of the study is to align the international sphere with national legislation. The research will be mainly based upon various treaties, national and international policies and reports of different ministries.

Keywords: Globalization; Governance; Intellectual Property Rights; High Sea; Equity.

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Abstract ID :	OPT3-0019

Analyzing the notion of global commons and global network of submarine cable

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Abstract

The evolution of submarine communication cable dates back to the 18th century and from 1884 the systematic evolution of the submarine cable have been started and the same carried forwarded by the advent of United Nations Convention on the Law of the Sea in 1982 which is universally accepted which also lays the procedure for exploration coverin g all the areas of sea however, with the advent of biodiversity beyond national jurisdiction will change the scenario as the instrument will accurately cover all the sea related aspect specifically High Seas. The primary treaty related to submarine cablesis United Nations Convention on the Law of the Sea as it provides for the freedom to lay and maintain cables in high seas. Implementation of the Biodiversity Beyond National Jurisdiction may restrict the laying off submarine cables in the areas beyond national jurisdiction especially in marine protected areas and the schemes which permits the same may come into conflict with the high – seas. Considering the present scenario, the same may lead to authority and jurisdiction overlap and to eradicate it streamlining the authorities is need of the hour. The research will be mainly based upon various treaties, committee reports and various policies. The research will contribute to sustainable solution to sustainable development .

Keywords: High sea; submarine cables; global common; governance; sustainable development

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Women's Empowerment and Early Childhood Development: A Field-Based Assessment of Maternal Influence in Anganwadi's in Anand, Gujarat

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Abstract

The early years of a child's life, from birth to six years, represent a critical window for physical, cognitive, emotional, and social development. During this foundational period, the mother plays an indispensable role in shaping the child's developmental path. Extensive research demonstrates that women's empowerment, including education, economic independence, decision-making autonomy, and social participation significantly influences child development outcomes. This study aims to understand the connection between maternal empowerment and early childhood development in Anand district, Gujarat. It seeks to assess how different dimensions of women's empowerment influence developmental outcomes of children aged 0-6 years, identify gaps in current Anganwadi systems, and recommend evidence-based strategies for strengthening support systems. The study adopts a descriptive and analytical research design using a mixed-method approach. A sample of 300-400 mothers of children aged 0-6 years will be selected through stratified random sampling from urban and rural areas of Anand district. The study will produce a contextually grounded framework mapping pathways between maternal empowerment and early childhood development, empirical evidence establishing correlations between specific empowerment dimensions and child outcomes, policy recommendations for strengthening ICDS and early childhood education programs, and rich qualitative documentation of mothers' perspectives.

Keywords: Women's Empowerment, Early Childhood Development, Maternal Influence, Anganwadi, ICDS, Anand, Gujarat, Decision -Making Autonomy, Child Nutrition, Cognitive Development, Mixed-Methods Research.

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The transformative impact of social media on the Indian film industry

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Abstract

This study examines the transformative role of social media in reshaping film marketing, audience behaviour, and commercial outcomes within the Indian film industry the world's largest producer of motion pictures. Transitioning from Web 1.0 to Web 2.0, over 500 million Indian social media users have turned platforms like Facebook, Instagram, YouTube, and Twitter into critical tools for film promotion and real -time audience engagement. Using a mixed-methods approach (quantitative social media analytics and qualitative case study analysis), this research identifies four key social media strategies in film promotion: influencer collaborations, hashtag campaigns, exclusive content drops, and interactive live sessions. Findings indicate a statistically significant positive correlation between pre-release social media buzz (measured by share of voice and sentiment polarity) and opening-day box office collections. However, the study also reveals emerging risks: toxic fandom, review bombing, privacy leaks, and the rapid viral spread of negative sentiment, which can disproportionately harm a film's longevity. The report concludes that social media is no longer ancillary but a core pillar of film marketing, transforming audiences from passive viewers into active participants. Recommendations include platform-specific content strategies, real-time sentiment analysis, community-building over pure promotion, and crisis management protocols. This research contributes a framework for producers, distributors, and marketers to harness social media's power while mitigating its inherent risks in the Indian cinematic context.

