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CURIN Research and Development News

CURIN
Chitkara University
Research & Innovation
Network

Volume 2022, Issue 2

R&D Activities During April - June 2022

COVER STORY

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Won by a Faculty Member from CURIN

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EXPLORE YOUR POTENTIAL

CURIN Organized the 7th Edition of its Flagship Engineering Conference - WECON™ 2022

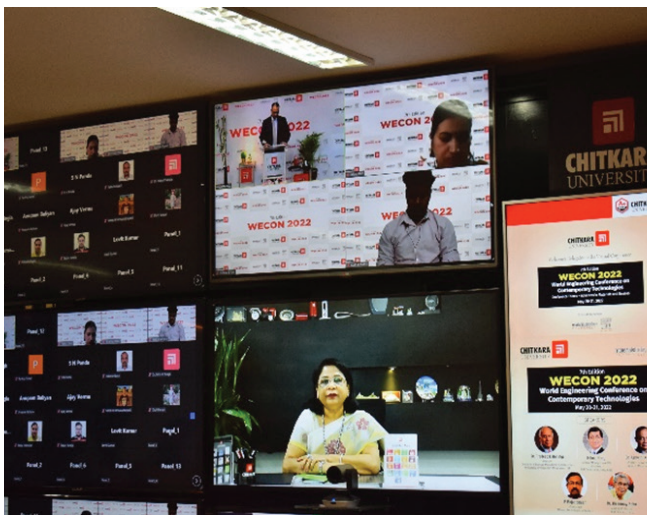
The proceedings of WECON 2022 to be published by Elsevier in Materials Today

Cover Story By*: Sagar Juneja, Editor, Res Novae*

Chitkara University, India has been conducting World Engineering Conference on Contemporary Technologies™ (WECON™) since 2008 and the latest edition of the conference was held on May 20-21, 2022. WECON 2022 was the 7th edition and it was organized with a theme 'Advances in Materials and Devices'. The conference was done in collaboration with Elsevier and the proceedings will be published by Elsevier in Materials Today.

On May 20, 2022, the inaugural ceremony of WECON 2022, the flagship engineering conference of Chitkara University, commenced with an inspiring video message from Dr. Madhu Chitkara, Pro-Chancellor, Chitkara University, and a welcome address by Dr. Archana Mantri, Vice-Chancellor, Chitkara University, Punjab and the General Chair, WECON.

Dr. Madhu Chitkara appreciated the efforts in conducting the seven editions of WECON in the last decade or so and she emphasized upon the strong focus of Chitkara University in promoting the research culture in the university. Dr. Archana Mantri in her welcome address highlighted the importance of the theme of WECON 2022 that focused on advances in wide range of materials including semiconductor materials, nano materials, superconductors, polymers, composites etc.

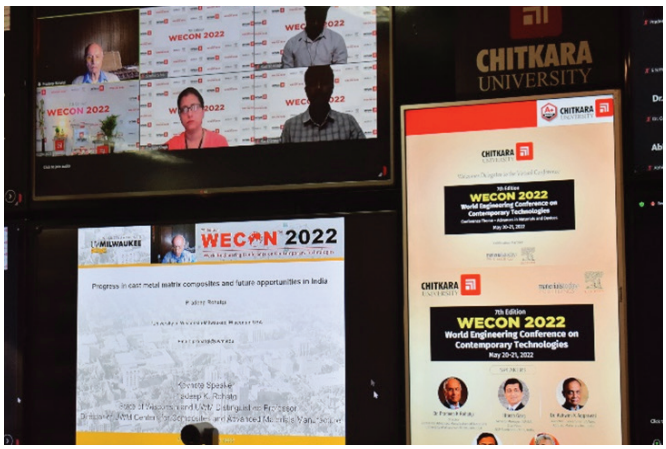


The inauguration ceremony was followed by two insightful keynotes by Dr. Pradeep K. Rohatgi – Director, Centers for Composites and Advanced Materials Manufacture, University of Wisconsin-Milwaukee, USA, and Dr. Ashwini K Aggarwal - Director, Government Affairs, Applied Materials.

Dr. Rohatgi shared his rich experience in the field of metal matrix composites, unique properties of these composites, their need, processing methods and research opportunities for India in this field. Dr. Aggarwal, on the other hand discussed about semiconductor industry in India including the key policies, challenges, major opportunities etc.

