



RES NOVAE

Research and Development News: CURIN & CRIO

Cover Story:

Sharing Expertise and Knowledge: Workshops and Talks Delivered by Our Faculty Members at Multiple Forums

Vol. 2024
Issue 2 | April – June



Mega Startup Event

InvestX - Pitch | Partner | Prosper

Highlights

- Key collaborative initiatives in research and development kickstarted
- State-of-the art workshops and events organized
- Four upcoming conferences in 2024
- Individual Contributions: Distinguished Researcher Award, Spearheading a Multinational Project, Book Publication, etc.

254 Research Publications | 116 Patents Granted

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Editorial

Our faculty members and researchers are contributing immensely by delivering invited workshops and seminars at multiple forums across the country. I congratulate my fellow colleagues for their exceptional contributions in this regard. The cover story of this issue features all those invited sessions. Further, our faculty members are sharing their expertise by spearheading state-of-the-art projects, organizing top-quality academic conferences, representing technical committees of reputed journals and conferences, etc. You will find the details of all these initiatives in this issue.

We have forged a lot of partnerships to carry out joint projects and research. One of the key partnerships that kicked off in the last quarter was the signing of a MoU with the Indian Air Force (IAF) to work on advanced projects involving aircrafts and helicopters.

The previous quarter also witnessed a mega start-up event, InvestX, that benefitted not only the student and faculty start-ups at Chitkara University but also the entire startup community, working closely with the Chitkara Innovator Incubator Foundation (CIIF). Congratulations to CIIF for the success of this mega event.

Congratulations also to Dr. S.N. Panda for winning the Distinguished Researcher Award. In the Insights section of this issue, you will find details of exceptional research work being carried out in Dr. Panda's lab.

In the last quarter, 116 patents were granted to Chitkara University, which is a big number! You will find the details of patents filed by our researchers in the last quarter in this issue.

Finally, we organized a lot of workshops, which benefitted the stakeholders in the entire region. Some of these workshops that we conducted in the last quarter were funded by government agencies, including DST, NCSTC, PSCST, etc.

We hope our readers will find the details of our initiatives and activities useful. We will be delighted to receive feedback.

Thanks,

Sagar Juneja, PhD

Editor, Res Novae

Sharing Expertise and Knowledge: Workshops and Talks Delivered by Our Faculty Members at Multiple Forums

Our faculty members and researchers receive invitations to deliver talks and workshops at multiple platforms. Such forums provide wonderful knowledge sharing opportunities as well as opportunities for meaningful collaborations. We are sharing with you the details of all such sessions conducted by our faculty members during April – June 2024.

India's Rising SaaS Market: A Beacon of Growth (Innovation Mission Punjab Centre)

India has secured the 2nd position globally in the Software as a Service (SaaS) industry, valued at \$257 billion USD and projected to soar to \$1298 billion USD by 2030. Dr. P.K. Khosla – Pro VC, CURIN, Chitkara University, Punjab, inaugurated an event on SaaS where he was honored by Dr. P.J. Singh, Chairman of CII, during the inaugural session. Held on April 12 at Innovation Mission Punjab Centre, this event marked a significant milestone in recognizing India's burgeoning SaaS sector. Additionally, it also provided an invaluable opportunity for many



students from Chitkara University to gain insights into this promising field, which is poised to revolutionize the global tech landscape. The event, which was attended by over 100 participants, underscored India's pivotal role in the SaaS industry and highlighted the immense potential for future growth and innovation.

Embedded Systems Design Workshop (Government Polytechnic, Ambala City)

Dr. Bhanu Sharma – Assistant Professor, Research, CURIN, delivered a One-day Invited Workshop on Tinkercad and Embedded systems on April 23 at the Government Polytechnic, Ambala City. It was an opportunity for the electronics and communication engineering students of this institution to delve into the practical aspects of Tinkercad, a powerful tool for designing and simulating electronic circuits. Additionally, they also got an exposure of embedded systems by working on Arduino platform in the workshop. Students will utilize these practical concepts of electronics in building their academic projects.



Hands-on Workshop on Basic Cell Culture (King George's Medical University, Lucknow)

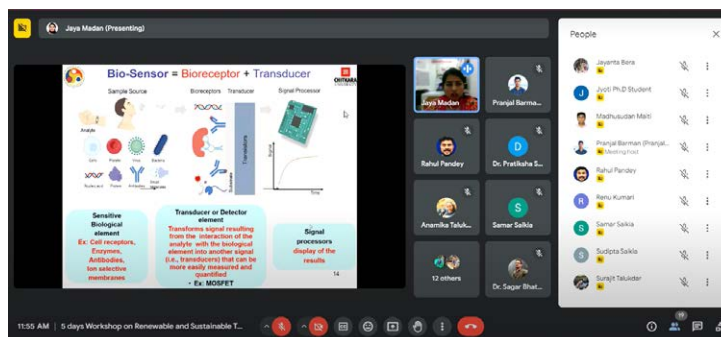
Dr. Satyam Kumar Agrawal – Professor, Research, Centre for In Vitro Studies and Translational Research (CVSTR), CURIN, was invited as a resource person in a One-day Hands-on Workshop on Basic Cell Culture that was organized by the Department of Health Research - Multi-Disciplinary Research Unit (DHR-MRU), King George's Medical University (KGMU), Lucknow, on June 10. The workshop was convened by Dr. Sumit Kumar – Research Scientist, KGMU, Lucknow, and was attended by faculty members, residents, research scholars, and students of nearby institutions.

In the theory session, participants were introduced to the science behind basic cell culture, including details about primary and secondary cell culture, handling of cell lines, counting of cells, trypsinisation, cryopreservation, and its applications in cytotoxicity assays and anticancer studies. The participants also had hands-on experience as they observed the cancer cell lines (MCF-7 and HeLa) under a microscope and witnessed the demonstration of trypsinisation and passaging procedures.



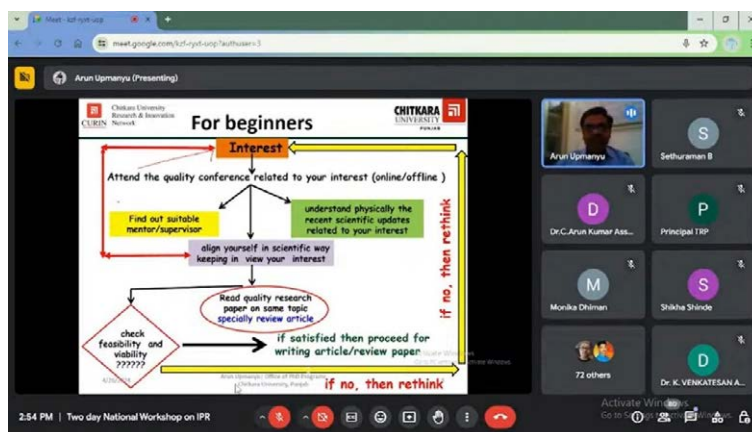
Workshop on Renewable and Sustainable Technologies (IIT Guwahati)

Dr. Rahul Pandey – Assistant Director, Research, CURIN, and Dr. Jaya Madan - Assistant Professor, CURIN, served as resource persons in the five-day Advanced Workshop on Renewable and Sustainable Technologies, which was organized by IIT Guwahati - Technology Innovation & Development Foundation (TIDF) during April 1–5. Dr. Jaya's talk was titled FET Technology for Advanced Biosensing. She discussed how FETs can be functionalized with biological molecules like enzymes, antibodies, and DNA probes to detect specific biomolecules such as proteins, DNA, and pathogens. This integration of electronics with biology opens a world of possibilities for developing sensitive, rapid, and portable biosensing devices.



Expert Talk at the National IPR Workshop (SRM TRP Engineering College, Tamil Nadu)

On the occasion of the World Intellectual Property Rights (IPR) Day, April 26, Dr. Arun Upmanyu - Professor, CURIN, was invited to deliver an expert talk at the National Workshop on IPR. Served as a convergence point for scholars, faculty members, and budding researchers eager to hone their skills in academic writing, it was organized by the Department of Physics, SRM TRP Engineering College in Tiruchirappalli, Tamil Nadu, India. Dr. Arun delivered a talk on the details of crafting research articles, wherein he delved into the finer points of research paper composition,



emphasizing the importance of structure, effective data presentation, citation conventions, and the art of lucid and succinct scientific writing. He offered pragmatic advice and actionable strategies gleaned from his own experiences of navigating the intricate landscape of research paper publication. The participants were actively engaged in the session as they shared their research journeys and received guidance tailored to their needs. Additionally, the open exchange of ideas not only fostered a sense of camaraderie among the attendees, but also paved the way for meaningful networking opportunities. It was attended by over 75 participants, including research scholars and faculty members from different disciplines.

Session on Immersive Technologies for Design Applications (Department of Interior Design)

Dr. Bhanu Sharma was invited by the Department of Interior Design, Chitkara School of Planning and Architecture, Chitkara University, Punjab, to deliver an expert session on Design Disruption: Embracing Immersive Innovation in Interior Spaces. Held on April 11, the session was jointly conducted by Dr. Bhanu and Mr. Narinder Pal Singh - S-Trude Technologies, Bengaluru and attended by 50 students. It provided a wonderful exposure of the immersive technologies to the students, who seemed quite keen on using these technologies for interior design applications.



India's Ayushman Bharat Digital Mission: Transforming Healthcare with AI (Department of Physiotherapy)

India's Ayushman Bharat Digital Mission (ABDM) is rapidly becoming a backbone of the nation's digital health infrastructure, significantly reshaping healthcare delivery for its citizens. Under the aegis of the Institution's Innovation Council (IIC), Dr. PK Khosla delivered an expert talk titled Emerging Trends: Exploring the Intersection of AI & Healthcare Technologies in Revolutionizing Patient Care on April 20 for the undergraduate and postgraduate students, as well as faculty members of the Department of Physiotherapy, Chitkara University, Punjab. Dr. Khosla highlighted the numerous opportunities and challenges presented by AI in healthcare. He discussed how AI technologies can revolutionize patient care and provided insights into exploring and negotiating these advancements. This talk underscored the critical role of AI in transforming India's healthcare landscape, aligned with the ambitious goals of the ABDM.



Driving India Forward: Innovative Technologies Shaping the Future (Department of Applied Sciences)

The Department of Applied Sciences, Chitkara University, Punjab, hosted an expert talk by Dr. P.K. Khosla. The event was titled Driving India Forward: Innovative Technologies Shaping the Future and organized in collaboration with the Indian Society for Technical Education (ISTE) student chapter and Institution's Innovation Council (IIC) to mark the celebration of the National Technology Day. The first-year engineering students and faculty members of the Department of Applied Sciences attended that talk, which was focused on the pivotal role of innovative technologies in propelling India towards a brighter future. The audience was delighted to learn about the India Stack, which is the largest open API in the world, and how it has become a cornerstone of our country's digital infrastructure. Dr. Khosla also highlighted the importance of National Technology Day during his talk that was attended by over 150 students and convened by Dr. Mohit Kakkar – Assistant Dean and Professor, Department of Applied Sciences, Chitkara University, Punjab.