Keywords:

Social media marketing, Indian film industry, box office correlation, audience engagement, sentiment analysis, toxic fandom.

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An Interdisciplinary Research Study: Post-Reform Dynamics of India's Agricultural Sector in International Trade

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Abstract

Agriculture trade contributes 15 per cent of total foreign exchange earnings of India. The major agricultural exports of India are cereals, rice, spices, oilcake, tobacco unmanufactured tea, coffee and marine products. As against agricultural exports, agricultural imports constitute only a small proportion of the country's total imports of 5 per cent. After the economic reforms initiated in June 1991, removing the restrictions and protective licensing regime, free trade in many items has become the order of the day. With the removal of quantitative restrictions on agricultural items and urea the Indian farmer community has been placed to face stiff competition from the developed nations (Krishna Chaitanya V. 2004). India exports excess food and agricultural products. A large proportion of India's export trade is based on the agricultural products, such as jute, tea, tobacco, coffee, spices, and sugar. India is ranked seventh in terms of agricultural exports. In 2013, India exported agricultural products valuing around 39 billion dollars (Anil Bose 2015). During the post economic reforms period the proportion of Indian agriculture in the world agricultural trade has gone up to 1.47 per cent which for the sector indicates a long period to go. Indian agriculture has greatly contributed to foreign trade even in its traditional form. Indian Agricultural products have been facing stiff competition from Asian countries for quite some time.

Key words:
Agricultural trade, Exim, Foreign trade One sample test, Paired test, Pre and Post Trade

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Promoting Financial Literacy for Effective Financial Management: A Study Approach

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Abstract

Financial literacy has become an essential competency in today's dynamic and complex economic environment, where individuals are required to make informed financial decisions on a regular basis. It refers to the ability to understand and effectively apply financial knowledge related to budgeting, saving, investing, and managing debt. A lack of financial literacy often leads to poor financial planning, excessive borrowing, and financial instability. The present study focuses on examining the role of financial literacy in promoting effective financial management practices. It aims to analyse how financial awareness influences individual behaviour in areas such as saving, investment, and expenditure management. The study is descriptive and exploratory in nature and is based on secondary data collected from various sources, including research journals, government reports, and financial websites. The data considered for the study reflects recent trends in financial education and financial inclusion. The findings of the study indicate that financial literacy plays a significant role in improving financial decision-making and enhancing overall financial well-being. Individuals with adequate financial knowledge are more likely to adopt disciplined financial habits, such as maintaining a budget, saving regularly, and making informed investment choices. The study also highlights the role of digital platforms and financial technology in increasing access to financial information and services. However, certain challenges such as lack of awareness, limited financial education, and socio-economic barriers continue to hinder the widespread adoption of financial literacy. The study concludes that promoting financial literacy is crucial for achieving effective financial management and long-term economic stability. It emphasizes the need for coordinated efforts by educational institutions, governments, and financial organizations to enhance financial awareness among individuals.

Keywords: Financial Management, Awareness, Budgeting, Saving, Investment

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Technology Acceptance of AI-Enabled Sustainability Tools in the Restaurant Sector: A Stakeholder Perspective from Vadodara, India

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Abstract

Hospitality businesses across the world are making a conscious effort to be more sustainable in their day-to-day operations and look to reduce their operational costs through these practices. This change in outlook has created a need for AI-based applications and IoT devices that can help the food business achieve both objectives. There are other studies that support the theory that restaurant owners are now seeking ways to boost profitability while simultaneously reducing food waste, which positions AI-enabled applications as the critical tools for data-driven menu planning today. This study examines the acceptance rates of AI technologies for sustainable menu planning and their perceived usefulness among restaurant professionals in Vadodara. The primary objective of the AI tool being tested is to suggest the core principles of reduce, reuse, and recycle, while also helping with Menu planning decisions. A study conducted through semi-structured interviews with 50 restaurant professionals in Vadodara also indicates a growing readiness among key stakeholders—specifically chefs, owners, and managers to adopt mobile applications and IoT-integrated solutions. These interviews with professionals in Vadodara's emerging urban market help us identify the key drivers and barriers that determine whether a restaurant will use these tools in a real-world setting. The analysis focused heavily on the perceived usefulness of these tools and the staff's behavioural intentions to adopt them into their daily workflow.