Additionally, Day 1 of the conference witnessed paper presentations in two parallel tracks and four invited talks by Prof. Satyabrata Jit (IIT BHU), Prof. Angsuman Sarkar (Kalyani Government Engineering College, West Bengal), Dr. Govind

Gupta (CSIR-National Physical Laboratory, New Delhi) and Dr. Arpan Deyasi (RCC Institute of Information Technology, West Bengal).



On Day 2, two keynote talks were organized that were delivered by Prof. Dr. R.S. Gupta (Maharaja Agrasen Institute of Technology, Rohini, Delhi) and Mr. P Rajagopalan (Marvell Technology, Singapore). Prof. Gupta talked about Evolution of Electronics and VLSI. Mr. Rajagopalan spoke about Design Considerations and Recent Trends in Automotive IP Cores (Semiconductors). This was followed by paper presentations in three parallel tracks. Day 2 also witnessed five invited talks by Prof. Dr. Rajesh Khanna (Thapar Institute of Engineering and Technology, Punjab), Prof. Dr. Rishu Chaujar (DTU, New Delhi), Dr. Harsupreet Kaur (University of Delhi South Campus), Dr. Sudhanshu Singh (Amity University, Rajasthan), and Dr. Manas Chanda (Meghnad Saha Institute Of Technology, Kolkata).

More than 200 delegates attended WECON 2022 that witnessed 50 paper presentations in 5 tracks, 4 keynote talks and 9 invited talks.

The core organizing team of WECON 2022 included Dr. Archana Mantri – Vice Chancellor, Chitkara University (General Chair, WECON 2022), Dr. Rajnish Sharma – Dean, Academics Affairs, CUIET (Technical Program Chair, WECON 2022), Mr. Sagar Juneja – Assistant Dean, CURIN (Convener, WECON 2022), Dr. Rahul Pandey and Dr. Jaya Madan – Assistant Professors, CURIN (Track Chairs, WECON 2022).

Research@CURIN

High Impact Research Papers Published by CURIN during April - June 2022

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 researcher papers, discussed in this issue are the ones that were published during April - June 2022. A complete list of publications by CURIN faculty members and scholars during this period is available in a separate section.

Cost-Effective and Efficient Lead-Free Perovskite Solar Cells (PSCs) Proposed

By: Dr. Jaya Madan, Assistant Professor, CURIN

This article is based on the research paper titled 'Investigation of Carrier Transport Materials for Performance Assessment of Lead-Free Perovskite Solar Cells' published by Dr. Rahul Pandey and Dr. Jaya Madan from CURIN, Chitkara University, Punjab, India in IEEE Transactions on Electron Devices.

Nowadays, perovskite solar cells (PSCs) have attained significant interest for their unprecedented optoelectrical properties than the conventional Si-based solar cells. They may be due to the excellent priorities of high absorption coefficient, high carrier transport phenomena and changeable bandgaps accreditation with larger diffusion lengths.

A research team in VLSI Centre of Excellence, Chitkara University, Rajpura, Punjab, India, comprising of Dr. Rahul Pandey and Dr. Jaya Madan have proposed lead-free methylammonium tin tri-iodide ($MASnI_3$)-based perovskite solar cells (PSCs) under optimizing pre-conditions. The prior selection of the perovskite material of $MASnI_3$ is feasible for a more extended absorption spectrum due to a smaller bandgap of 1.3 eV than higher bandgap methylammonium lead tri-iodide ($MAPbI_3$)- based PSC and the factor of lesser toxicity. Furthermore, to enhance the efficiency of the device, selecting potentially steadier and superior carrier transport materials (CTMs) is among the most effective approaches for optimizing device outputs. Among the proposed materials, a prior selection of copper antimony sulfide ($CuSbS_2$) and zinc oxide (ZnO) as CTMs with an optimized thickness of $MASnI_3$ material has offered a higher power conversion efficiency (PCE) of 22.16% under the photoillumination AM1.5. Furthermore, the less-defective PSC device can also be helpful for further device optimization and futuristic development. The present work offers a superior option for achieving cost-effective and better device productivity for the reasonable fabrication of PSC devices.

