CURIN CONNECT

What is New and Exciting @ CURIN

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COVER STORY
CURIN-CONNECT:
A One-day Event to Apprise about
Exciting New Initiatives of CURIN

Q2 Witnessed Many New Collaborations

- Two joint projects with industry
- Research collaborations with three foreign universities
- Participation in THE Asia Universities Summit 2023

G20

भारत 2023 INDIA

**G20 Digital Innovation Alliance
(G20-DIA) Event Organized**

Insights into newly established
Center for In vitro Studies and
Translational Research

146
Research Publications

61
Patents

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CURIN-CONNECT
A One-day Event to Apprise about Exciting New Initiatives of CURIN

Held on April 15, 2023 | Attended by 198 Delegates

By: Sagar Juneja: Assistant Dean, CURIN

Chitkara University Research and Innovation Network (CURIN) is a network of researchers, innovators, inventors, etc. both from within the university (from across the departments/programs), as well as outside the university to carry out impactful applied research in a collaborative manner. CURIN continuously takes newer initiatives to meet its objective and benefit all its stakeholders. On April 15, 2023, a one-day event was organized by CURIN to apprise about the exciting new initiatives that have been taken in the recent past that would benefit the researchers, professionals, students, etc. who are associated with the CURIN. The program was chaired by Dr. Archana Mantri – Vice Chancellor, Chitkara University, Punjab and attended by 198 delegates comprising PG students, PhD scholars, and faculty members from different departments of the university.

In her opening remarks, Dr. Mantri highlighted the agenda of the program as well as the format of the program. She emphasized upon the importance of conducting such networking events and sought active participation from the audience.

The first presentation was delivered by Mr. Sagar Juneja – Assistant Dean, CURIN. Mr. Sagar heads the GoI funded NewGen IEDC project and Technology Enabling Centre (TEC) project at Chitkara University. He discussed how students from all

the departments of the university can benefit from NewGen IEDC by taking prototype development funding. Additionally, he highlighted how TEC at Chitkara University is promoting industry-academia collaboration for joint development of technologies and how faculty members from all the departments of the university can benefit from this initiative. Finally, being the editor of Res Novae, he showcased the impact we have been able to create through the newsletter.

The second presentation was by the Office of Research Publications and it was delivered by Dr. Amit Mittal – Pro VC, Research Programs, Chitkara University, Punjab, along with his

team members Dr. Vinay Kukreja (Professor) and Dr. Rahul Pandey (Assistant Professor) from CURIN. They discussed about the Research Promotion and Incentive Policy (RPIP) - 4.0 and its elements including Absolute Publication Score and Qualitative Publication Score. They also discussed about Research Collaboration Initiatives (RCI) and Research Capacity Building Initiatives. While RCI incorporates elements including joint doctoral program, joint publication program, etc. with the partner institutions, Research Capacity Building Initiatives aims to assist and train PG students on the nuances of academic writing.

The next presentation was delivered by Dr. Manish Sharma – Professor, CURIN and Vice President, Institution's Innovation Council (IIC), Chitkara University, Punjab. He discussed about the different types of activities under IIC and how we performed as an institution under each category. He also explained the importance and weightage of different activity-categories and how departments should plan their activity calendar. Finally, he also made audience aware about the YUKTI portal and how it should be used effectively.

This was followed by a presentation on 'Opportunities and Success Stories at Incubation Eco-system of Chitkara University' by Dr. Adarsh Aggarwal - Vice President, Chitkara Innovation Incubator Foundation (CIIF). He shared the performance of CIIF

with the audience that highlighted 50+ DPIIT recognized startups, 56 current incubates, INR 350+ Crore valuation of all incubated startups, etc. He also showcased the opportunities for both faculty and students at CIIF.

Dr. P.K. Khosla – Pro-VC, CURIN, in his presentation stressed upon the importance of carrying out research that translates into something tangible and is beneficial for the society. He discussed about various such opportunities that may be explored by the researchers of Chitkara University.

Dr. Nitin Saluja – Associate Director, CURIN discussed about different funding opportunities available under different government schemes. He also shared his expertise on writing good quality research proposals that have greater chances of securing research funding.

The initiatives of the Office of Patent Facilitation, Licensing and Consultancy (OPFLC) were presented by Dr. S.N. Panda – Executive Director, Research, CURIN, Mr. Sanjay Bhatnagar – Head, Tech Commercialization, CURIN and Mr. Varinder Singh – Manager, Consultancy Division, Chitkara University. Dr. Panda highlighted about the new Patent Information Extraction (PIE) form and shared his insights on effectively filling the PIE form to streamline the patent filling process. He gave insights about the entire patent filing process and apprised potential applicants about their roles. Mr. Varinder talked about the consultancy policy, and the complete process flow of carrying out industry consultancy. Mr. Sanjay Bhatnagar talked about how the technologies developed by our faculty members and students are taken up for commercialization and what active role innovators can play in speeding up the commercialization process.

Finally, Dr. Gurjinder Singh – Assistant Professor, CURIN gave insights about the Chitkara University Central Instrumentation Facility (CUCIF) and different instruments available in CUCIF for the benefits of all researchers of the university. Dr. Pankaj Kumar - Dean (PhD Program) shared the improved and efficient processes the Office of PhD Programs.

A panel discussion session was also conducted that was moderated by two volunteers from the audience. The panelists were Dr. Manish Sharma, Dr. Adarsh Agrawal, Dr. P.K. Khosla, and Dr. Nitin Saluja. This session was very interactive and a lot of good questions were received from the audience. Additionally, in between the presentations, short quizzes were conducted to ensure healthy participation. The entire program that was meticulously planned by Dr. Archana Mantri, was very well received by all the stakeholders who participated in it.

Forging Collaborations for Joint Projects and Joint Research

Collaborations with industry, research labs, and universities

Joint Project with Tynor Orthotics Pvt. Ltd.

Tynor, a pioneering name in the industry, and Chitkara University, a leading educational institution, have forged a promising partnership through a transformative Agreement for Project Work (APW) on April 26, 2023. This collaboration is set to propel the realm of quality control and defect detection into the future by harnessing the power of Artificial Intelligence. The project will be headed by Dr. P.K. Khosla (Pro-VC, CURIN) and his team comprising Dr. Sushil Narang (Professor, CSE), and Dr. Gurpreet Singh (Assistant Professor, Mechatronics). An investment of INR 44 Lacs has been received from Dr. PJ Singh, Chairman, CII Punjab and Managing Director, Tynor, who visited Chitkara University and personally handed over a cheque to the Hon'ble Pro Chancellor, Dr. Madhu Chitkara.

Innovating for Defense: Chitkara University's DRDO Project on Scalable and Secure Air Gap Wireless Solutions

Chitkara University continues to thrive in cutting-edge research with the sanctioning of another impactful project by DRDO on April 28, 2023. The project titled 'Scalable and Secure Air gap based Wireless Enabled Solution for DRDS Assessment Process', stands as a testament to the university's prowess in innovation. Spearheaded by Dr. Khosla, Pro-VC, CURIN as the Principal Investigator, the project brings together a team of experts including Dr. Sushil Narang and Mr. Gurpreet Singh who serve as Co-Principal Investigators.

Chitkara University secures Funded Research Project from DRDO

Scalable and Secure Airgap based Wireless Enabled Solution for DRDS Assessment Process

INR 36.40 Lac

This project reflects the intersection of advanced technology and defense needs, showcasing Chitkara University's

commitment to pioneering solutions. The project's focus on a scalable and secure air gapped wireless solution for DRDS assessment underscores its practical relevance in addressing critical challenges. As the team delves into this ambitious venture, the amalgamation of expertise promises to yield breakthroughs that contribute significantly to both academia and national defense capabilities.

Industry-Academia Meet to Commercialize Technologies Developed by Academia

On May 18, Technology Enabling Center (TEC) facilitated industry-academia meet with an objective to productize and commercialize a prominent technology from academia. The said technology is about Water Purification System that has been developed by Dr. Jyotsna Kaushal (Professor, Water Sciences, CURIN). The potential industry partner is from Ambala Scientific Instruments Manufacturers' Association. The meet took place in EPIC-Ambala and the host was Mr. Rama Kant (Director, EPIC, Ambala). A few days later, Dr. Pankaj Kumar(Professor and Dean PhD Program, CURIN), also visited EPIC-Ambala to explore the possibilities of commercializing LCD devices, which he and his team has been developing in Center for Liquid Crystal Research, CURIN, Chitkara University. Mr. Sagar Juneja – Assistant Dean, CURIN and Coordinator, Chitkara University TEC facilitated these visits.

Unveiling Global Synergies: Chitkara University's MoUs with Morocco's Esteemed Mohammed VI University of Sciences and Health and Morocco's Innovation and Technology Transfer Foundation (ITTF)

Amidst the intricate tapestry of contemporary global challenges, the significance of international collaborations emerges as a vital linchpin. In a resounding commitment to tackle these challenges head-on, Chitkara University is embarking on a proactive journey by formalizing MoU that serve as catalysts for international cooperation.

The first stride in this direction involves a robust partnership between Chitkara University and Morocco's esteemed Mohammed VI University of Sciences and Health. This alliance transcends geographical boundaries, knitting together diverse intellectual and cultural tapestries in the shared pursuit of knowledge and innovation. By forging this connection on May 24, 2023, both institutions leverage their collective strengths to unravel solutions for complex global issues.

Complementing this bilateral academic endeavor is another impactful MoU between Chitkara Innovation Incubator Foundation (CIIF) and Morocco's Innovation and Technology Transfer Foundation (ITTF). This collaboration nurtures an ecosystem of innovation and entrepreneurship, facilitating the exchange of transformative ideas and groundbreaking technologies. The MoU stands as a bridge between nations, fostering the cross-pollination of expertise and innovative approaches, vital for tackling the multifaceted challenges that traverse borders.

Invitation to Attend the DRDO Academia Conclave

Dr. Ramkumar K R – Professor, CURIN was invited to attend the DRDO Academic Enclave 2023 during 25-26 May 2023. This prestigious invitation was a testimony to his expertise and contributions to the research field. The

presence of Shri Rajnath Singh – Honorable Defense Minister of India, at the inauguration ceremony was the highlight of the event.

The event was focused on the importance of DRDO academic collaborations, covering various fields such as life sciences, materials, security, drug discovery, and food processing. This enclave aimed to foster new opportunities for collaboration and innovation among the principal investigators of various ER&IPR projects of DRDO, India. Dr. Ramkumar is an investigator of one such project from DRDO.