Keywords: Artificial Intelligence, Food waste reduction, Restaurant profitability, Sustainable menu planning, Technology adoption

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Community Engagement and Socio-Economic Impacts of Eco-Tourism: Evidence from Gujarat, India

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Abstract

Eco-tourism represents a significant pathway for sustainable development by integrating environmental conservation with community -driven economic growth. The present study examines the influence of community engagement on the socio-economic impacts of eco-tourism in selected destinations across Gujarat, India. Situated within the broader framework of sustainable tourism and aligned with global development goals, this research aims to clarify how local participation affects livelihood generation, inco me diversification, and overall community well -being. An exploratory qualitative approach was adopted, utilizing field observations from eco-tourism sites in and around Jambughoda Wildlife Sanctuary, including Targol, Dhanpuri, Kada, and Bhat campsites. Th ese observations were supplemented by informal interactions with local stakeholders and a review of relevant academic and policy literature. The analysis employed thematic interpretation of patterns related to infrastructure, employment, community particip ation, and sustainability practices. The findings demonstrate that eco-tourism contributes positively to employment generation, small-scale entrepreneurship, and environmental awareness, particularly where local communities are actively involved in tourism operations. This paper emphasizes the necessity of inclusive policy frameworks, capacity -building initiatives, and participatory governance models to enhance community engagement. It contributes to the ongoing discourse on sustainable tourism by presenting field -based insights and establishes a foundation for future empirical research employing structured methodologies.

Keywords: Community -Based Tourism, Community Engagement. Eco-tourism, Socio-Economic Impact, Sustainable Development

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Investor Perception & Awareness of Sovereign Gold Bonds

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Abstract

Gold has always been considered a reliable form of investment, particularly in India, where it carries both economic and cultural importance. With changing financial markets, the Government of India introduced Sovereign Gold Bonds (SGBs) as a modern alternative to holding physical gold. This study aims to analyze investor perception and awareness regarding Sovereign Gold Bonds. The research focuses on understanding how much investors know about SGBs, including their benefits such as fixed interest income, safety, and exemption from storage-related risks. It also examines the factors that influence investor behavior, such as risk preference, level of financial knowledge, trust in government schemes, and ease of investment. The study reveals that although awareness about SGBs is improving, many investors still prefer physical gold due to habit, emotional value, and lack of complete information about financial alternatives. Limited awareness and insufficient promotion remain key challenges in increasing participation. The study concludes that better investor education, along with effective communication strategies, can improve the adoption of Sovereign Gold Bonds. Encouraging informed decision-making can help investors shift toward safer and more efficient investment options.

Key Words: Sovereign Gold Bonds, Exemption, Economic, Cultural

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Impact of Organizational Culture in Parul Sev ashramHospital Impact of Organizational Culture in Parul SevashramHospital impact of organizational culture

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Abstract

Organizational culture: shared values, beliefs, and norms. Influences employee behavior, decision-making, teamwork. In healthcare: essential for coordination, empathy, and safety. Parul Sev Ashram: healthcare, Academic Training Facilit y. Culture shapes both service delivery and medical education. Understand the prevailing organizational culture. Assess perceptions of leadership, communication, and teamwork. Identify links between culture and job satisfaction/motivation. Explore conflict resolution and feedback mechanisms. Provide actionable recommendations for cultural improvement.

Key Words: Working Life Balances,Health care,Working culture,

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Hybrid Work Model: Challenges And Opportunities For HR

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Abstract

The hybrid work model is a flexible work arrangement that enables employees to divide their working hours between remote locations (such as home) and the office. It allows employees to choose their work setting based on their job requirements, preferences, and company guidelines. A mix of remote and on-site work, Flexible scheduling options, Heavy use of digital communication and collaboration tools, Focus on outcomes instead of physical presence, Improved work-life balance, Fixed hybrid: Specific days for office attendance, Flexible hybrid: Employees choose their work location, Remote-first: Remote work is prioritized, with occasional office visits, Importance of Hybrid Work in Modern HRM ,Hybrid work has become an essential part of contemporary HR practices because it directly affects productivity, employee morale, and organizational performance.