Mastering Research Paper Writing with Overleaf (CRIO)

The Office of Research Publications (ORP), CRIO, Chitkara University, Punjab, organized a hands-on session on Mastering Research Paper Writing with Overleaf on May 18. It was delivered by Dr. Himanshi Babbar – Assistant Professor, Research, CRIO, and attended by 21 participants, including research scholars and faculty members. Through hands-on practice, participants learned how to develop their research manuscripts as per the formatting requirements of different journals. Dr. Himanshi shared useful insights for effectively using the Overleaf platform, which is an online LaTeX editor.



Emerging Interdisciplinary Technologies in Engineering (DICE)

A hands-on workshop on AR application development was conducted by a team from the Immersive and Interactive Technologies Lab, CURIN, comprising of Dr. Amanpreet Kaur (Assistant Professor), Priyanka, Neha, and Akarsh (Research Scholars) on June 27. It was held as part of the Five-day Faculty Development Program (FDP) on Emerging Interdisciplinary Technologies in Engineering that was organized by the Department of Interdisciplinary Courses in Engineering (DICE), Chitkara University, Punjab. The FDP was attended by 15 faculty members from different engineering departments of the university.



Forging Collaborations

Collaborations with like-minded people and institutions are very important for the advancement of research and innovation. We, at Chitkara University, have established several impactful tie-ups that are yielding fruitful results. The details of some of the important collaboration initiatives taken between April and June 2024 are as follows:

Participation in the Global Sustainable Development Congress, Bangkok, Thailand

A delegation from Chitkara University headed by Dr. Madhu Chitkara – Pro-Chancellor, Chitkara University, and comprising Dr. Amit Mittal (Pro VC, Research Programs), Dr. K.K. Mishra (Pro VC, Quality Assurance), and Dr. Rina Angel (VP, Infrastructure Enhancement), attended the Global Sustainable Development Congress organized by Times Higher Education on June 10–13 in Bangkok. This event brought together a diverse array of representatives from higher education institutions, governments, industry, and civil society, fostering four days of insightful thought leadership, engaging sessions, panel discussions, and hands-on workshops. The focus of this congress was on addressing the pressing sustainability challenges in line with the United Nations' Sustainable Development Goals (SDGs). It also provided a platform for building collaborations with universities across the globe for research and faculty exchange programs.

Making New Alliances: Memorandum of Understanding with the Indian Air Force

Chitkara University signed an MoU with the Indian Air Force (IAF) on May 27, marking the culmination of prolonged and sustained efforts. This partnership opens doors for our teams to work on advanced projects involving aircrafts and helicopters. A visiting team of IAF engineers and pilots addressed students and faculty and presented an opportunity to collaborate on Immersive Technology project for helicopters.

During the visit, one of the pilots shared a nostalgic moment about flying the HPT aircraft displayed near the main gate of the Chitkara University campus while discussing employment opportunities with the students. The session ended with a lively Q&A session with the



students, highlighting the relevance of the topics and interest of the students. As many as 300 engineering students and faculty members attended this session and witnessed the signing of the MoU. Dr. P.K. Khosla – Pro VC, CURIN, Chitkara University, Punjab, has been leading this initiative at Chitkara University.

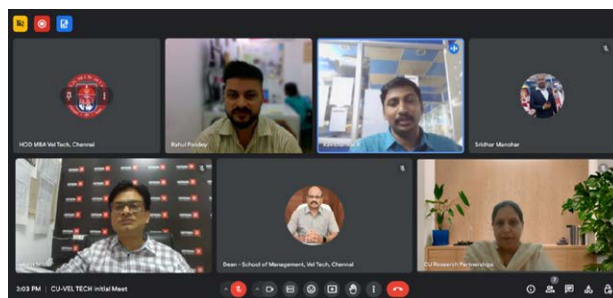
Collaborative Work at the Centre for Life Sciences - Molecular Biology and Bioinformatics Division

The Centre for Life Sciences (CLS), CURIN, led by Dr. Varsha Singh – Associate Professor, CURIN, hosted two students from Netaji Subhas University of Technology, Delhi, and the Central University of Jammu, Jammu and Kashmir, who spent two weeks (May 9 – 24) at the CLS and completed their experimental work. The three institutions aim to collaborate on expanding research work towards the generation of synthesizing metal-organic frameworks (MOFs), and pivotal porous crystalline materials for industrial applications using the solvothermal technique. The CLS plan to work for advancing MOFs towards drug delivery nanocarriers for drug loading capacity and controlled release at the target organ site in the ongoing work on non-communicable disease at the centre.



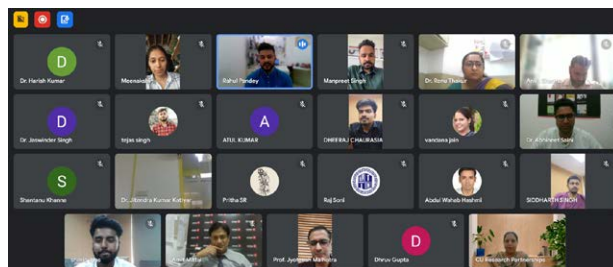
Initial Meet & MoU Signing with Vel Tech, Chennai

An online meeting was held on May 30 to explore the possibilities of building a research partnership between Chitkara University and Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai. During this meeting, both institutions explored common interests, initiating discussions on potential areas for collaboration spanning diverse fields such as technology, innovation, entrepreneurship, business management, and healthcare. It was followed by a signing of a MoU on June 28 between the two institutions, which aims to enhance research collaboration and promote academic excellence, marking a significant milestone in the joint commitment of the two institutions to advancing knowledge and innovation across various disciplines. The MoU encompasses collaborative research projects, organization of conferences, workshops and seminars, sharing of research facilities and infrastructure, and joint publication and dissemination of research findings.



Research Sandpit with NIT, Delhi

A collaborative Research Sandpit that took place on June 5, 2024, brought together 11 faculty members from Chitkara University and 21 participants, including faculty members and research scholars from the National Institute of Technology, Delhi, all from the field of Additive Manufacturing, to discuss the innovative ideas and collaboration opportunities. Several participants contributed distinct viewpoints, fostering engaging discussions and exploration of ideas for joint research efforts. Both the institutions expressed the desire to conduct similar sandpits across different disciplines and departments in the near future.



Research@ CURIN and CRIO

**Top Research Papers of the Quarter by CURIN and CRIO
(Published during April – June 2024)**

Faculty members and research scholars from CURIN and CRIO publish high-quality research articles in top peer-reviewed journals and conferences. In this section of the newsletter, we select high impact research papers from CURIN and CRIO and attempt to discuss them in the form of short summaries.

The research papers discussed in this issue are the ones that were published between April and June 2024. The complete list of publications by CURIN and CRIO faculty members and scholars during this period is available in a separate section.

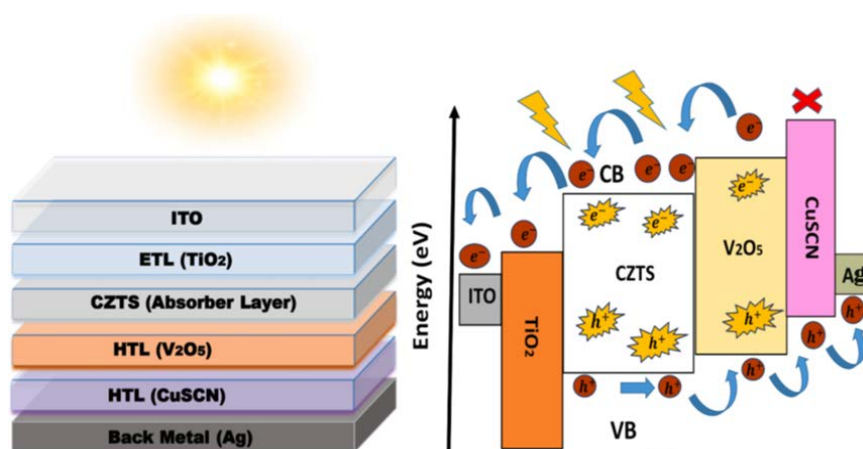
Highly efficient hybrid-solar cells for sustainable energy solutions

By: Shivani, JRF, CURIN

This article is based on the research paper titled 'Efficiency enhancement of hybrid-solar cell by optimizing CuSCN and V2O5 based dual hole transport layer' published by Dr. Jaya Madan from CURIN, Chitkara University, Punjab, in Elsevier journal entitled Solar Energy.

In response to the global demand for sustainable energy solutions, a recent study explored advanced third-generation solar cell technologies. This research focuses on hybrid solar cells (HSCs), aiming to enhance efficiency through innovative design. Utilizing a dual hole transport layer (HTL), the study integrates copper zinc tin sulfide (CZTS) to achieve remarkable results. Simulations involved using TiO₂ and dual carrier transport layers (CTL) of V2O5 and CuSCN, which have specific bandgaps of 3.4

and 2.2 eV, respectively. This dual HTL configuration significantly boosts the open-circuit voltage (VOC) to 1.102 V, resulting in a notable efficiency of 23.45%. Additionally, the research examines the effects of thickness, defect density, and temperature on the device's performance. This work highlights the potential of dual-HTL HSCs in advancing solar energy technology, offering a promising pathway toward meeting the world's increasing energy needs with higher efficiency and sustainability.



The illustration has been borrowed from the published paper

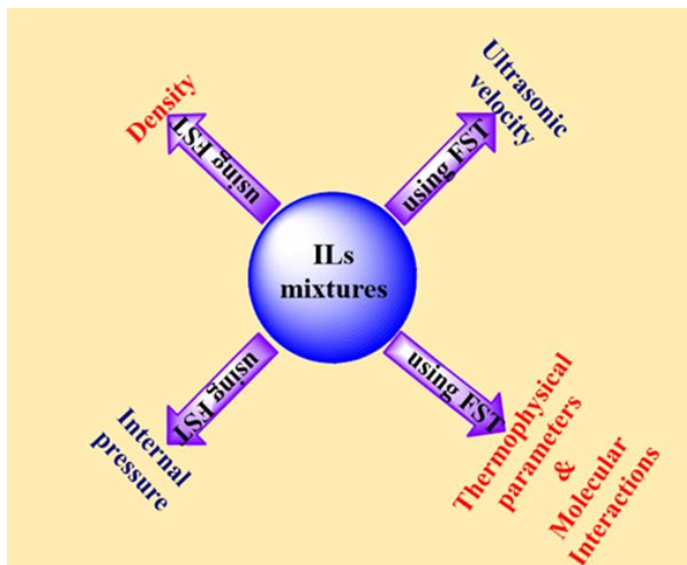
Physical parameters prediction of ionic liquid mixtures for industrial applications using Flory's statistical theory

By: Prof. (Dr.) Arun Upmanyu - Assistant Director, Research, CURIN

This article is based on the research paper titled 'Estimation of ultrasonic velocity, density, internal pressure, and thermo-physical parameters of ionic liquid mixtures: Application of Flory's statistical theory' published by Dr. Arun Upmanyu and Dr. Pankaj Kumar from CURIN, Chitkara University, Punjab, in ACS OMEGA, a lead journal of American Chemical Society.