## Industry Visit to Understand their Technical Problems

On May 31, Dr. Rakesh Goyal (Professor, CURIN), and Mr. Sagar Juneja (Assistant Dean, CURIN) visited a Manufacturing Industry (JJ Engineers & Fabricators, Chatauli, Punjab) to discuss some of their specific technical problems where Chitkara University can collaborate with the industry in solving these problems. Mr. Aggyapal Singh (Technical Head, JJ Engineers & Fabricators) explained the problem of manual loading and unloading of jobs in CNC machines, and he was looking for semi-automatic solution to the problem. The visit was facilitated under Chitkara University Technology Enabling Centre (TEC) that aims to promote industry-academia collaborations for the joint development of technologies.

Joint Research Collaborations with Foreign Universities

- Chitkara University and Cebu Normal University, Philippines signed a MoU on June 1, 2023, to collaborate on research and academic activities. The MoU aims to foster cooperation between the two universities in the areas of research, teaching and student exchange. Under the MoU, the two universities will collaborate on joint research projects, share resources, and exchange faculty and students. The MoU also includes a provision for the establishment of a joint research center between the two universities. For the smooth execution of the MoU, an initial meeting was conducted by the Research Collaboration Initiatives team of Chitkara University (Team-RCI) with the delegates of Cebu Normal University on May 10, 2023. The discussions related to potential joint research projects and exchange of ideas for research capabilities enhancement was the key agenda of the meeting. Team-RCI comprises of Dr. Amit Mittal (Pro-VC, Research Programs), Dr. Rahul Pandey (Assistant Professor) and Namita Sharma from CURIN, Chitkara University.

- MoU was signed between Chitkara University and Daffodil International University, Bangladesh on June 6, 2023, to strengthen the research ties between the two organizations. The MoU will serve as a framework for research collaborations and will aid in achieving shared research goals. The MoU outlines the general principles and terms of our collaborations, including the scope of work, responsibilities of each party, intellectual property rights, confidentiality, publication, and termination clauses.
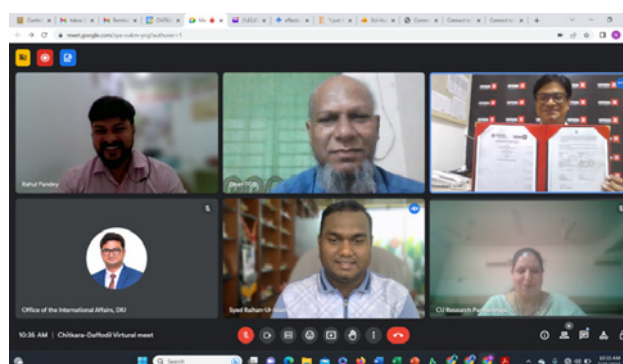
- Chitkara-JSS initial virtual meet was organized on May 4, 2023, between Chitkara University and JSS Academy of Higher Education, Mysuru with an aim of conducting a research sandpit for ongoing Joint Publication Program. The event was conducted by the Office of Research Publications, Chitkara University and was attended by Dr. Amit Mittal, Dr. Rahul Pandey and Namita Sharma from CURIN, Chitkara University and Dr. Prashant Vishwanath, Dr. Vishal Gupta, Dr. Chandan S., Dr. Devanadd from JSS Academy of Higher Education. Various models were proposed by both the parties for the identification of

faculty members with common research interests. The fields of Pharmacy and Health Science were identified for the next phase of the program.
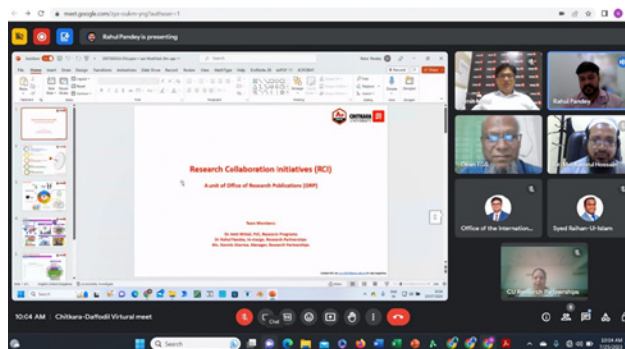
Making an Impact in the International Arena: Participation in THE Asia Universities Summit 2023

Chitkara University participated in the Times Higher Education (THE) Asia Universities Summit 2023 in Hong Kong that was held during June 21-23 at The Chinese University of Hong Kong. The summit delved into the areas of university partnerships and alliances, university research strategies, and emerging megatrends. From Chitkara University, a delegation comprising of Dr. Madhu Chitkara (Pro-Chancellor, Chitkara University), Dr. Archana Mantri (Vice-Chancellor, Chitkara University, Punjab), Dr. K. K. Mishra (Pro-Vice Chancellor, Quality Assurance), and Dr. Hazel Siromoni (Pro-Vice-Chancellor, International Office) participated in the summit. Dr. Madhu Chitkara was the

invited speaker and she shared her thoughts on the topic "Transitioning to a Clean Energy Future and the Role of Universities". Dr. Archana Mantri also made a presentation in the summit on our university's unique approach to fostering an inclusive and transformative educational environment, serving as an inspiring model for other institutions.

Synergizing Research Frontiers: Chitkara University's Interaction with CSIR and IMTECH for Mutual Enrichment

On June 24, 2023, at the invitation of CSIR, Dr. P.K. Khosla, Pro VC delivered a comprehensive assessment of the research initiatives undertaken at Chitkara University. This insightful presentation was extended to Dr. (Mrs.) Kalaiselvi, Director General of CSIR and Director of IMTECH, effectively shedding light on the university's academic pursuits. The outcome of this interaction has kindled CSIR's curiosity in evaluating an ongoing project linked to DRDO.

The central aim of this collaboration is to investigate the potential integration of the ongoing project's outcomes into the fabric of CSIR's undertakings. This

Interaction between Director CSIR-IMTECH and Dr Khosla

symbiotic partnership holds the promise of mutual enrichment, capitalizing on the wealth of knowledge garnered from Chitkara University's research endeavors. By aligning the project's insights with CSIR's pursuits, a dynamic convergence of expertise can be harnessed to amplify the impact of their collective initiatives. This development underscores the invaluable exchange of ideas between academia and research institutions, fueling innovation and fostering collaborative solutions for shared objectives.

Bridging Academia and Military Innovation for Technological Advancement

Army generals have opened a gateway of enticing prospects for academia to engage with cutting-edge technologies. This collaborative endeavor envisions a synergy between the military's advanced technological pursuits and the intellectual prowess of academic institutions. The generals' outreach serves as an invitation to explore novel innovations and research avenues that can contribute to the nation's defense capabilities.

An illuminating event hosted by the Confederation of Indian Industry (CII) was attended by Dr. Khosla (Pro VC, CURIN) and Dr. Amanpreet Kaur (Assistant Professor, CURIN) on April 25, 2023, which provided the firsthand exposure to the formidable baffle range developed by the Terminal Ballistics Research

Laboratory (TBRL). This range has been meticulously crafted to facilitate precise shooting practice, embodying the synthesis of scientific precision and military application. The event not only showcased the tactical sophistication of the range but also illuminated the opportunities it presents for fostering a deeper understanding of ballistics and weaponry.

This convergence of academia and military technology exemplifies a symbiotic relationship, where knowledge transfer and collaborative ventures stand to enrich both sectors. As this juncture of innovation was navigated, the prospects for cross-disciplinary exploration and groundbreaking solutions become all the more pronounced, promising a future where advancements benefit not only the defense mechanism but also the broader landscape of technology and academia.

Cross-Industry Innovation on Wheels: Exploring Eaton's Mobile Showcase of Multidisciplinary Advancements

In line with the prevailing shift towards multidisciplinary research, a significant development has unfolded on our campus. Adjacent to the Newton Block, an impressive 40-feet long van was stationed on May 15, 2023, housing an array of cutting-edge components spanning diverse sectors including vehicles, agriculture, marine, and aerospace. Crafted by Eaton, a global industry leader with a remarkable 18000 patents and a presence in 170 countries, this showcase encapsulates innovation on a global scale.

This mobile exhibit stands as a testament to the interwoven nature of various industries and the potential for cross-pollination of ideas. All members of the campus were heartily encouraged to capitalize on this unique opportunity to explore the rich and diverse exhibits. In doing so, not only the dynamic advancements that Eaton has to offer were engaged but also the larger ethos of collaborative innovation that defines the current research landscape.

FDPs Attended

Dr. Manish Sharma - Professor, CURIN and two of his research scholars, Parminder Kaur and Lovish Matta attended a one week international workshop on "RF & Microwave Components 2023," which was organized by School of Electronics Engineering, VIT-AP University during May 17-23. The workshop was focused on the simulation and generation of results for planar antenna using HFSS and CST softwares.

Dr. Sharma and his PhD scholar Parminder Kaur attended a Faculty Development Program on Design of Microwave Antennas using HFSS, which was conducted by the Department of Electronics & Communication Engineering, Vardhaman College of Engineering, Hyderabad in association with IEEE MTT-S Vardhaman Student Brach from June 26 to July 1. The workshop focused on designing planar antennas on HFSS Electromagnetic Simulator. The results related to impedance matching, gain, radiation pattern etc. were also discussed. The hands-on session was very useful in designing the different types of antenna for several existing wireless communication bands.

Research@CURIN

Top Research Papers of the Quarter by CURIN (Published during April – June 2023)

Faculty members and research scholars from CURIN 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 attempt to discuss them in the form of short summaries.

The research papers discussed in this issue are the ones that were published during April – June 2023. A complete list of publications by CURIN faculty members and scholars during this period is available in a separate section.

A novel concept of employing n-butanol, diesel, and biogas as a promising triple-fuel combination for cleaner and more efficient internal combustion engines in the future

By: Dr. Deepam Goyal - Assistant Professor, CURIN

This article is based on the research paper titled 'Application of Taguchi Design for Performance and Emissions Optimization in Dual-Fuel Mode Using n-Butanol/Diesel/Biogas' published by Dr. Deepam Goyal from CURIN, Chitkara University, Punjab, in Elsevier journal entitled Fuel.

This article explores the utilization of Taguchi design to enhance performance and reduce emissions of triple-fuel blend comprising n-butanol, diesel, and biogas in a dual-fuel combustion system. The paper begins by acknowledging the growing concern over environmental pollution and the need for cleaner and more efficient energy sources in the transportation sector. In response to these challenges, they propose the novel concept of employing n-butanol, diesel, and biogas in combination to exploit their unique properties and optimize engine performance.

To achieve this objective, the study implements the Taguchi optimization method, a statistical approach that efficiently determines the optimal combination of input parameters to achieve the desired output performance. The team of researchers meticulously designed experiments to investigate the effects of various factors, such as biogas flow rate (BFR), butanol in fuel blend percentage, and engine load (EL), on engine performance and emissions. Through a series of controlled tests on a dual-fuel engine using the n-butanol/diesel/biogas blend, team gathered data on important performance parameters, including brake thermal efficiency (BTE), and emissions characteristics, such as nitrogen oxides (NOx), carbon monoxide (CO), hydrocarbons (HC), and smoke.