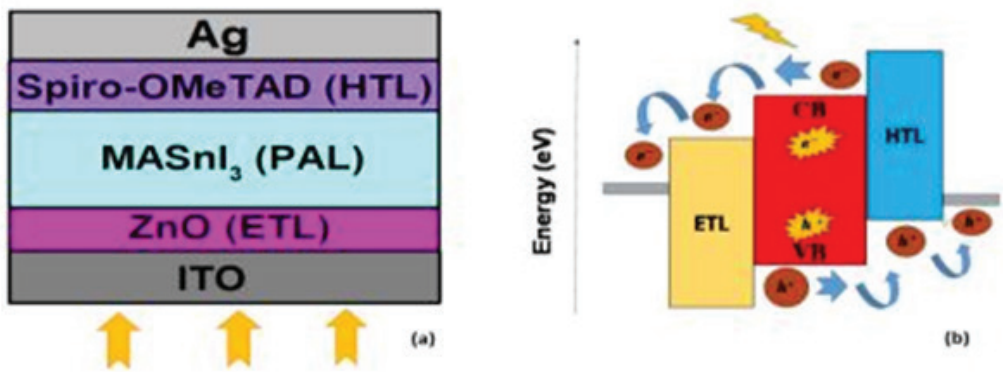


Illustration is borrowed from the published paper

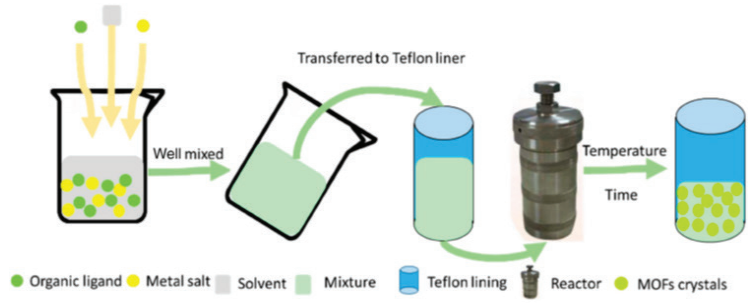
Diverse MOF-Based Composites for Highly Efficient Anode Materials in Lithium-Ion Batteries

By: Dr. Varun A Chhabra, Associate Professor, CURIN

This article is based on the research paper titled 'Metal-Organic Frameworks and their Derivatives as Anode Material in Lithium-Ion Batteries: Recent Advances towards Novel Configurations' published by Dr. Varun A. Chhabra from CURIN, Chitkara University, Punjab, in Wiley journal entitled International Journal of Energy Research.

Lithium-ion batteries (LIBs) have drawn extensive research interests due to their noticeably enhanced gravimetric energy density relative to other chemical batteries. The potential utility of metal-organic frameworks (MOFs) and their derivatives has recently been recognized as highly effective anode components for LIBs because they can be tuned to select specific metal sites and/or to adjust pore sizes. In this work, their electrochemical performance as anodic materials is carefully evaluated with respect to lithium-ions storage capacity, energy/power, stability, and flexibility. Furthermore, through the coordination of the organic linker and metal center, MOFs can benefit from enhanced catalytic activities in the design of advanced LIBs. For future research for next generation LIBs, scientific focus should be placed on the development of diverse features of MOF-based composites such as core-shell MOFs, mono/bimetal doped MOFs, dual organic linker-based MOFs, MOFs@MOFs core shell structure, and dual organic ligands-based MOF. As such, MOF-based LIB electrode materials are expected to expand their utility with the improvement in topology and functionality in association with the dimensionality, pore size, and surface area.

As porous structure of MOFs facilitates the access of functional groups, the guest molecules or small atoms can lead to superior storage capacities. Likewise, the large surface areas of MOFs make them a suitable electrode material in LIBs. At the same time, for improved electrochemical behaviours, the presence of hollow space in MOFs pores is important to buffer the discharge of inner stress and volumetric variation. Moreover, the porous structure enhances contact area of the active material with the electrolyte, which is in charge of the increases in rate capability of LIBs and the rapid Li-ion diffusion. Also, MOFs are advantageous in terms of tuneable redox properties, desirable structural changes, cost effectiveness, and simple synthetic mechanism. Some standard reports have robustly illustrated the promising electrochemical performance of MOF-based negative electrodes in LIBs. MOFs-based chemistry is undergoing a significant development. Several researchers are focusing on developing of new MOF-based strategies for the build-up of the next generation LIBs. In this regard, the development of core-shell MOFs, mono/bi-metal doped MOFs, and dual organic linker-based MOFs may be considered as effective options. The growth of a MOF shell on the surface of another MOF to obtain a core-shell structure is one of the most important strategies for fabricating the next generation anodes material. MOFs@MOFs core-shell structure can be prepared by using various MOFs. The core-shell MOF@MOFs structure may offer more possibilities in the field of energy storage. Furthermore, mono/bimetal doped MOFs can also be prepared by encapsulating mono/bi-metallic nanoparticles into the pores of MOFs. The insertion of such nanoparticles into the pores of MOFs is useful to increase the enthalpy of adsorption physisorption and to boost the storage capacities. The MOFs can provide a limited space to restrict particle growth and prevent nanoparticle agglomeration.