Nowadays, theoretical and computational studies of liquids and their mixtures are the key areas of research in industry. It significantly influences cost optimization and material management within the manufacturing sector. From time to time, many theoretical and computational theories or models have been proposed and implemented to predict the physical properties of industrially useful liquid mixtures.

Flory's statistical theory (FST) stands out as the leading theoretical model for predicting properties such as density, ultrasonic velocity, surface tension, molar volume, and internal pressure in liquid mixtures, surpassing other models in prominence. It is based on the reduced equation of state, involving reduced volume, reduced temperature, critical volume, critical pressure, and critical temperature. The distinctive feature of FST lies in its minimal requirement of input parameters. This model relies solely on the coefficient of volume expansion and isothermal compressibility as essential input parameters.



The illustration has been borrowed from the published paper

However, in general, FST has been employed to predict the physical parameters of organic liquid and polymer mixtures. The limited work is reported for ionic liquid mixtures and therefore, in the present study, we have employed the FST on the eight ionic liquid mixtures involving water as a solute and [BMim][dca], -[BMim][TfO], -[BMpy][TfO], -[BMpyr][dca], -[BMpyr][TfO], -[EEPy][ESO₄], -[HMim][dca], -[MPy][MSO₄] are as solvents. The density, surface tension, molar volume, internal pressure, and ultrasonic velocity are predicted using the FST, as shown in the illustration. The predicted values of the density and molar volume are in good agreement with the measured values, which endorses the applicability of FST for these systems. Whereas the predicted values of ultrasonic velocity and internal pressure are in reasonable agreement with experimental values, this revealed that the FST can be employed to study these parameters within a certain limit.

Additionally, some other thermodynamical properties, namely, energy of vaporization, heat of vaporization, cohesive energy density, solubility parameter, and polarity index, are computed using FST for the same mixtures. The purpose of evaluating these parameters was to investigate the molecular interactions prevalent in these systems. Molecular interactions are the physical forces between molecules that affect their physical properties, especially in liquid mixtures. Herein, the variation of these properties with respect to temperature and concentration infers the dominance of solute-solute interactions over solute-solvent interactions in the water-rich region of the mixture. Also, the behavior of energy of vaporization and heat of vaporization with respect to the concentration of water in the mixtures indicates that the cohesive forces gradually decrease with an increase in the water content in the mixtures. This study provides valuable insights into these mixtures, offering significant potential for industrial applications.

The future of small retailers in the digital age: Challenges and opportunities

By: Dr. Balraj Verma – Associate Professor, DRC, CBS

This article is based on the research paper titled 'Resistance to O2O technology platform adoption among small retailers: The influence of visibility and discoverability' published by Umesh Chawla, Dr. Balraj Verma, and Dr. Amit Mittal from DRC, CBS, Chitkara University, Punjab, in an Elsevier journal entitled Technology in Society.

In an era where digital transformation is reshaping the retail industry, small retailers, face an uncertain future. Our recently published research delves into this very issue, examining the resistance of small retailers to adopt online-to-offline (O2O) technology platforms. These platforms, which integrate digital and physical retail experiences, promise to revolutionize the way small retailers operate, yet their adoption remains limited.

The Digital Shift: A Double-Edged Sword

The COVID-19 pandemic accelerated digitalization across industries, including retail. E-commerce platforms saw

a surge as consumers turned to online shopping for convenience and safety. However, this shift posed significant challenges for physical stores, pushing them to rethink their business models. The question we sought to answer was: Why are small retailers resistant to adopting O2O technology platforms, which could potentially bridge the gap between online convenience and offline personalized service?

Understanding Resistance: Functional and Psychological Barriers

This study highlights the concept of consumer resistance, which refers to the hesitation or refusal to adopt new products or services. We used the Innovation Resistance Theory (IRT) to explore the barriers small retailers face. These barriers are categorized into functional (e.g., perceived risk, complexity) and psychological (e.g., tradition, perceived vulnerability) aspects. The study's findings showed that the usage barrier—followed by the image barrier, perceived privacy vulnerability, and inertia—was the most crucial factor contributing to resistance against the attractiveness and usage intention of O2O platforms. Concerning the value barrier and information smog, the study found no statistically significant evidence.

Visibility and Discoverability: Key to Adoption

An interesting dimension we explored was the role of visibility and discoverability. Despite the potential benefits of O2O platforms, their true value remains untapped if small retailers cannot discover these platforms amidst the digital clutter. Our research found that enhancing the visibility of these platforms can significantly reduce psychological barriers and increase adoption rates.

Implications for Small Retailers and Stakeholders

Our study offers several practical implications. First, addressing the psychological and functional barriers through education and support can help small retailers overcome resistance. Ensuring data security and simplifying the user experience are crucial steps in this direction.

Second, increasing the visibility and discoverability of O2O platforms through targeted marketing and improved platform design can boost adoption. Stakeholders should leverage success stories and data to highlight the benefits of these platforms, demonstrating their potential for growth and market reach.

A Path Forward

The future of retail lies in the harmonious integration of digital and physical experiences. O2O platforms offer a promising solution for small retailers to thrive in the digital age. However, overcoming resistance requires a concerted effort from all stakeholders involved.

By addressing the barriers identified in our research and enhancing the visibility of these platforms, small retailers can unlock new opportunities for growth and customer engagement. As the retail landscape continues to evolve, embracing digital transformation while preserving the essence of personalized service will be key to the success of small retailers.

In conclusion, this research underscores the importance of understanding and addressing the resistance small retailers face in adopting O2O technology platforms. By doing so, we can pave the way for a more inclusive and innovative retail future, where small retailers can compete and thrive alongside their digital counterparts.

Vallis solanacea, an Indian medicinal plant explored for its anticancer potential

By: Dr. Satyam Kumar Agrawal - Professor, CVSTR, CURIN

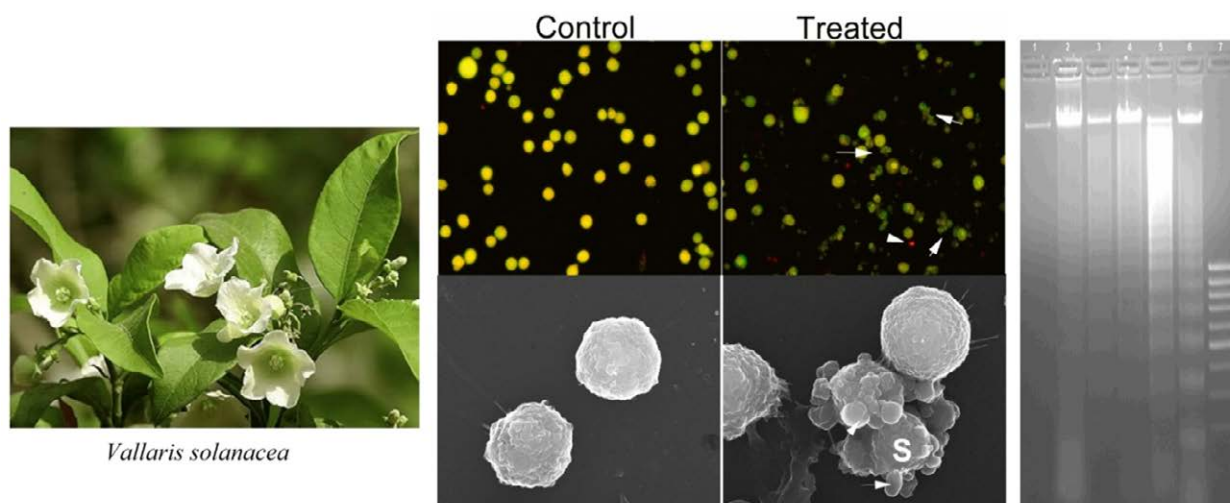
This article is based on the research paper titled 'Vallis solanacea induces mitochondrial mediated apoptosis in HL-60 human promyelocytic leukemia cells' published by Dr. Satyam Kumar Agrawal from CURIN, Chitkara University, Punjab, in an Elsevier journal entitled Food and Chemical Toxicology.

Cancer is a complex disease characterized by uncontrolled cell growth and division. Normally, our body has mechanisms to regulate cell growth and death. In cancer, these mechanisms fail, leading to the formation of tumors that can invade healthy tissues.

Plant-derived agents, also known as phytochemicals, have emerged as a promising area of research in cancer control.

These natural compounds hold potential for various aspects of cancer management. However, there is a continuous need to explore new agents due to the heterogeneous and complex nature of cancer. In the same league, the present study unveiled the potential of *Vallisneria spiralis* to induce cell death by apoptosis in HL-60 leukemia cells.

The plant was collected and extracted to its bioactive fraction, and the most active fraction was chosen for this study. Human leukemia cell line - HL-60 was chosen as a model system to represent leukemia cells. These cells were exposed to different concentrations of the chloroform fraction of *Vallisneria spiralis* (VS) for varying incubation times. Firstly, the cytotoxic potential of the fraction was evaluated by MTT assay. Further, several techniques were employed to assess the extract's effect on cells. Morphological changes due to treatment with VS were observed under a microscope to see if their shape or size changed after treatment with the extract to understand the mode of cell death.



The illustration has been borrowed from the published paper

Apoptosis is the desired mode of cell death for any anticancer agent. To understand how VS exactly triggered apoptosis in leukemia cells, various experiments were conducted, including measuring changes in the electrical potential across the membrane of mitochondria, a critical event in apoptosis. It was assessed in the form of alterations in mitochondrial membrane potential. Further, detecting the release of cytochrome c was also observed, which acted as a signal for cell death by apoptosis. Caspase activation and identifying the fragmentation of DNA, a hallmark of apoptosis, were also determined colorimetrically and through gel electrophoresis, respectively.

By employing these methods, the researchers were able to build a comprehensive picture of how VS induced apoptosis in leukemia cells, paving the way for further exploration of its potential as a therapeutic agent.