Parameters	Optimized Results		
	Load	Biogas F.R.	Butanol
BTE	100 %	15 lpm	10%
HC	100%	15 lpm	20%
CO	60%	15 lpm	20%
NOx	20%	35 lpm	10%
Smoke	20%	35 lpm	20%

Illustration is borrowed from the published paper

Upon analyzing the experimental data using Taguchi's method, the BTE demonstrated a higher value of raw data and S/N ratio when the EL was high, and the BFR and butanol blend percent was low. On the other hand, concerning emission characteristics such as HC, CO, and smoke, lower raw data and higher S/N ratio values were observed in the following order of significance: EL > butanol blend percent > BFR. However, for NOx emissions, similar values of raw data and S/N ratio were obtained with the following ranking: EL > BFR > butanol blend percent.

Overall, the study sheds light on the potential of n-butanol, diesel, and biogas as a promising triple-fuel combination and highlights the effectiveness of the Taguchi optimization method in fine-tuning engine parameters for optimal
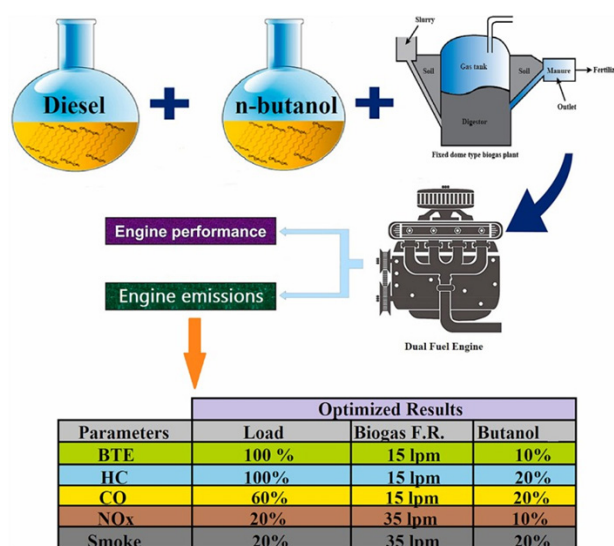
performance and reduced environmental impact. The findings have implications for the development of cleaner and more efficient internal combustion engines in the future.

Cloud and fog computing based new framework for smart grids for optimizing energy consumption

By: Dr. Bhisham Sharma – Associate Professor, CURIN

This article is based on the research paper titled 'Energy Aware Load Balancing Framework for Smart Grid using Cloud and Fog Computing' published by Dr. Bhisham Sharma from CURIN, Chitkara University, Punjab, in MDPI journal entitled Sensors.

The management of renewable energy, including generation, delivery, and consumption, has become progressively complex with its growing usage. The large amount of data generated by data centres has made cloud computing a crucial component of smart grids. Even though a few concerns, like resource management, higher response and processing times, and increased energy consumption, have been associated with cloud computing, it can still be a viable option. Smart grids require both cloud and fog computing for the successful collection of requests and their distribution, which is important for energy conservation. Keeping these challenges in mind, a solution using both cloud and fog computing has emerged as a viable solution for smart grids. Together, cloud and fog help improve security, reduce traffic, and speed up the execution of requests. This paper presents a new framework for energy-aware load balancing for the smart grid that leverages both cloud and fog computing. The aim of this paper is to develop a paradigm for optimizing energy consumption on smart devices by combining cloud and fog computing. The framework underlines the importance of load balancing in improving energy efficiency and illustrates how this can be performed

Illustration is borrowed from the published paper

efficiently by utilizing cutting-edge technologies. The efficient collection and distribution of requests is critical to the energy conservation strategy. A three-layer module is outlined in the framework, comprising a central cloud and fog nodes that host energy-efficient virtual machines to achieve optimal performance. In the framework, the end-user layer of structures is made up of many residential units that use and request energy. Data is temporarily held on fog nodes before being sent to the cloud. The fog node is responsible for all user's security and inquiry processing. The cloud layer is made up of data centers that process and store consumer data. The cost of services is determined by the requirements and applications submitted. At the cloud level, a large number of servers are present to process requests. The suggested framework optimizes energy utilization, lowering operational costs while improving the dependability and resilience of smart grid infrastructure. The framework efficiently distributes computational resources by deactivating overused virtual machines, resulting in lower energy consumption. The meta-heuristic algorithm used is Rock Hyrax Optimization for balancing the load in the smart grid environment. For optimal performance, the optimization algorithm adopts a method known as "divide and conquer." Based on the number of requests received, the framework categorizes fog nodes as either over utilized or underutilized. To save energy, the framework turns on and off nodes based on whether the threshold value on the request queue is met. The technique was successfully implemented in the CloudAnalyst simulator, yielding a trustworthy and efficient solution. Four unique geographical elements are considered to accurately depict the fog environment. The algorithm's performance is evaluated by comparing it to both static and dynamic algorithms. Different QoS parameters are considered for comparing the performance of the algorithm, where processing time is decreased by 26%, response time is reduced by 15%, energy usage is reduced by 29%, cost is lowered by 6%, and delay is reduced by 14%.
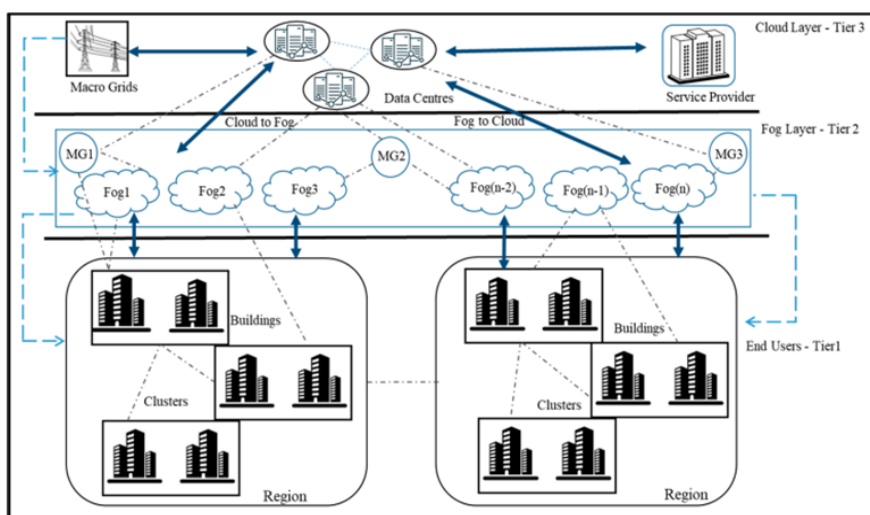
Effects of travel-related events and experiences on mental wellbeing

By: Dr. Urvashi Tandon - Associate Professor, DRC, CBS

This article is based on the research paper titled 'Influence of Memorable Travel Experience on Psychological Capital, Mediated by Mindfulness and Moderated by Restoration' published by Dr. Akansha Tyagi, Dr. Urvashi Tandon & Dr. Amit Mittal from DRC, CBS, CURIN, Chitkara University, Punjab, in Taylor & Francis journal entitled Current Issues in Tourism.

In the past several years, mental health has received a lot of attention, and numerous innovative therapies as well as businesses working in the field have emerged. Further, prolonged social isolation due to COVID caused tension and anxiety in the people which in-turn led to emotional instability and impacted psychological well-being. Travelling, on the other hand rejuvenates and promotes healing. Travel-related events and experiences have a lasting impression on our memory and help people to replenish mental strength, improve attention, and increase consciousness (mindfulness). Travelling and participating in excursions actively foster psychological well-being and social wellness because they allow people to escape from their daily routines and the monotonous repetition of their lives, eradicating mental stress and managing psychological stress through memorable travel experiences. Various startups have emerged in India offering both natural and artificial surroundings which offer humans a variety of therapies to recapture healing characteristics. One such therapy is Dance and Movement Therapy (DMT) that has a favorable impact on people with musculoskeletal problems' mental states. Due to the fundamental role that dance and movement play in the therapeutic relationship, it may aid clients in sharing and expressing their deepest thoughts and emotions. DMT has been widely practised in wellness centres to reduce mental and physical illness. Analyzing the memorable experiences of such therapy along with other psychological aspects may be recognized as a comprehensive method effective in treating a wide range on mental health issues.

The uniqueness of this research work lies in exploring the role of DMT in improving psychological capital. The results of the study indicated a strong relationship between mindfulness and special travel experiences involving DMT. This finding emphasizes how travel experiences, particularly those combined with alternative treatments, have the potential to improve people's mindfulness, a crucial aspect of psychological well-being. The study also proved that mindfulness has a significant impact in bridging the gap between psychological capital and memorable travel experiences, highlighting the importance of mindfulness in building psychological resources and resilience. The study reveals that Restoration strengthens the relationship between psychological capital and mindfulness. The study enhances our knowledge about the interplay and intricate relationships among mindfulness, restoration, and psychological capital.

This research has extensive and multifaceted implications for academicians, practitioners and society as well. Academically, it establishes the relationship between memorable travel experience and mindfulness and provides a fresh insight by validating the moderating role of restoration. From the practical perspective, mental health providers may use the results of this research by incorporating DMT into their treatment plans. Nature-based treatments and memorable travel experiences may help in restoring psychological capital and encouraging resilience in a post-pandemic age marked by increased mental health problems owing to social isolation. Organizations may boost employee productivity and wellbeing by including mindfulness and restorative practices into their wellness programmers. The study's conclusions might inspire group initiatives to plan group excursions and assist people experiencing stress and anxiety. The significance of recuperating one's vital mental resources and aiding friends and family members in restoring their mental health will strengthen societal harmony and cooperation.

Planar Quasi-Yagi antenna with high directional gain for 300 GHz applications

By: Dr. Manish Sharma - Professor, CURIN

This article is based on the research paper titled 'A Novel Conformal Quasi-Yagi antenna with offset feed for high directional 300GHz Applications' published by Dr. Manish Sharma from CURIN, Chitkara University, Punjab, in IEEE journal entitled IEEE Access.