Keyword: Flexible working model, modern HRM, Employee Morale

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Challenges Faced by IT Recruiters in Recruitment Processes

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Abstract

The Information Technology (IT) sector plays a significant role in global economic growth, increasing the demand for skilled professionals and making recruitment a critical organizational function. This study explores the challenges faced by IT recruiters in modern recruitment processes within a highly competitive and rapidly evolving technological environment. The research adopts a descriptive methodology, utilizing primary data collected through surveys and questionnaires from IT recruitment professionals, along with secondary data from academic and industry sources. Key challenges identified include skill gaps between candidate capabilities and job requirements, intense competition for limited talent pools, and high candidate dropout rates during hiring stages. Additionally, rapidly changing technology demands, unrealistic salary expectations, and pressure to fill positions quickly further complicate the recruitment process. The find ings indicate that recruiters frequently face skill mismatches and delayed candidate responses, which negatively affect hiring efficiency. The study concludes that these challenges can be addressed through the adoption of advanced recruitment tools, improv ed screening techniques, and enhanced communication strategies. Furthermore, building strong talent pipelines and streamlining recruitment processes can significantly reduce time-to-hire and improve overall recruitment outcomes.

Keywords: Talent Acquisiti on; Skill Gap; Candidate Dropout; Recruitment Challenges; Hiring Process

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Role of FinTech in Reshaping the Indian Financial Services Sector"

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Abstract

In today's rapidly digitizing economy, Financial Technology (FinTech) has emerged as one of the most dynamic and transformative forces in the global financial landscape. India, driven by initiatives such as the Digital India Mission, Unified Payments Interface (UPI), and Jan Dhan–Aadhaar–Mobile (JAM) trinity, has become one of the world's fastest - growing FinTech markets. Through this research, to analyze how FinTech innovations are reshaping the traditional financial services sector, enhancing customer experience, improving financial inclusion, and promoting economic growth. It is examining key areas such as digital payments, lending, wealth management, Insurtech, and regulatory developments. It also highlights the challenges of data security, consumer protection, and infrastructural disparities that influence the sustainable growth of FinTech in India. The process of conducting this research has greatly enhanced my understanding of how innovation, policy, and technology converge to redefine financial services in India. It has also deepened my appreciation of the collaborative relationship between FinTech firms, traditional banks, regulators, and consumers in driving this transformation.

Key words: JAM, Digital mission , UPI, fintech market

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A comparative study: A Pre-GST Vs Post-GST in India

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Abstract

GST brought simplicity, uniformity, and transparency to India's taxation system. Mass - market goods became cheaper, helping consumers. Luxury and construction sectors saw higher rates, aligning with the government's aim to tax luxury more and essentials less. Businesses benefited from ITC and removal of cascading taxes, though compliance requirements increased. Under pre-GST, execise & entry tax got added into the VAT base (tax on tax). Under post-GST, seamless credit removes cascading lowering customer invoice by ₹13,300 in this case. GST leads to lower tax incidence, no cascading effect, and simpler compliance for manufacturers. GST charged only on base value, eliminating cascading. Many studies focus on specific sectors or industries, potentially overlooking the broader macroeconomic effects of GST. A comprehensive analysis requires considering the impact on various sectors, including manufacturing, services, and agriculture, as well as the overall economy. GST was implemented alongside other significant economic events and policy changes, making it hard to isolate the specific impact of GST on various sectors. Factors like economic cycles, global market conditions, and other government policies can influence outcomes, making it challenging to attribute changes solely to GST.