Wheat diseases recognition using computer vision: A detailed review

By: Dr. Vinay Kukreja – Director, Research, CURIN

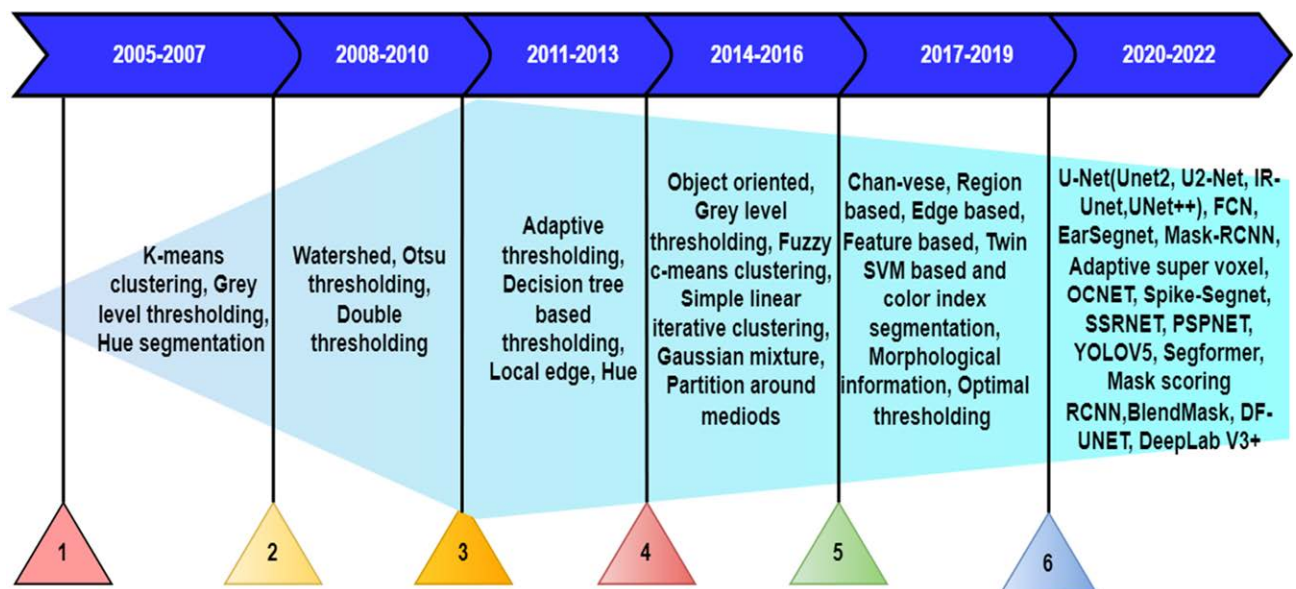
This article is based on the research paper titled 'Image segmentation, classification, and recognition methods for wheat diseases: Two decades' systematic literature review' published by Deepak Kumar and Dr. Vinay Kukreja from CURIN, Chitkara University, Punjab, in an Elsevier journal entitled Computers and Electronics in Agriculture.

Wheat, one of the world's most vital staple crops, is currently under threat. Wheat diseases (WD) are causing a 3.6% annual decline in global wheat production, posing a significant challenge to food security. However, advancements in computer vision technology offer a glimmer of hope. By leveraging image processing, segmentation, feature extraction, and AI-based recognition models, detecting and managing WD has become more feasible. This article has reviewed and analyzed studies published between 2005 and 2022, highlighting key developments in image segmentation models and their applications in WD recognition.

The study has followed a Standard Systematic Literature Review (SLR) approach, wherein researchers have selected 638 studies from five different web databases. After a rigorous extraction process, 544 studies were discarded, leaving 94 studies for detailed analysis. These studies, published in 45 reputed journals and 49 conferences, were evaluated

based on proposed, validation, and philosophical criteria. A critical challenge identified is the lack of public datasets for WD recognition across different color spaces. Researchers often have to build real-time datasets due to the scarcity of free public datasets, hindering standardized comparative analysis.

The review identified ten types of image segmentation models used in WD recognition. Clustering-based segmentation emerged as the most prominent technique, used in 34.78% of cases for recognizing powdery mildew and stripe rust diseases. Image segmentation models effectively detect and classify WD by separating wheat plant images into meaningful parts, enabling accurate disease region identification. This review is the first comprehensive analysis addressing WD recognition using image segmentation models. It highlights the necessity for standard datasets and enhanced accuracy in AI-based classifiers. The study suggests that future research should explore hybrid segmentation models combining multiple techniques and classifiers for better WD detection. The findings underscore the importance of developing more precise and hybrid segmentation classification models. By organizing the extensive literature on WD recognition, this study provides a valuable template for future research, guiding efforts towards more effective and efficient WD management using computer vision technology.



The illustration has been borrowed from the published paper

Apart from values, this research offered a novel approach in validating the moderating effect of digital technologies. Further, the findings suggested maintaining confidentiality of e-learning systems and providing adequate e-learning resources so that academicians can deliver the best content through e-learning platforms and feel a sense of achievement.

Individual Contributions of Our Faculty Members and Researchers

Our faculty members are leading multinational projects, driving journals and conferences, and publishing books. The details of these individual contributions by our faculty members made during April – June 2024 are as follows:

Spearheading a Multinational Project

A multinational research project funded by the International Development Research Centre (IDRC), Canada aimed to investigate the extent and nature of unhealthy TV food marketing targeted at children. Led by Dr. Tilakavati Karupaiah – Professor, School of Biosciences, Taylor’s University Malaysia, the project involves nine Asian countries, including India, Malaysia, China, Bangladesh, Mongolia, Nepal, Philippines, Sri Lanka, and Vietnam.

In India, Dr. Naveen Kumar - Associate Professor, CURIN, is spearheading the project.

To disseminate the key findings and advocate for necessary policy actions,

Dr. Naveen organized a stakeholders’ meeting on April 6 to highlight concerns over unhealthy food marketing to Indian children. Held at the National Science Centre, Pragati Maidan, New Delhi, the meeting provided a platform for engaging with Indian stakeholders, including government agencies, research institutions, civil society organizations, and academia. The goal was to raise awareness about the impact of unhealthy food marketing on children and urge policymakers to take proactive measures to address this issue.

The meeting featured presentations on the prevalence of unhealthy food marketing, and the need for robust policy measures to address this issue. Panel discussions provided a platform for stakeholders to exchange views and explore collaborative solutions to tackle the growing challenges posed by unhealthy food marketing in India.

Tremendous Value Addition in Reputed Journals and Conferences

Dr. Ayush Dogra – Assistant Director, Research, CRIO, has been appointed as a member of the editorial board of two reputed journals, technical program committee of several conferences and a couple of reputed technical societies. The names of these reputed entities include: journals - BMC Artificial Intelligence and Biomedical Reports Journal; conferences - 5th World Nursing and Patient Healthcare Conference (Portugal), 2nd International Conference on Advances in Artificial Intelligence and Applications (Singapore), 4th International Conference on Advanced Optics & Photonics Research in Engineering (China), 8th International Conference on Intelligent Traffic and Transportation (Italy), and 3rd International



Conference on Mathematics, Modelling and Computer Science (Norway); societies - The International Management Research and Technology Consortium, USA and BioImaging North America



BioImaging North America

Furthermore, Dr. Dogra is also acting as an editor of the book titled Harmony in

Complexity: Exploring the Nexus of Computational Intelligence, Mathematical Computing and Sustainability that will be published by Elsevier.

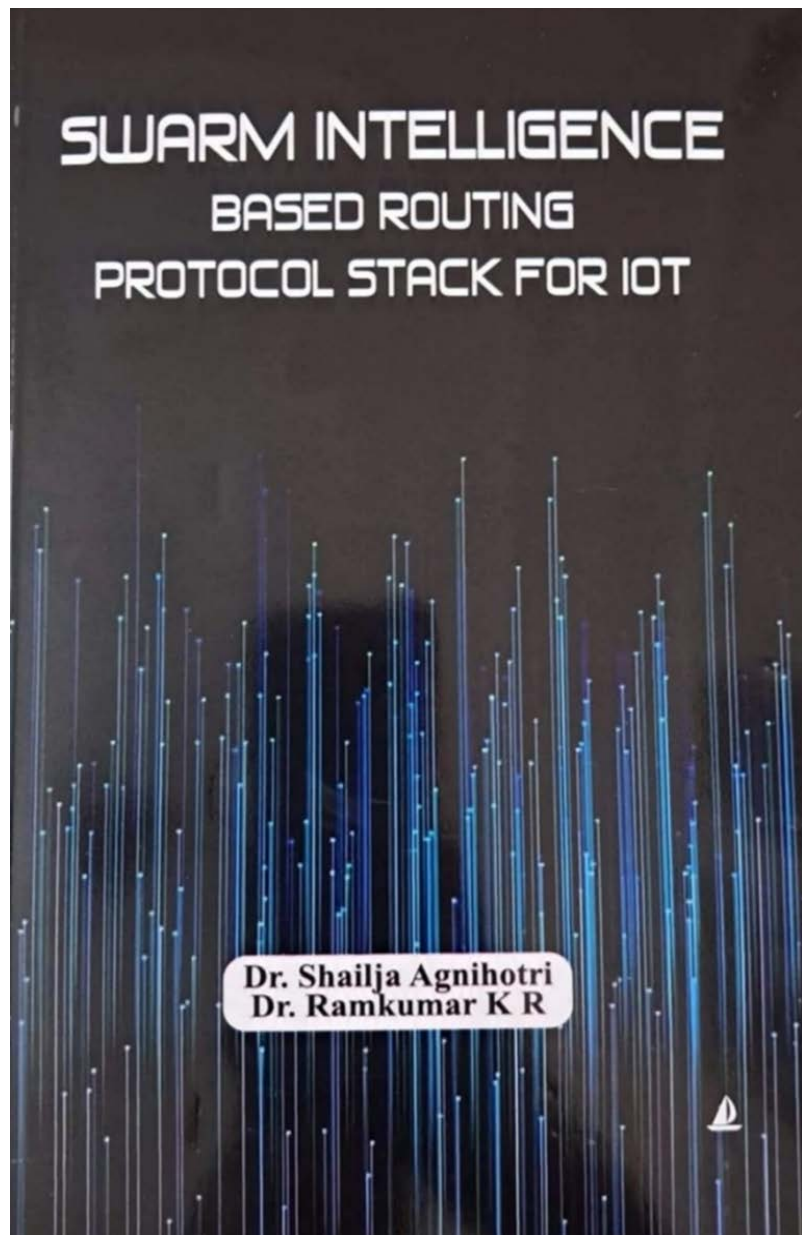
Book Publication

A book titled Swarm Intelligence Based Routing Protocol Stack for IOT, which has been authored by Dr. Ramkumar K.R. – Professor, Research, CURIN, and Dr. Shailja Agnihotri, is crucial in today's landscape due to its dedicated exploration of IoT routing. It has been published by Saptrishi Publications, Chandigarh, and has the ISBN-10: 8197227144. As IoT deployments expand, efficient and reliable routing protocols become increasingly important. This book investigates the complexities of managing multiple routing protocols, offering insights into optimizing network performance, enhancing scalability, and addressing security concerns. By tackling these contemporary issues, the authors provide valuable guidance for researchers, engineers, and policymakers striving to harness the full potential of IoT technology while ensuring robust and resilient network infrastructures.