A flexible antenna that offers high directional gain is reported for 300 GHz applications in this paper. The proposed antenna has been designed on a Silicon-dioxide substrate and it has a Quasi-Yagi shaped radiating patch and partial rectangular ground. The three additional
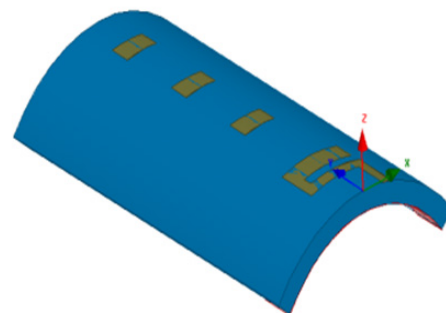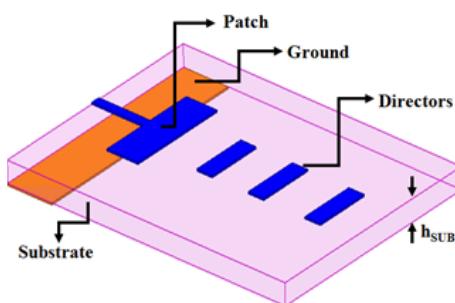
parasitic patches in the design are excited by the main patch, which is fed by a feedline and that is how the directivity is achieved. The substrate has a thickness of 60μm and metal thickness is 5μm on both sides of the substrate. Gold has been chosen as a conducting material. The size of the antenna is very small with dimensions of just 1000×1350 μm2. It offers a maximum gain of 8.62dBi in end-fire direction and has an operating bandwidth of 270 GHz to 333 GHz. The antenna has been designed for THz range wireless communication systems for applications including 6G, THz imaging, spectroscopy, digital holography, and ptychography.
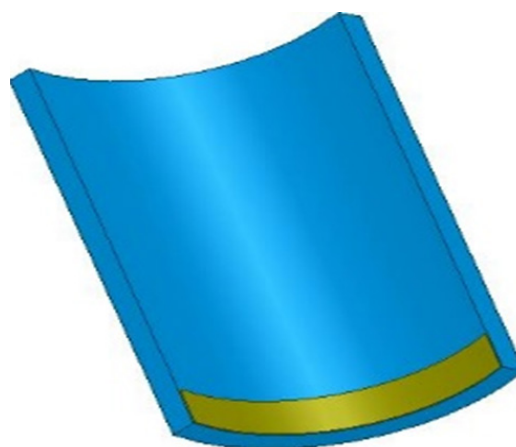

Illustration is borrowed from the published paper

Tandem solar cell design using perovskite and copper indium gallium selenide (CIGS) materials for enhanced energy conversion efficiency

By: Dr. Jaya Madan - Assistant Professor, CURIN

This article is based on the research paper titled '29.7% Efficient Perovskite-CIGS Monolithic Tandem Solar Cell: A Numerical Study' published by Mr. Nikhil Shrivastav, Dr. Savita Kashyap, Dr. Jaya Madan, Dr. Rahul Pandey from CURIN, Chitkara University, Punjab, in ACS Publications journal entitled Energy & Fuels.

Tandem solar cells have emerged as a promising solution to enhance solar energy conversion efficiency. In this paper, a tandem solar cell design using perovskite and copper indium gallium selenide (CIGS) materials has been explored. The key findings and implications of this research work have been discussed in this short summary. Tandem solar cells offer higher efficiency when compared with single-junction devices due to their ability to absorb a broader spectrum of photons. A research team at VLSI Centre of Excellence, CURIN comprising of Nikhil Shrivastav, Dr. Jaya Madan, and Dr. Rahul Pandey have proposed a tandem design comprising two sub-cells: the top sub-cell (Topsc) with a perovskite absorber (Eg 1.68 eV) and the bottom sub-cell (Bottomsc) with a copper indium gallium selenide (CIGS) absorber (Eg 1.1 eV). This combination allows the Topsc to absorb higher energy photons while the Bottomsc captures the filtered photons, reducing thermalization and transparent energy losses.

Illustration is borrowed from the published paper

To optimize the tandem solar cells' performance, the researchers utilized the state-of-the-art Me-4PACz hole transport layer (HTL) in the perovskite Topsc, as previously reported in literature. The Bottomsc was designed using calibrated 16.5% efficient CIGS material. Both the Topsc and Bottomsc were analyzed using filtered spectrum and current-matching techniques. The tandem solar cell exhibited outstanding results. At optimized absorber thicknesses of 347 nm for the Topsc and 2.3 μm for the Bottomsc, the device achieved an open-circuit voltage (VOC) of 1.92 V, a current density (JSC) of 20.04 mA.cm-2, and a fill factor (FF) of 77%. These combined attributes resulted in a remarkable power conversion efficiency (PCE) of 29.7%. This impressive efficiency highlights the potential of tandem solar cells to significantly advance solar energy technology. The successful implementation of perovskite/CIGS tandem solar cells paves the way for more efficient and sustainable photovoltaic systems. As the world faces pressing energy and environmental challenges, such breakthroughs are crucial in meeting the growing demand for renewable energy sources. The results reported in this study are very promising for the development of monolithic tandem solar cells. By harnessing the complementary properties of perovskite and CIGS materials, researchers can continue to explore innovative approaches to optimize tandem solar cell performance and scalability.
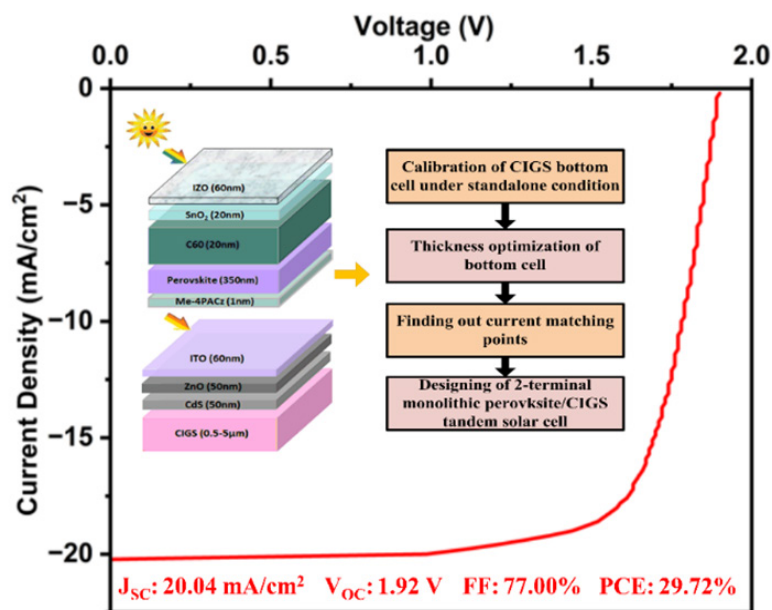
G20 Digital Innovation Alliance (G20-DIA) Roadshow Organized

Theme - Driving Digital Innovation for World Economies

Chitkara Innovation Incubator Foundation (CIIF), CURIN, in collaboration with the Ministry of Electronics and Information Technology (MeitY) of the Government of India, recently organized the G20 Digital Innovation Alliance (G20-DIA) roadshow event on the theme "Driving Digital Innovation for World Economy". The G20 DIA roadshow is a component of a larger G20 strategy to support digital innovation and create a more resilient and equitable global economy. The G20 DIA is dedicated to advancing regulatory frameworks that support innovation, building an ecosystem that promotes investment, and accelerating the adoption of innovative technologies through collaborative efforts.

This event at Chitkara University brought together leading experts and innovators from the digital technology industry to discuss the latest trends and opportunities in digital innovation. The main objective of the roadshow was to invite innovators and startups with digital solutions for solving problems specifically in six sectors namely Edtech, Healthtech, Agritech, Fintech, Circular economy and Digital Infrastructure. A total of 120 startups will be selected for showcasing during the G20 meet. Held on April 20, 2023, the event featured a number of engaging talks and thought-provoking presentations. Leading thinkers and decision-makers from the Indian innovation ecosystem came together for the roadshow, which examined how entrepreneurship may be encouraged across the country's diverse demographics and geographies. Over 150 people, including 50+ start-ups, attended the event. Mr. Samrat Soo - Additional Director, FICCI, and Dr. Archana Mantri, Vice-Chancellor, Chitkara University, graced the event with their presence. Mr. Kartik Pal - Founder, Gurdev Shakti Innovations Pvt. Ltd, Mr. Kamal Jeet - Founder, Kisaan Sanchar, Mr. Tejinder Jassal - Director, Dulcimer Innovations Private Limited and Mr. Taranpreet Singh - CEO, SleepLabs shared about their startup journey and motivated the budding entrepreneurs to start their own ventures. The event was convened by Dr. Adarsh Aggarwal – Vice President, CIIF.

Other Major Activities Carried Out by CIIF during April – June 2023

- On 17th April, a session on the topic "Introduction of Startup Punjab and Awareness about Policies and Incentives to Startups and Incubators" was organized. The speakers for the event were Mr. Amarpal Singh Walia - Junior Manager, Punjab Infotech – Startup Cell and Mr. Ankur Kushwaha - Senior Consultant, Invest Punjab. Around 26 Startups & students attended the session.

- CIIF in association with Samsung organized a bootcamp to sensitize the students regarding the idea challenge entitled "Samsung Solve for Tomorrow" on April 18, 2023. It is an annual competition by Samsung Electronics that encourages students to use their creativity and problem-solving skills to address real-world challenges in their communities using Science, Technology, Engineering, and Math (STEM). Around 123 students from different streams of engineering attended the bootcamp, which was conducted by Mr. Nitish - Program Manager, Samsung, India.

A team from CURIN won 2nd position in a national event

A team from CURIN comprising of Dr. Amanpreet Kaur (Assistant Professor) and a final year UG student of Electrical Engineering, Himanshu Jindal, bagged second position and won cash prize of INR 11,000 in the Siksha Mahakumbh, a national level event on Recent Advances in School Education (RASE-2023) held at NIT, Jallandhar from June 9-11. The team presented the idea of Smart Multifunctional Lecture Stand to provide high quality digital education to the students. The event is graced by the august presence of Captain Anurag Singh Thakur - Union Minister of Information & Broadcasting and Youth Affairs & Sports, Government of India, Shri Banwari Lal Purohit - Hon'ble Governor, Punjab, Shri Bandaru Dattareya - Hon'ble Governer, Haryana and many other eminent personalities from the field of Education and Research.

In vitro Drug Discovery and Development

Center for In vitro Studies and Translational Research (CVSTR), CURIN

By: Dr. Satyam Kumar Agrawal – Professor, CURIN and Head, CVSTR

In vitro means - in glass. It refers to the study that is conducted outside of a living organism, mainly in petri-dishes or tissue culture flasks, typically using cell culture or other artificial environments. In vitro testing is often used as a first step in assessing a drug's potential efficacy and safety, as it allows researchers to observe how the drug interacts with cells in a controlled environment. In vitro studies can help to accelerate drug discovery and reduce reliance on animal experiments, while also providing important insights into the potential risks and benefits of new drugs.

The Center for In vitro Studies and Translational Research (CVSTR), CURIN, Chitkara University is one such advanced research laboratory working in in vitro techniques for anti-cancer studies including Cytotoxicity screening, Apoptosis, Multi-Drug Resistance, Targeted Drug Delivery and Molecular Biology Assays. CVSTR is headed by Dr. Satyam Kumar Agrawal, Professor (Research), CURIN, Chitkara University. Under his guidance, a team of research scholars is working on different in vitro tools and techniques.

CVSTR came into existence in the first quarter of 2023 and is equipped with state-of-the-art facility for mammalian cell culture, including a Bio-safety Cabinet, CO2 Incubator, Inverted Microscope, Plate Reader and Washer, Analytical Weighing Balance, Gel Electrophoresis, Centrifuge, etc.