Schematic for metal organic framework (MOFs) synthesis via solvothermal process (Illustration is borrowed from the published paper)

Evaluation of an Open-Source Controller in the Implementation of Software Defined Network Architecture

By: Shanu Bhardwaj, ME Scholar, CURIN

This article is based on the research paper titled 'Performance Evaluation using RYU SDN Controller in Software-Defined Networking' published by Shanu Bhardwaj and Dr. S.N. Panda from CURIN, Chitkara University, Punjab in Springer journal entitled Wireless Personal Communications.

Nowadays, network bandwidth has become a major challenge in running various distributed computing applications by the network administrators and internet service providers. There has been a rapid growth in many new applications in the domain of internet of things, cloud computing that require distributed processing in the network. Thus, the conventional network architecture is not sufficient to meet the requirement of these applications since a large amount of network capacity is occupied. Therefore, a new paradigm is designed by researchers to prevail over the conventional

network architecture is named as Software-Defined Networking. The new approach provides enhanced flexibility to build or configure the network easily and a more programmable distinction of the control plane from the data plane with a global perspective of the network.

The motivation behind this work is to implement the architecture of SDN using an open-source RYU SDN controller for the network traffic analysis because there is a great need for a high-performance controller in data centres, academia and networking industries. Therefore, it is crucial to investigate the performance of an open-source controller. The implementation of the SDN architecture is carried out in the Mininet emulator, including the RYU controller for a custom-designed topology which consists of a switching hub, network nodes considered under a single topology, and an OpenFlow switch. The proposed work aims to evaluate the in depth performance analysis of SDN architecture for various parameters such as the number of packets transmitted, packets received, throughput, bandwidth, round trip time, etc. To the best of our knowledge, there has not been enough research in this domain for SDN architecture performance analysis using the RYU SDN controller. Hence, it needs to be explored further to assess the performance parameters for the SDN environment.

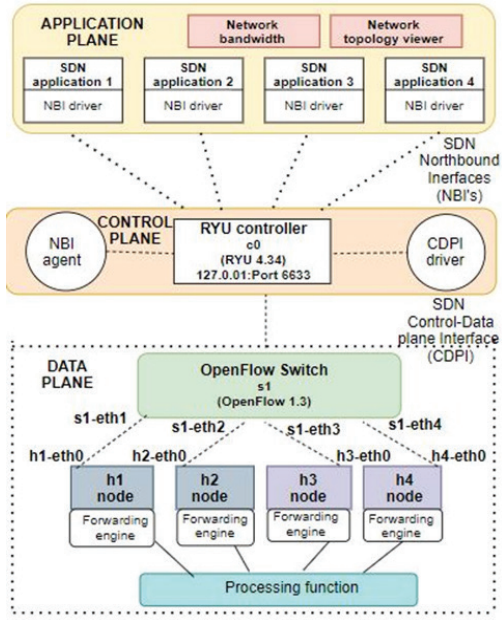


Illustration is borrowed from the published paper

Using Convolutional Neural Network and Infrared Thermography for Detecting Faults in Bearings of Machinery

By: Dr. Deepam Goyal, Assistant Professor, CURIN

This article is based on the research paper titled "Intelligent Fault Diagnosis of Bearings based on Convolutional Neural Network using Infrared Thermography" published by Dr. Deepam Goyal from CURIN in a Sage journal entitled Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology

With the rapid development of science and technology, the complexity of modern machinery and equipment is becoming higher and higher, and the demand of such equipment is also increasing. Therefore, deep concern about safety issues makes intelligent fault diagnosis the most irreplaceable key in the development of modern industry. The most prominent component related to these safety issues is the bearing, which is one of the major causes of failure in rotary machinery and equipment, and any damage to the bearings will cause the accelerated breakdown of other components, thus adversely affecting the operation quality and safety of equipment. One of the techniques to address this safety problem is condition-based monitoring to guarantee smooth operation of machinery and increase machinery availability. Generally, three types of maintenance techniques are employed viz., preventive, predictive and breakdown maintenance. Each technique has its own importance in the field of maintenance but when it comes to cost effectiveness then predictive maintenance may be employed to examine asset performance in a more real-time, identifying potential faults before they occur. It includes vibration monitoring, wear and debris analysis, oil analysis, motor current signature analysis, infrared thermography (IRT) etc. In recent years, IRT has been widely used and adopted by the NDT & E community due to its contactless and noninvasive features suitable for assessing machine health with higher reliability and accuracy. This article puts forward an intelligent non-invasive thermal images-based fault diagnostic approach to periodically monitor condition of the rolling contact bearings in respect of their deterioration due to defects on the inner race, outer race, and balls/rollers. Thermal images of four bearing conditions, including one healthy and three faulty states, have been considered followed by a classification performance based comparative analysis using Support Vector Machines (SVM) and Convolutional Neural Network (CNN). The CNN consists of many tools under its cap but for this work, the AlexNet architecture is used which has proved to be more effective than SVM. The experimental findings reveal that non-contact infrared thermography has enormous potential for automatically identifying problems and detecting early warning, regardless of speed, resulting in negligible shutdowns of the system due to bearing failure. Because of non-contact and non-destructive nature of the proposed methodology, it is intended to be employed in a wireless sensor network for condition monitoring and problem diagnostics of bearings located in remote places. The present work can also be expanded to monitor machine health using vibrations, acoustics, and a combination of these signals, as well as various bearing faults of varying severity. The proposed strategy could be extended to real-time online condition monitoring where the nature of degradation is consistent and transition from one fault to another is not self-evident.

Key Activities of Chitkara Innovation Incubator Foundation during April – June 2022

To support the start-up ecosystem in the region

Building a Start-up in Space Technology

Chitkara Innovation Incubator Foundation (CIIF), Chitkara University organized a session on "Building a Start-up in Space technology" wherein 100+ students and budding entrepreneurs participated and learnt the technical aspects of building start-ups in space technology. The speaker of the technical session was Mr. Jainul Abedin, Founder, Abyom Spacetech and Defence Pvt. Ltd. He mentioned that with the support from ISRO, India is slowly and steadily witnessing a rise in the space tech start-ups. These space tech start-ups are working on building CANSATs, sounding rockets, high altitude balloons, satellite components manufacturing, etc. He also discussed about his rocket testing platform that his team is building with the support from the government. The session was held on April 1, 2022.

Session on Entrepreneurial Mindset for a Start-up

This session was held on April 7 and was attended by 90 budding entrepreneurs & students to explore the career opportunities in the entrepreneurship domain. The speaker for the session was Ms. Aashna Narula, Founder Director, Psychopedia. The speaker said that an entrepreneurial mindset is a specific set of beliefs, knowledge, and thought process that drive the entrepreneurial behaviour. An entrepreneur must be inventive, communicative, and highly motivated to succeed, and yet remain open to risks and failures.

Cultivating the Mindset of Entrepreneur for a Successful Business

To sensitize the students of Mass Communication Department, Chitkara University about entrepreneurship and innovation, CIIF organised this session on April 8, 2022 wherein 80 students and budding entrepreneurs from the

Mass Communication Department participated and learned the different aspects of start-up building. The speaker for the session was Ms. Ritu Singal - Managing Director, Raglan Infrastructure. She is a Life Coach, Author, TEDx Speaker, Entrepreneur, Motivational Speaker, and Woman Entrepreneur of the Year 2011.

Three-day Event on 'Ideation to Commercialisation'

CIIF organized a three-day event titled "Ideation to Commercialization" (I2C) on 25th, 26th and 29th April 2022. The event aimed at inculcating entrepreneurship skills among the students. Around 80 students participated in the event. It featured activities like information sharing on prerequisites for start-up ideation by E-Cell executives, invited talks on topics like 'digital marketing and technology in the start-ups', 'idea building and scaling of start-ups' etc. Some budding entrepreneurs were invited to share their journey and challenges they faced. Additionally, 15 student teams pitched their ideas to the jury members and top ideas were awarded.