Representation on the Committees of Several Prestigious Conferences

Dr. Vatsala Anand – Assistant Professor, CURIN, contributed in the capacity of a technical program committee member and reviewer for several prestigious conferences, including 4th International Conference on Paradigms of Communication, Computing, and Data Analytics (PCCDA 2024) held on April 20 – 21 (Sri Dev Suman Uttarakhand University, Uttarakhand),

4th International Conference on Computer Vision and Robotics held on May 25 – 26 (Symbiosis Skills and Professional University, Pune, India), World Congress on Smart Computing (WCSC 2024) held at the Artificial Intelligence Research Centre, Babu Banarasi Das University, Lucknow, India on June 8 – 9.



InvestX - Pitch, Partner, Prosper: A Mega Startup Event

Organized by CIIF at the culmination of the Chitkara Xcelerator Program 2023

InvestX, a program organized by Chitkara Innovation Incubator Foundation (CIIF), CURIN, Chitkara University on April 18, 2024, marked the culmination of the Chitkara Xcelerator Program 2023, a platform where 12 startups, after six months of dedicated efforts, pitched their innovative ideas to 11 potential investors. With available funding totaling over ₹45 crore, these startups showcased their potential for disruptive change under the mentorship of the CIIF.



As part of the event, a panel discussion titled Exploring Early-Stage Startup Investment: Insights from Investors was held, which provided invaluable insights into the dynamics of early-stage investment. Esteemed investors, including Mahavir Pratap Sharma from Rajasthan Angels Innovation Network, Prof. Dhruv Nath from Lead Angels, Ashank Singh from Venture Catalyst, Ritika Singh from TIE Chandigarh, Nitika Khurana from Chandigarh Angels Network, and Krishna Kumar Devnally from Antennae Ventures, shared their experiences, strategies, and key considerations when evaluating and investing in startups. The discussions shed light on the importance of factors such as market potential, team capabilities, and scalability in the investment decision-making process. It offered

aspiring entrepreneurs a deeper understanding of what investors look for and how they can position their startups for success in the competitive investment landscape.

A range of startups showcased their products at the event, presenting latest advancements across multiple industries. These startups presented unique solutions and technologies, aiming to captivate investors and industry experts. Some were focused on sustainable and energy-efficient solutions, providing alternatives for thermal management and renewable energy. Others emphasized data-driven insights for improved farming practices and enhanced connectivity through satellite communication and data analytics.



InvestX was more than just a pitch event, it was a platform for startups to establish connections with influential investors and gain valuable insights into their ventures and initiatives. The strong focus of the program on collaboration and support fostered a positive environment for innovation and growth in the Indian startup ecosystem. Through events like InvestX, the startup community in India can continue to thrive and contribute to the country's economic development. The initiative was led by Dr. Adarsh Aggarwal - Vice President, CIIF and Dr. Neeraj Kumar – Senior Incubation Manager, CIIF.



Distinguished Researcher Award for Dr. S.N. Panda

Innovations from the IoT and Cloud Computing Lab, CURIN

Dr. S.N. Panda - Pro Vice Chancellor, Research, CURIN, Chitkara University, Punjab, and Head, IoT and Cloud Computing Lab, CURIN, has been awarded the Distinguished Researcher Award by Jamia Hamdard University, New Delhi, at the 13th International Conference on Interdisciplinary Research for Sustainable Development (IRSD 2024) on May 30, 2024.

Under Dr. Panda's leadership, Chitkara University has evolved into a hub of cutting-edge research. His invaluable guidance has enabled our researchers in achieving new heights of research excellence.



The IoT and Cloud Computing Lab, CURIN, which is headed by Dr. Panda, aims at developing medical assistive solutions based on IoT and cloud computing. The lab has secured a total research funding of INR 32.2 million in five projects and has filed over 150 patent applications, of which 17 patents have been granted. An overview of some of the technologies that have been developed in this lab is as follows:

1. Smart Portable Intensive Care Unit

It is a low-cost and versatile solution that can be introduced inside an emergency vehicle and is capable of transmitting the physiological parameters of the patient to the smartphone of a specialist doctor who may be present at any

remote location. The doctor, after checking the physiological information of the patient, can control or convey the medication from a remote location. This device takes into consideration the better use of specialists, diagnoses, and treatment abilities without wastage of time and gives appropriate emergency care to the patients. This project received funding of INR 2 million from the Millennium Alliance in 2017.

2. Smart Wheelchair Cum Bed

The invention focuses on a convertible wheelchair that seamlessly transforms into a bed or stretcher using a simple mechanical linkage mechanism, which is operated by an actuator via remote control. The wheelchair's structure is customized to allow smooth movement of the backrest relative to other parts like the seat and leg rest and includes a commode assembly. It also features an IoT-based infusion pump, a vital parameter unit, and a surveillance system for patient monitoring. Health monitoring devices integrated into the unit transmit real-time vital signs such as heart rate, body temperature, blood saturation, ECG, and non-invasive blood pressure to relatives and doctors through an Android application. This innovative design offers advantages over existing solutions by providing ease of transformation, reliable movement mechanisms, and comprehensive health monitoring capabilities. This project received a grant of little over INR 6 million from the Technology Intervention of Disabled and Elderly (TIDE) Scheme of Ministry Science & Technology, Government of India, New Delhi, in 2019.

3. Smart Featured Ergonomically Designed Commode Wheelchair

A novel and best-suited approach for elderly and disabled people. It is a wheelchair with smart features, an ergonomic design, and a remotely operated commode facility unit. A traditional wheelchair's unpleasant seat, height of the seat, and backrest adjustability issues make the wheelchair uncomfortable for a patient, and another problem associated with a wheelchair is defecation difficulties. This invention presents a wheelchair with ergonomic and anthropometric characteristics that give comfort to the user. A commode



assembly is integrated within the wheelchair for defecation, where the movement of the commode unit is controlled by a linear actuator. This invention is of great importance for society, especially for elderly and disabled people. The project received funding of INR 4.7 million from This project received a grant of little over INR 6 million from the Technology Intervention of Disabled and Elderly (TIDE) Scheme of Ministry Science & Technology, Government of India, New Delhi, in 2021.

4. Video Laryngoscope

Video laryngoscope improves laryngeal view as compared with direct laryngoscopy in patients with suspected difficult intubation and simulated difficult airway scenarios. For novices and experienced anesthesiologists alike, video laryngoscopy is easy to use. This present device is also able to store video information in the cloud for future use and view the video from a remote location during intubation.



Chancellor Lecture Series: Expert Talk titled Exploring Upanishadic Wisdom: Happiness and Leadership

Dr. S.N. Panda delivered an expert talk titled Exploring Upanishadic Wisdom: Happiness and Leadership on April 20. As part of the Chancellor Lecture Series, the talk was organized by Sri Guru Nanak Dev Ji Chair for Human Values and Professional Ethics, Chitkara University, Punjab, and was attended by students, research scholars, and faculty members of the university.

In his lecture, Dr. Panda highlighted that when we talk about the Upanishad, we need to discuss the main philosophy of Adi Shankaracharya, who believed that knowledge is the only thing that can save people from suffering. Adi Shankaracharya believed that ignorance was the root of all suffering and that humans could only find true happiness by seeking knowledge. True and inner happiness is not present in the physical world; it is within the human being and can be extracted with the help of the Upanishads.



Management Research: Workshops and Seminars for Better Research Outcomes

By Doctoral Research Centre (DRC), Chitkara Business School (CBS)

Seven-day Workshop on Advance Research and Scientific Methods

A seven-day online workshop was organized by the Doctoral Research Centre (DRC), Chitkara Business School (CBS), Chitkara University, from April 8 to April 14. The resource persons for this workshop were Dr. Balraj Verma (Associate Professor), Dr. Sridhar Manohar (Assistant Professor), and Dr. Meenal Arora (Assistant Professor) from DRC, CBS. The workshop was attended by 67 research scholars and faculty members of Chitkara University, whose objective was to acquaint research scholars with analytical tools, methodology, and techniques in management research. Research scholars received input about various statistical tools for data analysis. Scholars were able to identify and understand the intricacies of statistical software such as SPSS and AMOS. Resource persons also shared grounded theory approaches in research. Several steps of grounded theory, like in-depth interviews and observations, were discussed in detail so that the findings represent the real world accurately. This FDP was an important opportunity for the participants to enhance their research skills and gain practical knowledge about advanced analytical techniques, fostering a deeper understanding of management research methodologies.

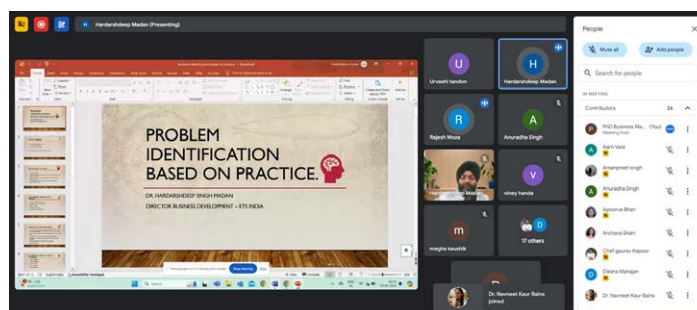


A Seminar on Fostering Effective Collaboration between Guides and Scholars

DRC, CBS organized a seminar on Fostering Effective Collaboration between Guides and Scholars on April 13, and it was delivered by an invited speaker, Dr. Purva Kansal – Professor, Panjab University, Chandigarh, India. The objective of this seminar was to discuss effective communication strategies for guides and scholars to ensure a clear understanding of research objectives, expectations, and progress. The resource person explained how to explore interdisciplinary approaches to research collaboration, gaining insights into how diverse perspectives, methodologies, and expertise can enrich their collaborative efforts. Dr. Kansal also gave insights into developing mentoring skills to support and guide the research scholars effectively, fostering their professional and personal development. A total of 63 participants, comprising both the faculty members and research scholars attended the session.

A Seminar on Problem Identification Based on Practice

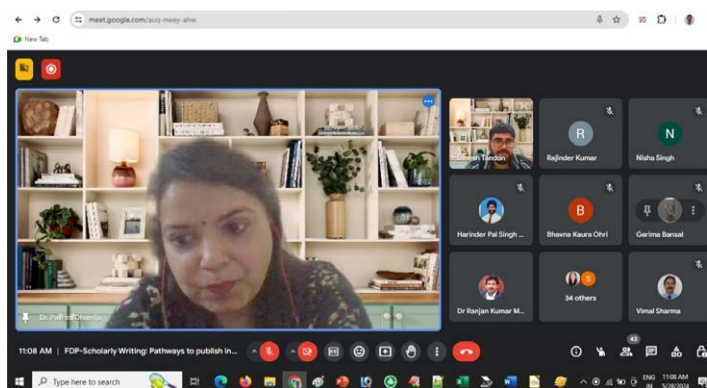
On May 18, Dr. Hardarshdeep Singh - Director, Business Development, ETS, India, and Alumnus, Doctoral Research Centre, CBS, was invited to deliver a seminar titled Problem Identification Based on Practice, which was attended by 43 research scholars. The objective was to encourage research scholars to identify research



problems from real-world scenarios. The seminar provided a platform for effective and pertinent research attempts by fostering a collaborative environment that encouraged meaningful interaction between scholars and practitioners.