In the realm of cell culture research, CVSTR excels in developing advanced in vitro models that closely mimic the complexity of human tissues and organs. These sophisticated cell culture systems serve as invaluable tools for studying cancer biology, drug screening and toxicology, accelerating the pace of medical research and discovery. CVSTR gives emphasis on establishing economical, easy to use and fast in vitro assays. The centre also specializes in doing anti-oxidant assays, focusing on Indian medicinal plants and their isolates. The centre is further planning to start anti-diabetic, anti- alzheimer`s studies and in vitro stress studies for phyto-chemical screening.

Committed to the dissemination of knowledge and creating awareness, CVSTR regularly hosts enlightening events and workshops on cancer-related topics. These events are open to students, faculty members, and the general public, fostering a spirit of collaboration and knowledge sharing with other institutions and external organizations. The centre is also open for internship to post-graduate students and joint research projects.

In summary, CVSTR stands at the forefront of in vitro studies and translational research, with a clear mission to combat cancer and other health challenges through innovative applications of in vitro techniques. The center strives to make significant contributions to scientific knowledge and translate its discoveries into tangible benefits for society, ultimately advancing the frontiers of novel drug discovery and development.

An Overview of Activities Conducted by Doctoral Research Centre-Chitkara Business School in Q2, 2023

*Seminars and Faculty Development Programs (FDPs)*

1. One-day Seminar on Questionnaire Design

A seminar on the Technicalities of Questionnaire Design was organized by the Doctoral Research Centre (DRC) - Chitkara Business School (CBS) on April 22, 2023. The seminar was delivered by Dr. Akansha Tyagi (Assistant Professor, DRC - CBS), and was attended by 46 research scholars and faculty members of Chitkara University. It was focused on the construction and administration of Questionnaire Design. The emphasis was on designing valid and reliable questions that address research objectives and placing them in a useful order. Participants received inputs on the layout and sequencing of scale items in questionnaire design. Dr. Akansha also emphasized upon differentiating standardized and unstandardized questionnaires, language-related issues, common errors during questionnaire, and how to rewrite the questions to avoid common errors.
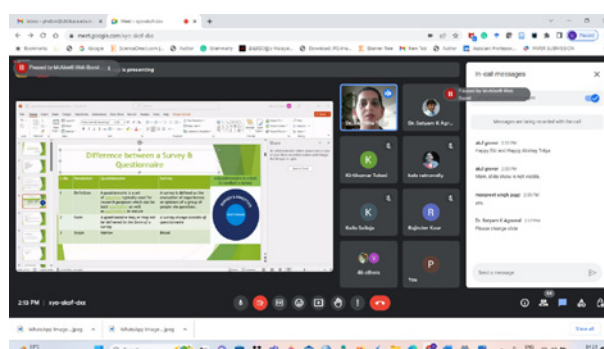
2. One-day Seminar on Bibliometric Analysis

The seminar on Bibliometric Analysis using VOSviewer was organized by DRC-CBS on April 29 and it was delivered by Dr. Meenal Arora (Assistant Professor, DRC-CBS). 65 research scholars and faculty members attended the seminar that aimed at giving an overview of bibliometric methods, performance indicators, and tools and techniques related to bibliometric analysis and mapping order. Participants were provided training on how to interpret data while structuring it into a format so that it is easy to understand and apply in real-world situations. Participants received insights about the following themes and sub-themes: Constructing a search term, Social network analysis, a primer for metrics used in bibliometric, How to identify the topical structure of a research area (Co-Occurrence analysis)? What is the theoretical foundation of a field of study (Co-citation analysis)? Identify past or current research fronts/trends (Bibliometric coupling) and Model for network evolution.
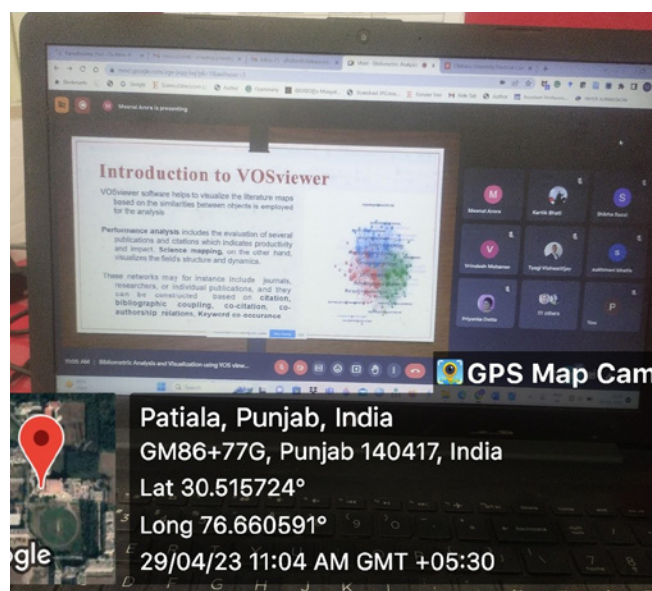
### 3. One-day Seminar on Guidelines for Designing and Interpreting Pilot Studies for Research

A one-day seminar was organized on the Guidelines for Designing and Interpreting Pilot Studies for Research on May 20, 2023 and it was delivered by Dr. Urvashi Tandon (Associate Professor, DRC-CBS). Research Scholars and faculty members were provided insights about pre-testing of questionnaire and pilot studies. The seminar was attended by

59 research scholars and faculty members. Dr. Tandon explained different concepts and laid emphasis on the areas such as sample size and selection for pilot studies, pretesting of the questionnaire, and checking the reliability and validity of the questionnaire.

4. Two-day FDP on Understanding the Best Practices for Ethical Research

A two-day FDP on Understanding the Best Practices for Ethical Research was organized during May 29-30 and was delivered by Dr. Sumanta Datta - Assistant Professor, Post Graduate and Research Department of Commerce, St. Xavier's College. Attended by 49 participants comprising both the faculty members and research scholars, the FDP covered a range of strategies to avoid research misconducts. The topic of plagiarism was discussed in great detail, with an effort to train the participants on carrying out ethical research.
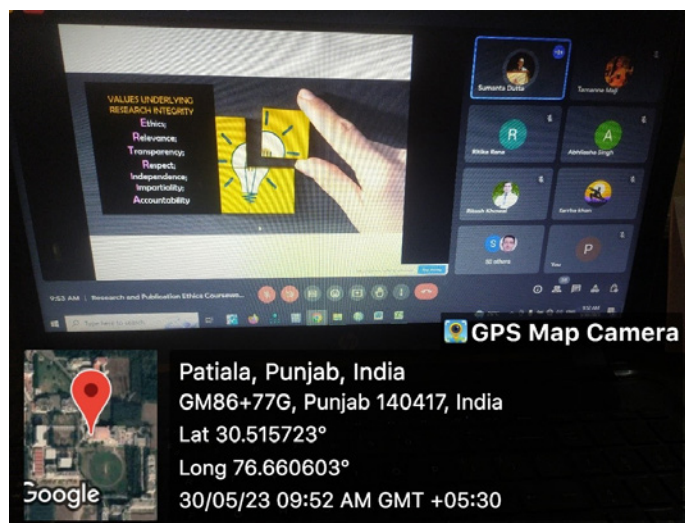
5. Five- day FDP on Navigating the Intricacies of Research and Publication Ethics

Another FDP of five days duration was organized by DRC-CBS that was titled Navigating the Intricacies of Research and Publication Ethics, and it was organized from May 29 to June 2. A total of 52 research scholars and faculty members attended the program that was delivered by Dr. Balraj Verma (Assistant Professor, DRC-CBS), Dr. Meenal Arora (Assistant Professor, DRC-CBS) and Dr. Akansha Tyagi (Assistant Professor, DRC-CBS). The purpose of conducting this FDP was to develop an understanding of different types of research ethics and misconducts. Scholars and faculty members were able to understand best practices, standards setting initiatives, and guidelines of COPE, WAME, etc. Predatory publishers and journals were also discussed in this FDP. It was an opportunity for the young researchers to develop in them the principles of carrying out original and ethical research.

Individual Contributions of the Faculty Members of the DRC-CBS

- It is a proud moment for Chitkara University that Dr. Amit Mittal (Pro Vice-Chancellor Research Programs) who heads the DRC-DBS is among the top administrators and admissions officials from Business Schools across the world, as a member of the Executive Committee of the Business School Advisory Council (BSAC) of India for ETS Global Higher Education. As the senior leader of Graduate Management Education Programs in India, the post entails assisting in the direction of ETS's strategic operations pertaining to graduate Business Schools in India. Every member on the BSAC commits to a three-year term. ETS offers globally renowned certifications such as TOEFL and GRE.

- Dr. Urvashi Tandon (Associate Professor, DRC-CBS) was invited to deliver a webinar on Introduction to Research Methodology at Grandmark International College, Ethopia on April 9, 2023. This webinar was attended by 50 students who are pursuing MBA from Grandmark International College, Ethopia.

- Dr. Akansha Tyagi (Assistant Professor, DRC-CBS) presented a paper entitled, "A Bibliometric Analysis of Green Banking Research" in the 2nd International Conference on Technology, Innovation, and Sustainability in Business Management (ICTIS, 2023) held in Dubai during May 3-4, 2023.

- Dr. Balraj Verma (Assistant Professor, DRC-CBS) was invited to conduct a two-day workshop on Developing Conceptual Frameworks and Formulation of Research Hypotheses. This workshop was organized by Chitkara School of Planning and Architecture (CSPA) in collaboration with DRC-CBS on June 5 and 6, and was attended by 15 faculty members and research scholars of CSPA. This FDP provided detailed insights into the conceptual framework development and framing of hypotheses considering the literature review as theoretical underpinning.

61 Patents Filed by CURIN Faculty Members and Scholars in Q2, 2023

The Patent Office has Granted
151 Patents
to Chitkara University in Q2, 2023.