Key words:

Cascading effect, Pre-GST and Post GST, Impact

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Abstract ID :	OPT3-0032

Analysing the notion of global commons and global network of submarine cable

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Abstract

The evolution of submarine communication cable dates back to the 18th century and from 1884 the systematic evolution of the submarine cable have been started and the same carried forwarded by the advent of United Nations Convention on the Law of the S ea in 1982 which is universally accepted which also lays the procedure for exploration covering all the areas of sea however, with the advent of biodiversity beyond national jurisdiction will change the scenario as the instrument will accurately cover all the sea related aspect specifically High Seas. The primary treaty related to submarine cables is United Nations Convention on the Law of the Sea as it provides for the freedom to lay and maintain cables in high seas. Implementation of the Biodiversity Beyo nd National Jurisdiction may restrict the laying off submarine cables in the areas beyond national jurisdiction especially in marine protected areas and the schemes which permits the same may come into conflict with the high – seas. Considering the present scenario, the same may lead to authority and jurisdiction overlap and in order to eradicate it streamlining the authorities is need of the hour. The research will be mainly based upon various treaties, committee reports and various policies. The research will contribute to sustainable solution to sustainable development.

Keywords

High -sea; submarine cables; global common; governance; sustainable development

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Impact of Digital Financial Services on Financial Inclusion: Empirical Evidence from Gujarat

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Abstract

Financial inclusion is essential for inclusive economic growth and equitable access to formal financial services. In India, rapid expansion of digital financial services such as mobile banking, Unified Payments Interface (UPI), internet banking, and fintech platform s has significantly improved financial access among underserved populations. This study examines the impact of digital financial services on financial inclusion with empirical evidence from Gujarat. Using primary and secondary data from selected districts, the study applies descriptive statistics, correlation, and regression analysis to evaluate the relationship between digital finance adoption and financial inclusion indicators such as account usage, transaction frequency, savings behaviour, and access to financial products. The findings reveal that digital financial services have positively influenced financial inclusion by increasing convenience, affordability, and participation in the formal financial system. However, challenges such as digital illiterac y, cybersecurity concerns, and limited internet connectivity in rural and tribal areas continue to hinder inclusive adoption. The study concludes that targeted policy support, digital literacy programmes, and infrastructure development are necessary to strengthen sustainable and equitable financial inclusion in Gujarat.

Keywords: Digital Financial Services, Financial Inclusion, FinTech, UPI, Gujarat, Inclusive Growth

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A study on effectiveness of reward system on the performance of Employees at GNFC

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Abstract

The chemical industry is a vital and expansive sector that significantly contributes to the global economy by producing a wide range of essential products. These include basic chemicals such as petrochemicals, inorganics, and polymers, as well as specialty and consumer chemicals like adhesives, coatings, detergents, cosmetics, and pharmaceuticals. The industry supports numerous other sectors, including automotive, agriculture, healthcare, and construction, highlighting its broad industrial integration. Operating on a global scale, with major production hubs in North America, Europe, and Asia, the industry plays a key role in international trade and employment generation. Innovation , driven by continuous research and development, remains central to enhancing product performance and meeting evolving consumer demands. However, industry faces significant challenges, particularly in achieving sustainability and complying with complex regulatory frameworks. Increasing environmental concerns have led to a focus on reducing emissions, minimizing waste, and developing eco-friendly solutions. Additionally, digital transformation is emerging as a key opportunity for improving operational efficiency and fostering innovation. The future of the chemical industry will depend on its ability to balance economic growth wit h environmental responsibility while maintaining competitiveness in a rapidly evolving global market.

Keyword: Consumer chemicals, innovation, Operational Efficiency, environmental responsibility

Sigma University International Conference Advanced Research in Science, Technology, and Management (SICARSTM–2026)
28th-29th April 2026

Abstract ID :	OPT3-0035

Empirical relationship between macroeconomic variable and capital market: with reference to Indian market