Workshop on Scholarly Writing: Pathway to Publish in Impactful Journals

A five-day workshop titled Scholarly Writing: Pathway to Publish in Impactful Journals was organized by Chitkara College of Sales and Marketing (CCSM) in collaboration with DRC, CBS during May 27–31, and attended by 41 research scholars and faculty members. This workshop aimed to enhance research publication skills and foster academic excellence. The resource persons were Dr. Balraj Verma, Dr. Sridhar Manohar, and Dr. Mohit Taneja (Assistant Professor) from DRC-CBS. Resource persons shared remarkable insights about manuscript preparation, journal selection, and publication strategies to elevate research impact. There was also a session on using statistical tools in research. Participants were provided with essential skills and knowledge to effectively navigate the complexities of academic publishing and thereby contribute meaningfully to their fields of study.



Sessions on Practical Insights into the Journey of a Research Scholar

Multiple sessions on the theme Practical Insights into the Journey of a Research Scholar were conducted by DRC, CBS in the month of April, wherein research scholars were invited to share their experiences and challenges. Arjun Nair – St. Lawrence College, Canada, and Umesh Chawla – Director and Head of Retail Management, Southeast Asia, Malaysia, both of whom are pursuing their PhDs at the DRC, CBS, were invited to share their experiences of publishing and undergoing publication processes for their papers. 57 research scholars and faculty members attended the session.

Individual Contributions

- Dr. Amit Mittal (Pro VC, Research Programs) was invited to deliver a session on Review of Literature in a one-week workshop on Research Methodology that was organized by the Department of Management Science and Commerce, Maharishi Dayanand University, Rohtak, India, during April 22-26. 68 research scholars and faculty members attended his session.
- Dr. Amit Mittal participated as a resource person in the 5th Meeting of the Academic Council of Model Institute of Engineering & Technology (MIET), Jammu, India, on May 28. He offered useful insights into emerging trends and opportunities in the field of research.
- Dr. Sridhar Manohar (Assistant Professor, DRC, CBS) was invited as a resource person to deliver a session in a workshop on Insights into Contemporary Healthcare Research Guidance on April 23. This workshop was organized by Chitkara School of Health Sciences, Chitkara University, Punjab, and it aimed at guiding participants on effective publications in healthcare research. Dr. Manohar also participated as a resource person in a workshop organized by Vel Tech University, Chennai, on June 22. The workshop was dedicated on using AI tools for writing impactful research papers.
- Dr. Balraj Verma (Associate Professor, DRC, CBS) served as an external examiner to review the students' performance in Data Analytics Program at SRM Institute of Science and Technology, Tamil Nadu, India. It took place on June 1.
- Dr. Niti Chatterji (Associate Professor, DRC, CBS) was invited as an external examiner for the final PhD defense at Ajeenkya DY Patil University, Pune, India, on May 8. She was also invited as an external examiner for the research proposal presentations at Parul University, Gujarat, India.

Events Organized

Workshops, Seminars, Faculty Development Programs, Expert Talks, Hackathons, etc.

To promote skill development and knowledge sharing, different research groups organize activities, including workshops, seminars, faculty development programs, expert talks, hackathons, etc. The details of all such activities conducted during April – June 2024 are as follows:

NCSTC (DST, GoI) and PSCST Supported One-day Event

CURIN, Chitkara University, Punjab organized a one-day event titled Celebrating the Integral Role of Mathematics in Engineering Education and Research on April 3, in collaboration with the Punjab State Council for Science and Technology (PSCST), Chandigarh. The event was catalyzed and supported by the National Council for Science & Technology Communication (NCSTC), Department of Science & Technology (DST), Government of India, New Delhi.

The event featured a range of activities such as declamation, poster presentations, quizzes, and expert talks. The objective of these activities was to highlight the indispensable role of mathematics in diverse educational, scientific, and engineering domains.

Dr. Archana Mantri – Vice Chancellor, Chitkara University, Punjab, was the chief guest and in her keynote address, she emphasized that mathematics serves as the foundation for numerous research

disciplines, including quantum computing, cryptography, space engineering, and image processing. Dr. Jeetender Kumar - Managing Director, Wisdom of Mind, delivered an expert talk where he touched upon the topics like right-brain learning, enhancing concentration, and memory power.

In the valedictory ceremony, Dr. Archana Mantri and Dr. S.N. Panda (Pro-VC Research, CURIN) felicitated the winners of different activities held as part of the event, judges of those activities, invited speaker and other resource persons who coordinated the whole event.

Attended by over 150 participants comprising school students as well as faculty members and research scholars of Chitkara University, the event was coordinated by Dr. Kalpna Guleria (Professor, Research) and Dr. Naveen Kumar (Associate Professor, Research), CURIN, Chitkara University, Punjab.



Hands-on Workshop in Collaboration with Synco Industries Limited, Jodhpur

A two-day hands-on workshop on the Role of Wire Thermal Spray Gun in the Surface Engineering Industry was organized on April 19–20 in collaboration with Synco Industries Limited, Jodhpur. The workshop featured insightful discussions on the significance of surface engineering and thermal spraying, with active participation from over 40 students, faculty members, and research scholars from the Department of Mechanical Engineering and Civil Engineering.



Participants received hands-on training on operating the wire thermal spray gun and shot blasting machine. It was convened by Dr. Rakesh Goyal – Professor, Research, CURIN, who also delivered an enlightening talk on the diverse applications of surface engineering and thermal spraying across various industry sectors, emphasizing the critical role of surface engineering in safeguarding machinery surfaces and prolonging their operational lifespan.

Invited Talk on Translating Discoveries into Better Health

The Centre for Life Sciences (CLS), CURIN, Chitkara University, hosted a talk by Dr. Rajiv Kumar on April 22, which was titled CD4+ Cell Responses: Translating Discoveries into Better Health. Dr. Kumar, a prominent immunologist leading his team at Banaras Hindu University, Varanasi, shared insights from his extensive work in the cellular and molecular immunology

of infectious diseases. With training from the National Institute of Allergy and Infectious Diseases (NIAID), the National Institute of Health (NIH), USA, and the QIMR Berghofer Medical Research Institute, Australia, Dr. Kumar's expertise is highly regarded. Their team has recently identified a new therapeutic molecule combining therapy and conventional anti-leishmanial drugs, marking significant progress in understanding immune mechanisms to combat diseases like visceral leishmaniasis (VL), known as Kala-azar, caused by protozoan parasites transmitted through sandfly bites. Dr. Kumar's team's innovative approach includes a cost-effective method to identify asymptomatic VL individuals, crucial for disease control and elimination. With a three-decade commitment to Kala-azar research, they aim for its eradication, given its debilitating symptoms like fever, weight loss, and organ enlargement. This talk was instrumental in advancing the research endeavors at the CLS, which are led by Dr. Varsha Singh - Associate Professor, CURIN.



DST Supported Innovators Meet

On May 18, 2024, DST funded Chitkara University Technology Enabling Centre (CU-TEC) organized an Innovators Meet with the theme Converting Projects to Products. It was attended by over 75 participants, including students and faculty members from different institutions and entrepreneurs from 7 start-ups.

We, as academic institutions, build a lot of technologies that need to be commercialized and benefit society. The whole landscape of technology commercialization was discussed in detail at the Innovators Meet. There were detailed discussions on technology commercialization policy, IP transfer and sharing between academia and industry, the role of industry in the technology commercialization process, the role of the innovator or inventor in successful technology commercialization, etc. The success stories of technology commercialization in top institutions around the world were also presented to highlight the immense benefits that academic institutions and innovators can reap through successful tech-transfers. The guest speaker for this segment was Dr. Namita Gupta - Sr. Manager & Head, Projects & IP, FITT, IIT Delhi, New Delhi.



Our innovators need funds to build their innovations. There are various mechanisms and schemes through which innovators can raise funds today for their unique technological solutions. To talk about how to raise funds to scale the innovations, in the second segment of the Innovators Meet, we invited Mr. Narinder Singh Jassal - Sr. Principal Scientist and Head, Business Development Group, CSIO, and Coordinator, DSIR-PRISM Scheme, to share his insights. He also held one-to-one meetings with the innovators to understand their innovations and their potential.

Prof. Dr. P.K. Khosla – Pro VC, CURIN, Chitkara University, Punjab, proposed a vote of thanks, and he encouraged the participants to keep searching for ways and means by which their innovations can reach the right beneficiaries and create impact.

The session was convened by Dr. Sagar Juneja - Associate Director (Research), Chitkara University, Punjab, and Mr. Sanjay Bhatnagar – Visiting Faculty and Head Technology Commercialization, Chitkara University, Punjab.

Expert Talk: Unlocking Global Research Opportunities

A remarkable event titled Unlocking Global Research Opportunities: An Introduction to the Chitkara-Deakin Joint Doctoral Program was organized at Chitkara University, Punjab, on June 6 in a hybrid mode. The session highlighted the significance of the Chitkara-Deakin Joint Doctoral Program and shared important details of the program, including the admission process, research domains, and numerous advantages such as international expertise, scholarships, and a globally recognized doctoral degree.



Four Upcoming Engineering Conferences at Chitkara University by CURIN and CRIO in 2024

ICEMSMCI: RISE 2024, ICAN 2024, ISCCSC 2024, and ADSSS 2024

Academic conferences play a pivotal role in the promotion and advancement of research by bringing like-minded people together to share their bright ideas and quality research work, thus fostering knowledge sharing and collaboration. These conferences also provide a platform for budding researchers and research scholars to not only showcase their work and obtain feedback from the experts, but also network with the seasoned researchers and learn from them about the new developments and advancements in their respective fields. Chitkara University understands the importance of conducting top-quality academic conferences. There are four top-quality conferences that are going to be conducted in the next few months at Chitkara University, with CURIN and CRIO leading those initiatives. The details are as follows.

International Conference on Emerging Materials, Smart Manufacturing, and Computational Intelligence: Recent Innovations in Sustainable Engineering (ICEMSMCI: RISE)

Chitkara University Publications Division, Center for Research Impact and Outcome (CRIO), Chitkara University will host the 2nd edition of the International Conference on Emerging Materials, Smart Manufacturing, and Computational Intelligence: Recent Innovations in Sustainable Engineering (ICEMSMCI: RISE) in association with the California State University, Fullerton, USA, on July 18–19, 2024. The conference is supported by the Science and Engineering Research Board (SERB) – Department of Science and Technology (DST), Government of India and sponsored by the industry partners, including LPS Bossard Pvt. Ltd., India, ForExcel Pvt. Ltd., India, and Ambey Pvt. Ltd., India. Additionally, the publication partners are AIP Conference Proceedings, CRC Press: Taylor and Francis Book series, and Chitkara University Publications.