A total of 178 patents (including industrial designs) have been filed by the different departments of Chitkara University during April - June 2023, out of which 61 have been filed by CURIN faculty members and scholars. The details of these 61 patents are given below:

S. No.	Title	Inventors	Application Number
1	A Device and a Method for Reducing Harmful Gases in an Exhaust Outlet of Vehicle	Aashish Kumar, Mansi Chitkara, Gulshan Dhillon	202311040317
2	A Food Carrier Device	Vishesh Tanwar, K R Ramkumar	202311029176
3	A Home Appliance and a Method for using the Same	Harsimran Jit Kaur, Meenu Garg, Rabindranath Jana	202311031651
4	A Retrofit Machine Learning based Milling Machine	Shivani Malhotra, Nitin Kumar Saluja, Gurjinder Singh, Debarshi Ghosh	202311043753
5	A Smart Gown and a Method for Manufacturing the Same	Shalli Rani, Himanshi Babbar	202311038358
6	A Smart Waste Management System and a Method for using the Same	Mandeep Kaur, Heena Wadhwa, Righa Tandon, Htet Ne Oo, Gagandeep Kaur, Leema Nelson	202311041415
7	A Smart Spectacles for Monitoring Screen Time	Kamini, Chirag Kumar, Shalli Rani	202311043754
8	Adhatoda Vasica Pristine Biochar	Lata Rani, Jyotsna Kaushal, Arun Lal Srivastav	202311043750
9	An Assistive Educational System and a Method Thereof	Suhavi Kaur Bhatia, Muskan Chawla, Sarakshi Kaur, Sandeep Kaur, Sajneet Kaur	202311041421
10	An Expandable Smart Shoe	Deepali Gupta, Ankit Kumar Rai, Harshita Batra, Monica Dutta	202311043747
11	An Unmanned Aerial Vehicle	Chinky Jaggi, Himanshu Kholi, Pankaj Kumar	202311038360
12	Artificial Intelligence based Name Plate	Atul Kumar, Ishu Sharma	202311031089
13	A 33.8 % Efficient all Perovskite Tandem Solar Cell	Nikhil Shrivastav, Jaya Madan, Rahul Pandey	202311041416
14	Blockchain-based Restaurant Feedback Provider System	Amanpreet Kaur, Prabhkirat Singh	202311037837

15	Digital Notice Board	Chinky Jaggi, Manoj Gaur, Pankaj Kumar	202311034678
16	Eight-Port MIMO Antenna for IOT Applications	Manish Sharma, Ashwni Kumar, Vaishali Kikan, Gaurika Jaitly	202311033083
17	Image Enhancement System for Face Recognition and Method Thereof	Garima Chopra, Gurinder Singh	202311026431
18	Iron Fortified Amla Sip for Diabetic	Leema Nelson, K Thirumalaiselvi, Mohamad Ali	202311031650
19	Lead-Free Perovskite-Cztsse based Tandem Solar Cell System and a Method Thereof	Shivani, Jaya Madan, Rahul Pandey	202311041422
20	Lime Peel Tea Composition	K. Thirumalaiselvi, E.A.Mohamed Ali, Leema Nelson, K. Krishnakumar, Vettivel S.C	202311041414
21	Mixed Reality-based Medication Management System and a Method Thereof	Puneet Bawa, Manisha, Pulkit Bindlish	202311041417
22	Magnetic Field Assisted Perovskite Semiconductor based Vacuum Channel Field Effect Transistor	Jaya Madan, Rahul Pandey	202311036370
23	Method and System for Augmented Reality-Based Speech and Language Disorder Assessment	Puneet Bawa, Pulkit Bindlish, Archana Mantri	202311036372
24	Multipurpose Clip-Lock based Broom Assembly System	Kulbhushan Sharma	202311043751
25	Night Vision System and Method for Identifying Objects in Low-Light Conditions	Rahul Pandey, Jaya Madan	202311036369
26	Non-Invasive Neonatal Health Monitoring System and Device Thereof	Shikha Prasher, Leema Nelson, Ahila SC , Madhusundar N	202311026434
27	Portable Multifunctional Walking Aid	Surya Narayan Panda, Sanjeev Verma, Ashutosh Panda, Vaishali Panda, Sonu Goel	202311035351
28	Personalized Non-Invasive Vagus Nerve Stimulation Device for Treatment of Speech and Language Disorders	Puneet Bawa, Archana Mantri, Shirvi Verma	202311038357
29	Pneumonia Detection using Federated Learning Techniques	Shagun Sharma, Kalpna Guleria	202311043748
30	Process and Composition for Preparing Multipurpose Instant Banana Mix	K. Thirumalaiselvi, E.A.Mohamed Ali, Leema Nelson, K. Krishnakumar, Vettivel S.C	202311041419
31	Riftongle-A USB Adapter	Bhanu Sharma, Akshiv, Harbani Sharma, Sheena Angra, Nitin Goyal, Deepika Sharma, Jatin Gulati, Narinder Pal Singh	202311029178
32	Removal of Heavy Metals using Graphene Oxide from Polluted Air by Langmuir-Freundlich Adsorption	Rabindranath Jana, Kanika Guleria	202311025313

33	Smart Footrest for Aiding in Therapy of Patient Suffering from Neurological Disorder	Aashish Kumar, Shikha Goel	202311028939
34	Solar Cell with Doped Surface Inversion Layer and Method of Manufacturing Thereof	Shivani, Jaya Madan, Rahul Pandey	202311026430
35	System for Protecting Crop Field Utilizing Thermoplastic Elastomer Sheet	Chinky Jaggi, Himanshu Kholi, Pankaj Kumar	202311043745
36	System and Method for Converting Crop Residue into Biofuel	Maninderjeet Singh, Nitin Kumar Saluja, Chanpreet Singh, Varinder Singh, Rajesh Kumar	202311041418
37	System and a Method for Gesture-Controlled Automatic Seed Sowing	Shivansh Rajput, Jaibr Singh Makkar, Jatin Garg, Rupesh Gupta, Sheifali Gupta, Vatsala Anand	202311040607
38	System and Method to Detect Drowsiness of Driver	Jaspreet Singh Bajaj, Naveen Kumar, Rajesh Kumar Kaushal	202311036778
39	System and Method for Augmented Reality-based Online Shopping	Gurjinder Singh, Nitin Kumar Saluja, Devarshi Ghosh, Varinder Singh	202311035527
40	System and Method for Remote Patient Monitoring	Shilpi Garg, Rajesh Kumar Kaushal, Naveen Kumar, Surya Narayan Panda, Francesco Flammini, Anshul Verma, Meena Rani	202311032808
41	System and Method for Managing Grievances using Blockchain	Rajesh Kumar Kaushal, Naveen Kumar, Surya Narayan Panda, Shilpi Garg	202311033082
42	Trolley for Managing Book Returns in Library	Shilpi Garg, Naveen Kumar, Rajesh Kumar Kaushal, Jyoti Sharma, Surya Narayan Panda, Shelly Singhal, Meena Rani	202311042455
43	Ultrafast Silica Gel Synthesis Process using Crop Waste	Maninderjeet Singh, Nitin Kumar Saluja, Varinder Singh, Rajesh Kumar, Chanpreet Singh	202311036373
44	Urine Analyzer Device	Kulbhushan Sharma, Shally Rani, Harmeet Kaur Kang	202311028942
45	Vertical Vapor Flow cum Condensed Liquid Collector	Mukesh Kumar, Vetivell S.C, Leema Nelson, Suresh Kumari, Parveen Kumar	202311036371
46	Water Purifier System	Amanpreet Kaur, Priyanka Datta, Lav Soni	202311036610

INDUSTRIAL DESIGN REGISTRATIONS

47. All-In-One Screwdriver

By: *Varun Jindal, Vinay Kukreja, Deepak Banerjee*

Application No. 383816-001

48. Bracelet with SOS Button

By: *Amanpreet Singh, Amandeep Kaur, Deepali Gupta, Rupinder Singh, Maninderjit Singh, Jaspreet Singh*

Application No. 383374-001

49. Comb with Auto-Cleaning Mechanism

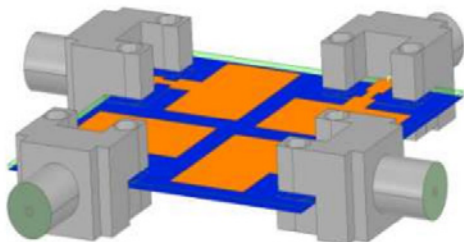**By:** *Varun Jindal, Vinay Kukreja*

Application No. 386546-001

50. Conformal 60.0 GHz MIMO Antenna

By: *Manish Sharma, Ashwni Kumar, Vaishali Kikan, Gaurika Jaitly, Anupma Gupta, Siddhi Bhardwaj, Neha, Takshish Bano*

Application No. 385918-001

51. Ceiling Fan

By: *Raghav Jain, Pulkit Singla, Rishabh Sharma, Vinay Kukreja, Varun Jindal*

Application No. 385917-001

52. Food Sugar Testing Watch
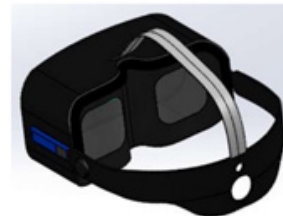
By: *Varun Jindal, Vinay Kukreja*

Application No. 387276-001

53. Head Mounted Display with Rechargeable Solar Panel

By: *Amanpreet Kaur, Priyanka Datta, Shishir Srivastva, Nikhil Srivastva*
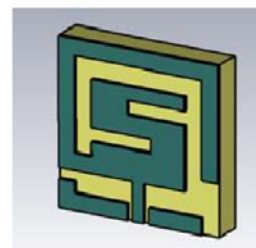
Application No. 385581-001

54. Miniaturized, wideband, high gain antenna for implantable devices operating at 2.45 GHz ISM band

By: *Anupma Gupta, Vipan Kumar, Manish Sharma, Shonak Bansal, Rachit Manchanda, Ankita Aggarwal*

Application No. 383372-001
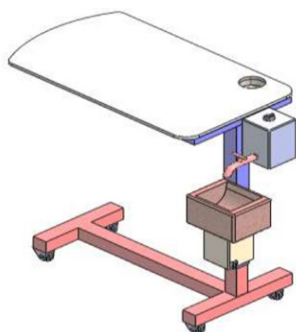
55. Mart White Board Marker

By: *Kalpna Guleria, Meena Rani, Surya Narayan Panda, Swati Goel, Mohit Kumar, Sanjeev Verma, Shilpi Garg, Shagun Sharma*

Application No. 385582-001

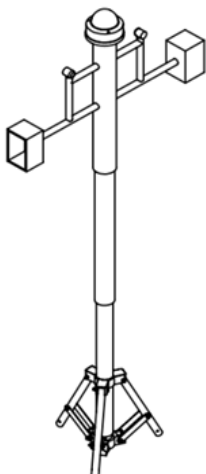**56. Smart Over Bed Table with Sink**

By: *Swati Goel, Kalpna Guleria, Surya Narayan Panda, Meena Rani, Mohit Kumar, Sanjeev Verma, Shagun Sharma, Ishita Seth*

Application No. 387279-001

57. Smart and Intelligent Scarecrow (SIS)

By: *Htet Ne Oo, Maninder Singh, Heena Wadhwa, Mandeep Kaur, Leema Nelson, Praveen Kumar Khosla*

Application No. 388314-001

58. Smart Attachment for Holding Screw Jack's Rotational Handle

By: *Ankit Sharma, Anoop Kumar Singh, Sahil Mehta*

Application No. 382990-001

59. Twin True Wireless Stereo (TWS)

By: *Agamjot Singh, Varun Jindal, Vinay Kukreja*

Application No. 386544-001
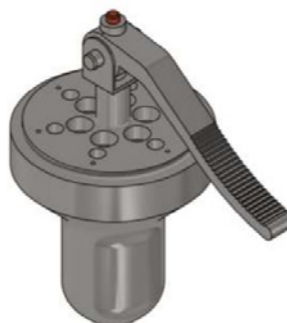

60. Universal Screen Guard Aligner

By: *Mr. Varun Jindal and Mr. Vinay Kukreja*

Application No. 386543-001

61. Vapor Flow -Cum-Condensed Liquid Collector for Pressure Cooker

By: *Mukesh Kumar, Vetivell S.C, Leema Nelson, Suresh Kumari, Parveen Kumar*

Application No. 386548-001

CURIN Faculty Members as Resource Persons

Expert Speakers, Invited Speakers, Trainers, Session Chairs, etc.