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Abstract

The study aims at examining how macroeconomic indicators affect the performance of stock markets by using the Indian Stock Exchange. This paper strikes up correlation among the variable and its relationship with each other and its influence level on using the existing empirical research conclusion, and gets its reliability with ADF, Akaike Information criterion and Schwarz Bayesian criterion, contemporaneous cross correlation analysis, granger causality test, cointegration test, Wald test method. Upon testing a vector error correction model, it shows that changes in Indian stock market index do perform a cointegrating relationship with changes in money supply (M1 and M2), interest rate, exchange rate, reserves and industrial pro duction index (PPI and PMI), Inflation rate (CPI), GDP, Unemployment rate, FDI and Balance of payment. Our lag exclusion test shows that all ten variables contribute significantly to the co -integrating relationship. This shows that the Indian stock market is sensitive to changes in the macroeconomic variables. Furthermore, based on the variance decomposition analysis, this paper highlights that Indian stock market has stronger dynamic interaction with reserves and industrial production index as compared to money supply, interest rate, and exchange rate. Its Originality/value is contribution of this study is its emphasis on macroeconomic variables and stock market performance in a developing country, since most studies have concentrated on stock markets and economic growth in advanced economies, developed economic and small economic.

Key Words: Macroeconomic variable, Stock Market, India and VAR Approach

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Liquidity Mismatch and Systemic Risk in Indian NBFCs: Evidence from Asset–Liability Management Structures in an Emerging Economy

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Abstract

In developing economies like India, Non-Banking Financial Companies contribute significantly towards enhancing credit access and catering to economic activities. Nonetheless, their dependence on short-term funding to underwrite long-term assets has given way to fears of liquidity mismatch and systemic risk. The focus of the paper is to investigate and quantify mismatches between assets and liabilities, and their potential implications to financial stability. The study is quantitative in nature and collects secondary data from selected financial institutions of India, covering the specific time. Structural imbalances are assessed through key indicators including maturity gaps, liquidity positions and funding patterns. These results demonstrate the presence of sizable mismatches, which amplify exposures to liquidity shock and refinancing risks, especially in times of financial distress. These vulnerabilities can also see beyond the individual institutions to affect the financial system through linkages with other entities. The need for increased management of risk and greater monitoring of asset and liability structures, as well as stricter regulatory oversight to address systemic risk. The findings provide useful insights for policymakers and financial institutions to promote stability and ensure sustainable growth in the financial sector.

Keywords

Liquidity Mismatch; Systemic Risk; Non-Banking Financial Companies (NBFCs); Asset–Liability Management; Financial Stability; Emerging Economy; Maturity Gap Analysis; Liquidity Risk; Financial Intermediation; Regulatory Framework

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Innovative Teaching Techniques for Enhancing Curiosity and Learning Outcomes

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Abstract

True education goes beyond memorizing facts; it focuses on training the mind to think and analyze. Curiosity plays a fundamental role in the learning process by encouraging active engagement and deeper understanding among students. In modern education, particularly in professional and technical domains, the integration of div erse teaching techniques has become essential to address varied learner needs. This paper explores the evolution of learning theories and emphasizes the importance of effective lesson planning and appropriate teaching methodologies. It highlights the role of large and small group teaching approaches and introduces innovative strategies such as the Three W's technique to enhance student participation and curiosity. The study concludes that a well -planned, learner-centered, and interactive teaching approach significantly improves learning outcomes and classroom effectiveness. The selection of teaching methods depends on various factors, such as the topic to be taught, the type and number of students, and the availability of infrastructure in the institution. W hatever method is used, it should fulfil the basic criteria of being innovative, engaging, and scientific in nature. Traditional lecture delivery often becomes a passive transfer of knowledge from teacher to students, which can make teach monotonous (Prince, 2004). There are numerous methods that can be adopted for effective teaching, such as advanced audio-visual aids, eye contact, healthy communication, and group discussions. However, innovative techniques can further transform these methods and help create curiosity among students. Examples of such techniques include problem-based learning, differentiating between similar concepts, encouraging active student involvement during teaching, designing purposeful and engaging activities, and incorporating e lea rning, especially in the current scenario (Savery & Duffy, 1995; Dochy et al., 2003).

Keywords:

Innovative Teaching Strategies, Curiosity-Driven Learning, STEM Engagement Problem-Based Learning, W-Model.