The conference will bring together scientists, engineers, technicians, and academics from a variety of disciplines to discuss the challenges of sustainable development and propose creative solutions in the fields of emerging materials, manufacturing technologies & industrial engineering, robotics & mechatronics, robotics, artificial intelligence, signal processing, network & sensor technologies, and internet of things.

Under the guidance of Dr. Amit Mittal – Pro Vice Chancellor (Research Programs), Chitkara University Punjab, this conference is led by Dr. Ankit Sharma – Associate Director, Research, CRIO, Dr. Ayush Dogra - Assistant Director, Research, CRIO, and Dr. Rahul Pandey – Assistant Director, Research, CURIN.

4th International Conference on Computing, Analytics and Networks (ICAN 2024)

ICAN 2024 is going to be the 4th edition of the International Conference on Computing, Analytics and Networks that will be conducted by Chitkara University on September 24–25, 2024. The conference is going to focus on a wide range of diverse applications in computing, analytics, and networks, and there are four track areas, namely Data Engineering for Advanced Analytics; Advances in Computer and Information Technology; Integrated Cyber-Physical and IoT Systems; and Cyber Security and Resilience.

Overtime ICAN has become one of the most sought-after conferences in the region that attracts quality papers from all parts of the country as well as abroad. Since inception in 2017, ICAN has been associated with Springer Nature. The accepted papers of ICAN 2024 will be considered for publication in the special issues of SN Computer Science Journal of Springer Nature. In the past, ICAN had also garnered support from IEEE in the form of technical

sponsorship. The proceedings of ICAN 2020 and ICAN 2022 were published on IEEE Xplore.

Since the inaugural edition, ICAN has been led by Dr. Rajnish Sharma (Vice Chancellor, Chitkara University, H.P.) and Dr. Sagar Juneja (Associate Director, Research, CURIN). This year we also have on the core committee, the leaders from Chitkara University Institute of Engineering and Technology, including Dr. Monit Kapoor – Professor and Dean Academics, Dr. Rishu Chhabra - Professor and Dean, CSE- Beta Cluster, Dr. Darpan Anand – Professor and Associate Dean, CSE-Zeta Cluster, and Dr. Sunil Kumar – Associate Professor and Associate Dean, CSE-Alpha Cluster. Coursera is the knowledge partner for ICAN 2024.

CHITKARA UNIVERSITY

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SPRINGER NATURE

CALL FOR PAPERS
4th International Conference on
Computing, Analytics, and Networks

ICAN 2024

Publication Partner
Springer Nature Computer Science Journal
[Scopus Indexed]

September 24-25, 2024*
Chitkara University, Punjab, India

International Conference on Smart Computing and Communication for Sustainable Convergence (ISCCSC 2024)

In collaboration with California State University, Fullerton, USA, the Centre for Research Impact and Outcome (CRIO), Chitkara University, Punjab, India, is organizing the inaugural edition of the International Conference on Smart Computing and Communication for Sustainable Convergence (ISCCSC 2024) on October 18, 2024. Dr. Amit Mittal, serving as the team leader, shall oversee this global event, with Dr. Shalini Rani (Director, Research, CRIO) as the General Chair, and Dr. Ayush Dogra and Dr. Ashu Taneja (Associate Professor, CRIO) as the General Co-Chairs. The conference shall focus on various areas, including smart computing, 5G/6G communication networks, AI, machine learning, data mining, image processing, smart communication, and signal processing. The conference proceedings will be published by Taylor & Francis, CRC.

Third International Conference on Applied Data Science and Smart Systems

The third International Conference on Applied Data Science and Smart Systems (ADSSS 2024) will be organized on December 13–14 by Chitkara University. It is a multidisciplinary conference on innovation and innovative practices in science, technology, and management. The conference seeks interdisciplinary and multidisciplinary research papers in the areas of advanced computing, communications, and applied informatics.

City University Malaysia is the academic partner, and the Indian Testing Board is the industry partner in the conference. The initiative is led by Dr. Jaiteg Singh - Pro Vice Chancellor, Department of Computer Applications, Chitkara University,

CHITKARA UNIVERSITY

Scopus

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G20

1st International Conference on
Smart Computing & Communication for Sustainable Convergence

ISCCSC 2024

On 18th October, 2024
Hybrid Mode (In-Person and Online)

Hosted by: Chitkara University, Punjab
and California State University, Fullerton, US

TRACKS

- Smart Computing**
 - Artificial Intelligence
 - Data Mining and Text Mining
 - Machine learning
 - Internet-of-Things (IoT)
- Sustainable communication**
 - Emerging communication protocols
 - Beyond 5G and IoT
 - Intelligent Reflecting surfaces
 - Mobile Technologies
 - 5G/6G Communication Networks
- Technological Convergence and Applications**
 - Convergence of multiple technologies for new network solutions
 - Intelligent communication for Convergence
 - Hybrid information Technology
 - Pervasive/ubiquitous computing and systems
- Inspiring Technology Solutions for Sustainable Technologies**
 - Smart and Micro Grids
 - Bio inspired Robotics
 - Electric vehicles
 - Industrial and home applications

IMPORTANT DATES

Paper Submission starts 7th May, 2024	Registration Open 10th May, 2024	Conference date 18th October, 2024
Paper Submission Closes 15th August, 2024	Registration Closes 15th September, 2024	

Organizers

GENERAL CHAIR Dr. Shalini Rani Professor & Director (Research) Centre for Research Impact & Outcome (CRIO) Chitkara University, Punjab, India	CO-CONVENOR Dr. Ayush Dogra Assistant Director (Research) Centre for Research Impact & Outcome (CRIO) Chitkara University, Punjab, India	CO-CONVENOR Dr. Ashu Taneja Associate Professor Centre for Research Impact & Outcome (CRIO) Chitkara University, Punjab, India
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Chairpersons

REGISTRATION AND FINANCE CHAIR Dr. Himanshi Babbar Assistant Professor (Research) Centre of Research Impact and Outcome (CRIO) +91 8557008265	Dr. Ankita Sharma Assistant Professor (Research) Centre of Research Impact and Outcome (CRIO) +91 9416113150
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All invited and extended papers will be published in following Journals (Scopus and SCI):
Intelligent Decision Technologies (Sage) | International Journal of Information Technology (Springer)
Decision Analytics Journal, Elsevier (ISSN 2772-6622) | Healthcare Analytics, Elsevier (ISSN 2772-4425)

PUBLICATIONS PARTNERS

Routledge Taylor & Francis Group

CRC CRC Press Taylor & Francis Group

Organised by Centre for Research Impact and Outcome, Chitkara University, Punjab, India

To know more visit: <https://www.chitkara.edu.in/isccsc-2024/>

Scan to Register

Punjab. Dr. Rajesh Kumar Kaushal (Professor) and Dr. Naveen Kumar (Associate Professor) are the members of the core organizing committee from CURIN. While Dr. Rajesh is the convener, Dr. Naveen is one of the three co-conveners.

Submissions to the conference are currently open.

The banner features the logos of Chitkara University and ADSS (Applied Data Science and Smart Systems) at the top. The main text reads "3rd International Conference on APPLIED DATA SCIENCE & SMART SYSTEMS-2024". On the right, there is a graphic of a person in a suit holding a smartphone, with several hexagonal icons floating around it, including "MACHINE LEARNING", "AI", and various data-related symbols.

Call for Book Chapters

Dr. Naveen Kumar – Associate Professor, CURIN, is one of the five editors of the proposed book titled Industry 5.0: Technologies, Digital Transformation, and Management that will be published by Bentham Science Publishers. The call for chapters is currently open. The scope of this book is to provide an understanding of the drivers and enablers of Industry 5.0; include real case studies of various applications in industries; discuss technologies such as internet of things, cloud computing, machine learning, decentralization, blockchain, and many other related areas; and covers design, implementation, challenges, and interoperability. In a nutshell, this book is going to offer detailed knowledge on Industry 5.0 and its underlying technologies, research challenges, solutions, and case studies.

The banner features a futuristic robot head on the left. The main text reads "CALL FOR CHAPTER" in large yellow letters, followed by "INDUSTRY 5.0: TECHNOLOGIES, DIGITAL TRANSFORMATION AND MANAGEMENT" in white. The Bentham Science logo is on the right.

Participation of Our Faculty Members and Scholars in Conferences and Events

Our research scholars and faculty members look for every possible opportunity to attend and participate in quality conferences and events and benefit from them. Our university hugely encourages such participation. Below are the details of our participation in external events in Q2, 2024.

- Dr. Vatsala Anand – Assistant Professor, CURIN, attended a Faculty Development Program (FDP) on Recent Technological Trends, which was organized by the Department of Information Technology, Easwari Engineering College, Chennai, during April 1–6. She also attended a one-week FDP on Deep Learning Techniques for Social Media Analytics that was organized by the Kongu Engineering College, Tamil Nadu, India, in collaboration with the University of Technology and Applied Sciences-Ibri, Oman, from April 15 to April 20. In the month of May, Dr. Anand attended a two-day FDP on Resource Management, Security and Architecting with Cloud, which was organized by Kongu Engineering College.
- Dr. Amanpreet Kaur and Dr. Mudita Uppal – Assistant Professors, CURIN, contributed as reviewers in the First International Conference on Advanced Network Technologies and Computational Intelligence (ICANTCI 2024) that was organized by the Department of Computer Applications, Chitkara University, Punjab, on April 5–6, 2024. Dr. Mudita also reviewed papers for the International Conference on Smart Devices (ICSD) held at Uttaranchal University, Dehradun, on May 2–3, 2024.
- Gurdeep Singh (ME Scholar) working under Dr. Amanpreet presented two papers titled “Advancing Sustainability in Communication Systems: Design and Analysis of Energy-Efficient Flip-Flop Circuits on FPGA Platforms” and “Demultiplexer Power Management: Strategies for Enhancing Energy Efficiency and Thermal Stability” in the IEEE International Conference on Information Technology, Electronics and Intelligent Communication Systems (ICITEICS-2024), which was organized by Vemana Institute of Technology, Bengaluru, on June 28–29, 2024.



In another event titled Futurescape Higher Education Symposium that was held on May 24 at Plaksha University, Punjab, her PhD scholars, Swati Singh and Neha, presented a paper and a poster, respectively. The paper was titled “Relative Assessment of Traditional and Cloud Enabled Augmented Reality Applications for Chemistry Teaching and Learning Practices” and the poster was titled “Augmenting Learning: The Transformative Power of Augmented Reality (AR) in Education.” Dr. Rubina Datta – Assistant Professor, ECE, Chitkara University, Punjab, was also one of the authors of the research work that was presented in the form of a poster.