- Dr. S.N. Panda – Executive Director, Research, CURIN, was invited as a guest speaker at the International Public Health Management Development Program (IPHMDP) hosted by PGIMER Chandigarh for doctors of Myanmar on April 2. He spoke on the topic of Artificial Intelligence in Healthcare. A day before on April 1, Dr. Panda conducted a workshop on Innovation to Intellectual Property Protection for Bengaluru North University and Kristu Jayanti College in online mode. Dr. Niranjana Vanalli - Vice Chancellor of Bengaluru North University inaugurated the workshop and more than 200 faculty members participated in it.

- Dr. Deepali Gupta – Professor, CURIN chaired a session at the International Conference on Networking and Communications (ICNWC 2023) on April 5, 2023. The conference was organized by the School of Computing, SRM Institute of Science and Technology, Chennai, India. A total of eight papers were presented in the session. Dr. Deepali also chaired a paper presentation session at the 4th International Conference on Emerging Technology (ICNET 2023) that was organized by Jain College of Engineering, Belagavi, India during March 26-28.

- During April 7-8, 2023, a team from the Center of Liquid Crystal Research, CURIN comprising Dr. Pankaj Kumar (Professor) and his PhD scholars including Pooja and Rajat Takkar participated in the National Conference on Recent Advances in Materials and Nanotechnology held at DIT University, Dehradun. Dr. Pankaj Kumar delivered an invited talk on the topic Vertical Anchoring of Liquid Crystals via Spherical Nanoscale Particles: Formation and Process. Additionally, Pooja and Rajat presented their paper titled   Fabrication and Characterization of Bistable Azo Dye-Doped Cholesteric Liquid Crystal Cells for Light Shutter Applications in the conference.

At a different platform - One Day National Seminar on Condensed Matter Physics and Materials (CMPM-
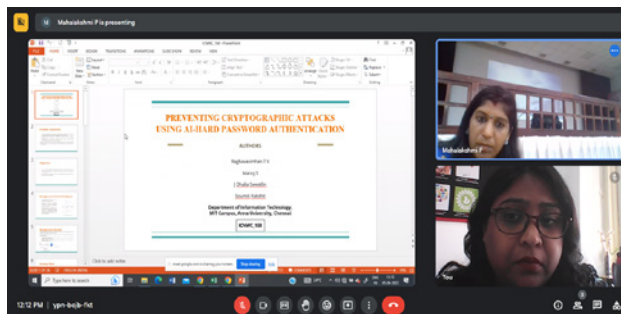
2023) held at Punjabi University, Patiala on May 8, Pooja and Rajat presented their paper titled Foreign Nanoparticles and Host Nematic Liquid Crystal Composites - An Analysis of Electro-optical and Dielectric Properties.

- Earth Day, April 22, was celebrated as NAVOTHAN by the Women Indian Chamber of Commerce & Industry (WICCI) at PEC, Chandigarh. Dr. Jyotsna Kaushal – Professor, CURIN was invited as one of the panelists on WATER FOOT PRINT. Dr. Kaushal heads the Center for Water Sciences at Chitkara University, Punjab and she has been doing a lot of work in the area of water treatment.

  Additionally, on the World Environment Day, June 5, Dr. Kaushal led the initiative of tree plantation outside Phytoremediation Lab, CURIN, Chitkara University. She was joined by Dr. Pankaj Kumar – Professor, CURIN and Dean, PhD Programs, Chitkara University.

- Dr. Ayush Dogra – Assistant Professor, CURIN, chaired a technical session on Intelligent Data Analytics and Computing on April 22 at the IEEE International Conference on Contemporary Computing and Communications (InC4) organised by the Department of Computer Science and Engineering, CHRIST (Deemed to be University), Bangalore. He was the Publication Chair of the International Conference on Intelligent Perception and Computer Vision (CIPCV 2024) that was held in Xiamen, China during May 19-21 and he also presented a paper titled Underwater Image Dehazing using Non-Local Prior Method and Air-Light Estimation in the conference.

  Additionally, Dr. Ayush is a guest editor of a special issue titled Tracing the Advancement and Implementation of Medical Imaging and Artificial Intelligence in Healthcare Applications in the Current Medical Imaging Journal. This journal is indexed in SCIE, SCOPUS, PUBMED, and Medline Databases.

  Dr. Ayush is serving on the organizing committee of the 2023 International Conference on Robotics, Control and Vision Engineering (RCVE) that will be held at Hosei University, Tokyo, Japan during July 21-23, 2023. He has also been included as an International Committee Member in the 2023 International Conference on Advances in Artificial Intelligence and Applications (AAIA 2023) that will be held during November 18-20, 2023 in Wuhan, China.

  Dr. Ayush has been selected as a post-doctoral research fellow in the Machine Intelligence Research Labs (MIR Labs), USA from June 20, 2023, to June 19, 2024. He will be working on the topic of Low Dose Computed Tomography Image Enhancement for Cancer Management under the supervision of Dr. Ajith Abraham.

  Dr. Dogra has been selected as an editorial board member of several magazines and journals including, IEEE Technology Policy and Ethics- IEEE Future Directions Newsletter, Journal of Computers, Materials & Continua, Journal of Health and Social Care in the Community, Journal of Healthcare Engineering and a section editor (Imaging) for Coronaviruses Journal.

- Dr. Amanpreet Kaur and Dr. Bhanu Sharma – Assistant Professors, Immersive and Interactive Technology Lab (IITL), CURIN, were invited as resource persons in an online National Level AR and VR Workshop, which was organized by Vardhman College of Engineering, Hyderabad from March 31 to April 1, 2023. Dr. Sharma discussed about marker based and marker less techniques for the development of AR applications. Dr. Kaur highlighted the key points regarding fully immersive, semi-immersive & non-immersive VR technologies. There were 70 attendees including faculty and students.

  Dr. Amanpreet Kaur was also invited by the Chitkara College of Education to impart knowledge of Metaverse in Education: A New Paradigm of Learning to the students of B.Ed. This session was held on May 11 wherein Dr. Kaur emphasized on the role of metaverse in the education sector while discussing technologies including AR, VR, MR, IoT and Blockchain.

  Dr. Amanpreet Kaur - Assistant Professor, CURIN, chaired an online paper presentation session at the 3rd International Conference on Intelligent Technologies (CONIT 2023), which was organised by K.L.E. Institute of

Technology, Hubballi, Karnataka during June 23-25. Around 15 research papers based on AI, IoT, microelectronics, nanomaterials and cyber security were presented in the session.

- Chitkara University hosted the EDUREFORM Expo on May 6. It is platform to showcase and discuss about innovative pedagogical tools with an aim of promoting creative, critical and analytical thinking in classrooms. EDUREFORM project has 11 partners from EU and India and it is co-funded by Erasmus. Chitkara University is the lead coordinator of the project. In this Expo, Immersive and Interactive Technologies Lab (IITL), CURIN was invited to showcase their AR/VR projects for school education. Following projects were demonstrated by team IITL:- ARscination, ARomatic, Learn-o-Little, Vidyut AR and EduGeo. IITL is headed by Dr. Archana Mantri – Vice Chancellor, Chitkara University, Punjab.

- Dr. Naveen Kumar - Associate Professor, CURIN, delivered a session in a hands-on workshop titled Build and Simulate Your Network using Packet Tracer on June 7, 2023. This event was organized by the Institution's Innovation Council (IIC) in collaboration with the IoT and Cloud Computing Lab and Immersive and Interactive Technology Lab, CURIN. Faculty members and research scholars from various departments actively participated in this workshop. The workshop was coordinated by Dr. Manish Sharma – Professor, CURIN and Vice President, Institution's Innovation Council (IIC), Chitkara University, Punjab.
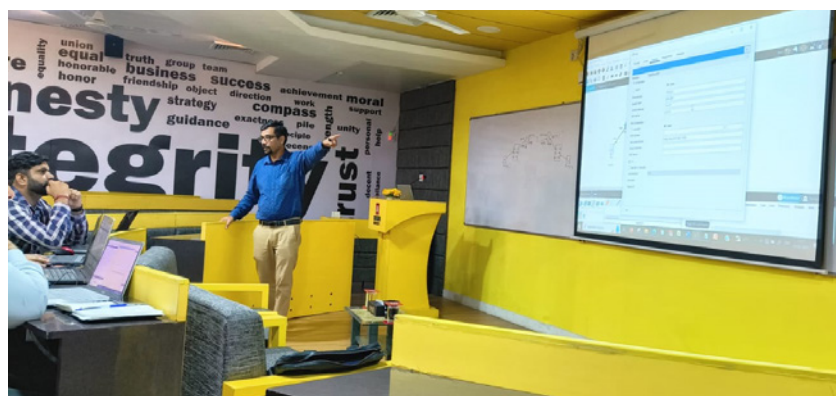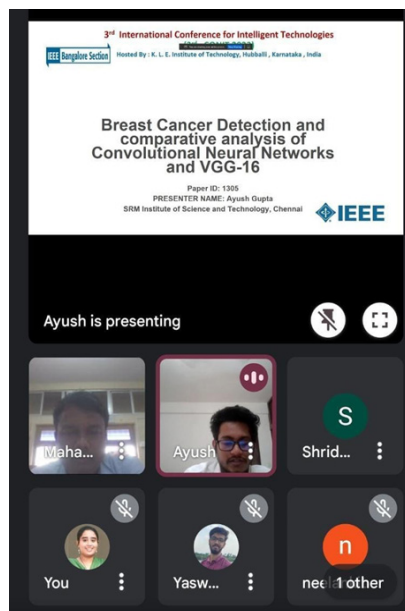
Paper Presentations in Different Conferences

- Archana Saini - ME scholar, CURIN working under the guidance of Dr. Kalpna Guleria - Associate Professor, CURIN presented papers in different conferences. The details of these papers are as follows. 'Tomato Leaf Disease Classification using Convolutional Neural Network Model' (International Conference on Electrical, Electronics, Information and Communication Technologies that was organized by Department of Electrical and Electronics Engineering, K. Ramakrishnan College of Engineering, Tiruchirappalli, Tamil Nadu during April 5-6), 'Machine Learning Approaches for an Automatic Email Spam Detection' (International Conference on

Artificial Intelligence and Applications that was organized by Alliance University, Bengaluru during April 21-22) 'An Efficient Deep Learning Model for Eye Disease Classification' (International Conference on Smart Computing and Systems Engineering 2023 that was organized by the University of Kelaniya, Colombo, Sri Lanka on June 29), 'An Automatic Fake News Identification using Machine Learning Techniques' (International Conference on Signal Processing, Computation, Electronics, Power and Telecommunication that was organized by IEEE Madras Section, India during May 25-26) and 'A Deep Learning-based Convolutional Neural Networks Model for White Blood Cell Classification' (4th International Conference of Emerging Technologies that was organized by the Department of Electronics & Communication Engineering, Jain College of Engineering, Belagavi during May 26-27)

- Dr. Mudita Uppal – Assistant Professor, CURIN presented her paper titled Efficient Machine Learning Model for Cardiac Disease Prediction in the 2nd IEEE International Conference on Vision Towards Emerging Trends in Communication and Networking Technologies 2023 (ViTECoN'23) held during May 5 and 6, 2023.