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A ComprehensiveStudy on Cryptocurrencyand BlockchainSystem and Its Applications in the Financial Sector

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Abstract

This Study Examines The impact of blockchain technology and cryptocurrencies on India's financial sector. Using secondary data, it analyses key blockchain featuresdecentralization, immutability, and security —and their role in enhan cing efficiency, transparency, and fraud reduction in financial systems. The research evaluates the involvement of regulatory bodies such as RBI and SEBI, highlighting key challenges including legal uncertainty and institutional constraints. It further exp lores blockchain applications by Indian banks and fintech firms through case studies and pilot projects, assessing their potential to transform traditional financial systems and promote financial inclusion. The study also reviews cryptocurrencies like Bitc oin and Ethereum, comparing them with traditional investment instruments while addressing risks such as volatility and cybersecurity concerns. The findings suggest that blockchain and cryptocurrencies hold significant potential to reshape India's financial ecosystem, provided there is a balanced regulatory framework, continuous innovation, and effective public –private collaboration.

Keywords:

Blockchain Technology, Cryptocurrency, Financial Sector, Decentralization, Immutability, Digital Payments, Finan cial Inclusion, Regulatory Framework, RBI, SEBI, Bitcoin, Ethereum, Fintech, Cybersecurity, Fraud Prevention, India

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Peer-to-Peer Skill-Matched Learning Network Using Artificial Intelligence

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Abstract

Conventional learnin g platforms connect users to content but consistently fail to exploit the instructional capacity latent within the learner community itself. The paper presents a Peer-to-Peer Skill Matched Learning Network (P2P-SMLN), an artificial intelligence -driven system that enables bidirectional knowledge exchange between participants who occupy the roles of instructor and learner simultaneously. The platform combines a multi -stage AI matching engine with an integrated real-time collaboration environment. Skill profil es are first converted into dense vectors via TF-IDF (Term Frequency-Inverse Document Frequency)-weighted GloVe (Global Vectors for Word Representation) embeddings, and then pairwise compatibility is computed through a novel Reciprocal Match Score (RMS). It is the harmonic mean of two directional cosine-similarity values, which guarantees mutual benefit in every optimized pairing. A hybrid recommendation engine, blending content -based and collaborative filtering, prevents cold -start failures and refines itself continuously from post-session feedback. Population-level scheduling is performed as a maximum -weight graph -matching problem. Deployment projections indicate that per-user annual operating cost falls below USD 4 at deployments exceeding 5,000 registered users, representing a substantial saving over vendor -led training programs. The architecture targets corporate upskilling, higher -education peer tutoring, and professional mentoring communities.

Keywords: Peer-to-Peer Learning; AI Matching Engine; Reciprocal Match Score; Collaborative filtering; GloVe embeddings

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An Empirical Investigation of the Effectiveness of Sustainable Leadership Shaped by Emotional Intelligence among Teachers in Academic Settings

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Abstract

Emotional Intelligence (EI) is increasingly recognized as a critical competency for effective leadership, particularly in academic environments where teachers play a dual role as educators and institutional leaders. In the context of evolving expectations influenced by Generation Z, emotional awareness and adaptability have become essential for fostering sustainable leadership practices within higher educational institutions (HEIs).A mixed-method approach was adopted to explore the relationship between EI and sustainable leadership practices. Data were collected from 100 teachers, including those in academic and administrative roles, across higher educational institutions. Quantitative data were gathered using standardized measurement scales, with reliability assessed through Cronbach's alpha and statistical analysis conducted using SPSS. Additionally, qualitative insights were obtained through semi-structured interviews, and the data were analyzed using NVivo through thematic coding. It will be better equipped to adopt sustainable leadership practices, effectively manage classroom and institutional challenges, and respond to the diverse expectations of Generation Z learners and increased institutional resilience. sustainable leadership and overall effectiveness among teachers in HEIs.

Keywords

Emotional Intelligence (EI), Sustainable Leadership, Teacher Effectiveness, Higher Educational Institutions (HEIs), Generation Z

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