- Dr. Deepali Gupta – Professor, Research, CURIN, chaired a paper presentation session in the 5th International Conference of Emerging Technologies (INCET 2024) that was held on May 24–26 at Jain College of Engineering (JCE), Belagavi. In the same conference, Monica Dutta (PhD Scholar) working under the guidance of Dr. Deepali presented her research paper. Dr. Deepali, Dr. Mudita and Monica Dutta presented multiple papers in ICITEICS-2024. Dr. Mudita presented a paper in the 4th International Conference on Intelligent Technologies (CONIT 2024), from 21st – 23rd June 2024. Finally, Dr. Mudita and Monica participated in a National Symposium on Multidisciplinary Research Trends for Sustainable World (MRTSW-24) that was organized by the Department of Applied Sciences, CUIET, Chitkara University, Punjab.
- Shagun Sharma (PhD Scholar) working under the supervision of Dr. Kalpna Guleria – Professor, Research, CURIN, presented a paper titled “A Deep Learning-based EfficientNetB0 Smoker Surveillance System for Enhancing Public Safety” in INCET 2024. She presented another paper titled “An Enhanced DarkNet53-based YOLOv3 Feature Pyramid Network for Real-Time Object Detection” in the IEEE International Conference on Computational Intelligence and Computing Applications (ICCICA-2024), which was also held in May 2024 at Panipat Institute of Engineering and Technology (PIET), Samalkha.
- Dr. Sonam Mittal – Assistant Professor, CURIN, along with her research scholar, Ankita Sharma, presented papers in two conferences. A paper titled “Revolutionizing Lung Cancer Prognosis Through CNN-Based Predictive Models” was presented at the 3rd International Conference on Applied Artificial Intelligence and Computing (ICAAIC 2024) and a paper titled “Deep Learning Approaches for Breast Cancer Classification” was presented in the 5th International Conference on Emerging Technology (ICECCT 2024). Both conferences were held in May 2024 and were technically sponsored by IEEE. Another research scholar, Atul Kumar, under her guidance, presented a paper titled “IoT Malware Detection: Navigating Challenges in Securing Smart Environments” in INCET 2024.



Dr. Sonam Mittal attended the workshop titled How to Write a Proposal for the Funded Projects? that was organized by Pantech E-Learning on June 2. The workshop featured interactive sessions and group activities that fostered collaboration and helped in practically applying the learned concepts. Participants were encouraged to engage in discussions, ask questions, and share their experiences, which greatly enriched the learning experience.

Dr. Sonam Mittal has completed a 12-week course on Cloud Computing on NPTEL. A certificate has been issued to her by NPTEL for completing all the evaluation criteria. This course has significantly enriched her understanding of cloud computing and prepared her to leverage cloud technologies for solving complex research problems.

- Sushmita Jain (PhD Scholar and JRF) working under the supervision of Dr. Satyam Kumar Agrawal – Professor, Research, Centre for In Vitro Studies and Translational Research (CVSTR), CURIN, attended a DST-SERB sponsored seven-day workshop on Development and Characterization of Bionanomaterials for Drug Delivery and Tissue Engineering" at Sharda University, Noida. She was one of the 25 fortunate students who got shortlisted for the comprehensive workshop, which was held from May 27 to June 2. Renowned experts in the field presented a range of topics to advance knowledge and skills in nanotechnology applications for healthcare.

The workshop covered various subjects, including designing and exploring smart graphene-based nanomaterials, advanced drug delivery approaches for medical conditions, and the challenges of nanotoxicity in future medicine. Practical sessions offered hands-on experience calculating

encapsulation efficiency, in vitro drug release studies, and cytocompatibility assessments of lipid-based nanomaterials. The workshop further delved into cutting-edge research areas such as the development of metal chalcogen nanoparticles, toxicological understanding at the cellular level, and the utilization of nanocrystals for versatile therapeutic applications. It also explored the nano-liposomes in demyelinating neuropathy, biopolymer-based formulations for chronic wound healing, and using carbon dots for biomedical innovations. Moreover, sessions on tissue engineering approaches, 3D bioprinting for tissue regeneration, and developing various nanoparticles for tissue engineering and drug delivery provided a holistic view of the workshop's theme. Attendees engaged in practical activities focusing on synthesizing and characterizing nanomaterials for tissue engineering applications.



Overall, the workshop served as a platform for participants to gain insights into the latest advancements in bionanomaterials, drug delivery systems, and tissue engineering techniques, fostering collaboration and knowledge exchange among experts and enthusiasts across the field.

- Dr. Himanshi Babbar – Assistant Professor, CRIO, attended an insightful workshop titled Exploring Image Processing Techniques Using Python that was held on June 3–7, 2024. This workshop was designed for both beginners and intermediate-level participants interested in learning the fundamentals and advanced concepts of image processing using Python. It was organized by the Department of Electronics and Communication Engineering, Chitkara University, Punjab, in association with the IETE Student Chapter. The sessions were conducted by Dr. Meenu Garg and Dr. Sonam Agarwal, who are experts in the field of image processing.



During June 25–29, Dr. Himanshi attended a five-day workshop on Emerging Interdisciplinary Technologies in Engineering that was organized by the Department of Interdisciplinary Courses in Engineering, Chitkara University. This intensive hands-on workshop provided deep insights into technology platforms like Unity 3D, Arduino, Python libraries, etc. Participants also explored the intersections of various engineering disciplines. Finally, there was a session on bibliometrics analysis using R Studio. The workshop was led by Dr. Rajneesh Talwar – Dean, DICE, Chitkara University, Punjab.

- Dr. Manish Sharma – Director, Research, CURIN and Dr. Rakesh Goyal – Professor, Research, CURIN, attended a Tech-Transfer Round Rable with the Institution's Innovation Councils (IICs), which was conducted by the DST-Technology Enabling Centre, Panjab University, in collaboration with the Punjab State Council of Science and Technology on June 28. The objective of the session was to brainstorm and bring forth innovative ideas from the IICs that can be transferred to the industry. Setting up IICs at higher education institutions to promote the culture of innovation and start-up ecosystems is an initiative of the Ministry of Education (MoE), Government of India. At Chitkara University, IIC is headed by Dr. Manish Sharma and Dr. Rakesh Goyal.



24 Patents Filed by CURIN Faculty Members and Scholars in Q2



The Patent Office has Granted
116 Patents
to Chitkara University in Q2, 2024.

A total of 53 patents (including industrial designs) have been filed by different departments of Chitkara University during April - June 2024, out of which 24 have been filed by CURIN faculty members and research scholars. The details of these 24 patents are given below.

S. No.	Title	Inventors	Application Number
1.	Unified Vaping and Wearable Device	Muskan Dixit, Sneha Garg, Sunny Singh, Muskan Chawla	202411030352
2.	Foot Cleaning Apparatus	Sonam Mittal, Soni Singh, Arpita	202411030353
3.	Actuator Assembly for Controlling Movement in Robots	Muskan Chawla, Sunny Singh, Amita Salaria, Swati Goel	202411030695
4.	An Inverted Marquee Shaped Compact and Conformal Four-Port Configured mm-Wave MIMO Antenna	Manish Sharma, Parminder Kaur, Lovish Matta	202411031454
5.	Restaurant Booking System and Method Thereof	Shalli Rani, Kamini	202411032477
6.	System for Fabricating Four-Port Multiple-Input-Multiple-Output (MIMO) Multi-Band Antenna and Method Thereof	Manish Sharma, Lovish Matta, Parminder Kaur	202411032908
7.	Conformal Multi-Wideband Ultra-Compact Four-Port MIMO Antenna	Manish Sharma, Lovish Matta, Parminder Kaur	202411033931
8.	Project Showcase Immersive Table	Sheena Angra, Bhanu Sharma	202411034458
9.	Smart Watch with Health Assistance System for Automatic Inhaler	Muskan Dixit, Sneha Garg, Muskan Chawla	202411034453
10.	Carbon Credit Incentive System for Cyclists	Ramkumar K R	202411034448
11.	Earthquake Detection System	Ayush Dogra	202411034449
12.	Eco - Blockchain Power Guard	Ayush Dogra	202411034456
13.	Digital Twin System and Method for Behavioural Analysis and Support in Autism Spectrum Disorder Individuals	Muskan Dixit, Muskan Chawla	202411035815
14.	System and Method for Analyzing Emotional Capabilities in Verbal Communication of Users	Muskan Chawla, Surya Narayan Panda, Vikas Khullar, Sunny Singh, Sonu Goel	202411036213

15.	Visitor Management System	Aashish Kumar, Prabhpreet Singh, Vasudev Rai, Mansi Chitkara	202411036802
16.	System and Method for Providing Recommendations for Developmental Diseases Using Federated Learning Technique	Kalpna Guleria, Shagun Sharma	202411037132
17.	Air Cooler Device	Aryan Sihag, Rahul, Neha Sharma, Sheifali Gupta, Rupesh Gupta	202411037295
18.	AI Based Device to Detect Mouth Cancer	SN Panda, Sanjeev Kumar, Sonu Goel, S. Sreenivasa, Usha Desai, Pankaj Kumar Natu	202411039861
19.	Sensor-Based Gesture Detection System for Underwater Divers	Puneet Bawa, Manisha, Virender Kadyan	202411034696

INDUSTRIAL DESIGN REGISTRATIONS

20. Automatic Rep Counter with Posture Correction System

By: *Varun Jindal, Vinay Kukreja, Shiva Mehta, Ayush Dogra*
Application No. 415297-001



23. Smart Wall Fan

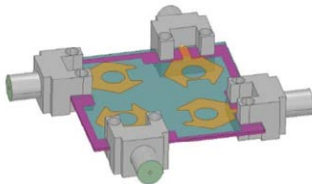
By: *Vinay Kukreja, Arun Aggarwal, Varun Jindal*
Application No. 415296-001



21. Compact Quad-Port Conformal 8.31 GHz-36.14 GHz MIMO Antenna

By: *Manish Sharma, Kanhaiya Sharma, Prabhakara Rao Kapula, Sarapaddi Narasimha Prasad, Kavya Bittasandra Sachidananda Murthy, Deepali Gupta*

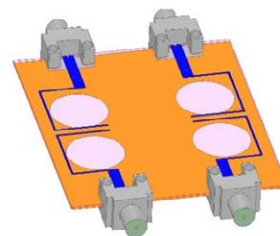
Application No. 415449-001



24. Ultra Compact FR2-Narrowband MIMO Antenna

By: *Manish Sharma*

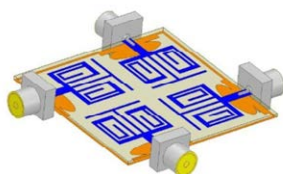
Application No. 415445-001



22. Dual Notched Four-Port Multiband MIMO Antenna

By: *Manish Sharma*

Application No. 415444-001



LIST OF PUBLICATIONS

254 publications by CURIN and CRIO

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