- Nikhil Shrivastav and Navdeep Kaur, PhD scholars of Dr. Rahul Pandey and Dr. Jaya Madan - Assistant Professors, CURIN, presented their research papers in the 1st International Conference titled Renewable Energy and Sustainable E-Mobility (RESEM 2023), which was held on May 17-18 at Maulana Azad National Institute of Technology, Bhopal. In the same conference, ME scholars – Vishal Yadav and Savita Yadav also contributed their papers.

- Researchers working with Dr. Deepali Gupta – Professor, CURIN, also presented their papers in RESEM 2023. Dr. Ramneet Kaur and Dr. Mudita Uppal presented a paper titled A Comprehensive and Comparative Study of Handwriting Recognition System, and Monica Dutta – PhD Scholar, presented a paper titled Bibliometric Analysis on Herbaceous Plants using Smart Precision Farming.

- Somya Srivastav – ME Scholar working under the guidance of Dr. Kalpna Guleria – Associate Professor, CURIN, presented a paper titled Skin Cancer Classification using Deep Learning Model: A Predictive Study in RESEM 2023. Somya also presented a paper titled Machine Learning Based Predictive Model for Intrusion Detection in the International Conference on Signal Processing, Computation, Electronics, Power and Telecommunication that was organized by IEEE Madras Section, India during May 25-26, 2023.

- Monica Dutta – PhD Scholar, CURIN and student of Dr. Deepali Gupta – Professor, CURIN, presented her paper titled Customer Churn in Telecom Sector: Analysing the Effectiveness of Machine Learning Techniques in the 4th International Conference on Data Analytics & Management (ICDAM-2023) held during June 23-24, 2023 at London Metropolitan University, London, UK.

- Dr. Anoop Kumar Singh – Professor, CURIN, and Dr. Ankit Sharma – Assistant Professor, from CURIN, attended and presented three research articles in an International Conference on Mechanical Engineering: Researches and Evolutionary Challenges, which was held during June 23-25 at the National Institute of Technology, Warangal. India. These research studies aim at sustainable manufacturing solutions. The title of these papers are 'Parametric Optimization for Material Removal Rate during Face Milling: Using Experimental and Mathematical Modeling Approach', 'Investigation for Optimization of Volumetric Efficiency using Variable Length Intake Manifold on IC Engine: A Comprehensive Review' and 'Performance Prediction of Electrode Materials on Surface Roughness during Electric Discharge Machining of HSLA Steel'.

Publication in a reputed monthly magazine

Dr. Ayush Dogra – Assistant Professor, CURIN published three featured articles in Laser Focus World magazine. He collaborated with Prof. Renu Vig - Vice Chancellor, Panjab University, Chandigarh for two articles in this prestigious magazine. This magazine is SCI indexed and it is widely read in the industry. The titles of the published articles are - Unveiling the art of image matting: Techniques and applications; Exploring image inpainting for seamless restitution; and Airlight estimation for simultaneous day and night image dehazing applications.

Activities Conducted Under Funded Projects

STEM Projects, NewGen IEDC and TEC (funded by DST)

Chitkara University has two GoI funded projects of Science, Technology, Engineering and Mathematics (STEM) demonstration and popularization from the National Council for Science and Technology Communication (NCSTC) division of the Department of Science and Technology (DST). Dr. Archana Mantri – VC, Chitkara University, Punjab and Sagar Juneja – Assistant Dean, CURIN are the PI and Co-PI of one of the projects, respectively. Dr. Deepti Prit Kaur - Assistant Professor, ECE and Dr. Bhanu Sharma – Assistant Professor, CURIN are the respective PI and Co-PI of the second project. In Q2 2023, the following activities were carried out under these two projects.

- On April 11, Mr. Chanpreet Singh (Project Manager, CURIN) visited St Attri's Senior Secondary School, Lalru Mandi to conduct a tutorial on the topic Design Thinking for Creativity and Innovation at Schools. The students witnessed demonstration of 3D printing technology, during which they printed the 3D-designed parts themselves using a 3D printer. A total of 100 students attended this session. In the same school, on April 13, Dr. Amit Kumar (Assistant Professor, ECE) delivered a tutorial session on Innovation in STEM Education: Robotics and Automation to grade 8 to 12 students. Dr. Amit talked about the different components used to assemble a robotic system, importance of motors and sensors in automation and basics of embedded programming.

- During April 20 & 21, two tutorial sessions were organized at VB International School, Zirakpur. The first tutorial was on the topic of Innovative STEM Education in Robotics, wherein students learned the working of robotics and different components used to assemble a robotic

system. It was delivered by Dr. Amit Kumar. The second tutorial that was titled Immersive and Innovative Technologies for Solving Societal Problems and it introduced students to technologies like Augmented Reality, Virtual Reality, Metaverse, Blockchain, etc. It was delivered by Dr. Bhanu Sharma.

- An expert session on Interactive and Smart Teaching - Learning Inside and Outside of the Classroom was organized to inculcate skill development among teachers, spreading scientific awareness among students, and methods for improving the spatial, cognitive and technical skills of the students. A total of 200 beneficiaries (students and teachers) participated from the government and private schools of Rajpura in this session that was held at Chitkara University, Rajpura, Punjab on April 26. This session aimed at enhancing

fundamental skills required for interactive and smart teaching. The focus was on making students familiar with a range of ICT tools. They were also introduced to various disruptive technologies being used in education such as Augmented Reality, Artificial Intelligence, etc. The resource persons of the session were Dr. Amit Kumar, Mr. Pardeep Kumar, and Mr. Bibhu Nandan Panda from Chitkara University.

- On May 3, Mr. Chanpreet Singh delivered a tutorial on the topic Rapid Prototyping: A Roadmap to Successful Products at The Humming Birds School, Rajpura. The students learned about idea generation from scratch and how to convert those ideas into useful prototypes, especially with 3D printing technology. There were about 80 students from class 8 to 10 who attended this session. On May 4, Dr. Bhanu Sharma conducted an exciting tutorial with the theme Revolutionizing Society: Exploring Immersive and Innovative Technologies for Solving Societal Problems. She gave insights into the latest trends & innovations in immersive technologies to school students. Over 60 students attended this tutorial along with three teachers. She also demonstrated AR/VR technologies with real life examples.

- On May 29, Chitkara University supported St. Soldier Paradise Senior Secondary School, Dhakoli in organizing a science exhibition as a part of the STEM project wherein students of class 6 to 12 showcased working models and project prototypes. Dr. Arun Upmanyu (Professor, CURIN), Dr. Reetu Malhotra (Professor, Applied Sciences), Dr. Pooja Mahajan (Associate Professor, Applied Sciences) & Mr. Sagar Juneja (Assistant Dean, CURIN) were invited by the School management to witness the exhibition and interact with the participating students.

Launch of 5ᵗʰ Edition NOVATE+ 2023 and Associated Activities

Chitkara University NewGen IEDC & TEC announced the 5ᵗʰ edition of NOVATE+ 2023 where innovative project ideas have been invited, and shortlisted ideas will receive prototype funding for their implementations. The objective of NOVATE+ is to support joint industry-academia projects that solve real-world problems, projects that are in-line with the Government of India schemes, projects targeting social and local problems, etc. The hackathon was launched on April 4.

After the announcement, Mr. Sagar Juneja (Assistant Dean, CURIN) conducted awareness sessions in different departments of the university during April 12 -25, interacted with the students and encouraged them to submit their projects ideas in NOVATE+ 2023 to win prototype funding.

On April 12, he conducted a session for the first & second year students of the Mechanical Engineering Department with a theme How They Can Win Prototyping Funding for their Innovative Projects from Chitkara University NewGen IEDC. On April 13, an exclusive session for ME and PhD scholars was conducted and they were informed about this opportunity. 50+ scholars attended the session that was titled How Pre-Incubation Centre is Fueling Innovations

in and around the University. On April 14, he delivered two expert talks, one was with the Pharmacy Department wherein he gave insights about innovations in Medical & Assistive Technologies, and the second session was with the Applied Sciences Department wherein he explained to students that they must avail pre-incubation support for building their projects. On April 19, he conducted an interactive session on Why Every Student Must Apply for Pre-Incubation Funding for the students of CSE Department. He counseled the students about how their innovative ideas could be the start of their entrepreneurial journey. Around 175 students attended this session. On 20, 24 & 25 April, he conducted one session each with three departments of the University, namely Interior Design, Computer Applications and Planning & Architecture with the same objective of encouraging students & faculties to participate in the upcoming Hackathon NOVATE+ 2023.

Tutorial by an Industry Expert

On April 26, DST sponsored Chitkara University NewGen IEDC and TEC conducted a tutorial on the topic "Pathway from Ideation, Prototyping, Product Designing to Manufacturing" with Electronics, Mechanical, Mechatronics & Electrical Engineering students of the university.

The session was delivered by an industry expert Mr. Rama Kant (Founder & Director- Elinco Innovations) who is into manufacturing of industrial instruments since 1976. He shared his rich experience in electronics design, sensors, product design, LCD Manufacturing and instrumentation. He also shared about the Technology Business Incubator (TBI), he is heading in Ambala. The session was attended by close to 80 students and 10 faculty members.

List of Publications

146 publications by CURIN researchers and scholars that were indexed in SCI and Scopus Journals and Conferences in Q2, 2023

[1] A. Bansal, R. Sharma, V. Sharma, A. K. Jain, and V. Kukreja, "A Deep Learning Approach to Detect and Classify Wheat Leaf Spot Using Faster R-CNN and Support Vector Machine," in *8th International Conference for Convergence in Technology (I2CT), Lonavla, India: IEEE*, 2023, pp. 1–6.

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