Invited Talk on Scaling Up Start-up

On May 23, 2022 CIIF invited Mr. Anuj Mittal - Founder, Flocus Technologies to deliver a talk on the topic 'Scaling Up Start-up'. It was attended by close to 200 participants who were guided about strategies for scaling of startups with real-life examples followed by an exciting concept of the staircase to heaven. Mr. Anuj Mittal was Co-Founder, Healthians.com and is alumnus of IIT Delhi & IIM Lucknow. He addressed the students and guided them regarding the importance of reliability. There was a brainstorming Q&A session for the students so as to improvise knowledge with a fun activity. The speaker

mentioned that aspiring entrepreneurs should focus not only on building the startups but also to look for marketing and sales solutions and should try to build a suitable marketing business model.

Demo Day for Start-ups

CIIF, Chitkara University, organized an event "Demo Day for Start-ups" on May 26, 2022. A total of 80 students and budding entrepreneurs participated in the event. The jury of the event was team Voyager X and Ms. Soniya, Advisor to Nipah. Dr. Adarsh Kumar Aggarwal, Professor and Head Incubation, CIIF, Dr. Neeraj Kumar - Incubation Manager, CIIF and Mr. Amit Gupta, Assistant Director, Pre-incubation Programs were also present at the event.

Dr. Aggarwal introduced all the participants to the guests and he talked about the start-up ecosystem of Chitkara University. The Voyager X team talked extensively about the journey of their start-up and demonstrated their product Vflat, which is being used worldwide for scanning the documents. Start-ups from both Chitkara University, Punjab and Chitkara University, Himachal Pradesh pitched their ideas to the jury and inputs were provided by the jury to them.

Workshop on Technology Entrepreneurship Development

A three-day event titled "Technology Entrepreneurship Development Program" was organized by CIIF during June 1-3, 2022. The event aimed at inculcating entrepreneurship skills among the students. Around 32 students and faculty members from the Chitkara International School participated in the event. The event started with a welcome note from Dr. Adarsh Aggarwal and was inaugurated by Dr. Archana Mantri - Vice Chancellor, Chitkara University, Punjab who motivated the young students of Chitkara International School to opt for entrepreneurship as a career option. E-Cell team of CIIF organised a brainstorming session for ideas building, then the participating teams pitched their ideas and received valuable inputs from the experts.

Women Entrepreneur of the Year Award Won by a Faculty Member from CURIN

Dr. Neha Tuli – Assistant Professor, Immersive and Interactive Lab (IITL), CURIN and Co-Founder, 6DOF Solutions Pvt. Ltd. won the Women Entrepreneur of the Year award by Software Technology Parks of India (STPI), Mohali and TIECon 2022 on April 29. 6DOF Solutions Pvt. Ltd. is incubated at Chitkara University and it provides immersive tech solutions for the Edu-Tech industry using technologies like augmented reality and virtual reality.

Activities under DST Sponsored STEM Project during April – June 2022

National Council for Science & Technology Communication (NCSTC) Division of the Department of Science and Technology (DST) has sanctioned a project to CURIN, Chitkara University under STEMM Popularization and Demonstration scheme. The objective of this project is to promote science and technology education among school children. Dr. Archana Mantri – Vice Chancellor, Chitkara University, Punjab and Mr. Sagar Juneja – Assistant Dean, CURIN, Chitkara University are the PI and Co-PI of this project, respectively, which is titled 'Science Fest and Fair on Design, Development and Implementation of a Sustainable Program/Model for the Skill Development of School Children in the Field of Science, Technology, Engineering and Mathematics (STEM).'

10 schools have been identified in the Punjab region under this project and activities including teachers' orientation, seminars, tutorials, and hands-on workshops for school students will be conducted. Finally, a science fair will be organized wherein students and teachers from all the 10 schools will be invited to showcase their learnings and experience.

During April – June 2022, we conducted STEM activities in several identified schools under this project. Some of these activities are listed below.

- Faculty orientation sessions were conducted in the following schools - Baby Convent School, Banur (April 11), Patel School, Rajpura (April 12), SD Model Sen. Sec. School, Mandi Gobindgarh (April 13), Shifaly International School, Ludhiana (April 25), Angels Valley School, Rajpura (April 26), DPS School, Rajpura (April 30), and Shemrock World School, Zirakpur (May 6). The main objective of these sessions was to give an overview of the project to principals and teachers of these schools. These orientation sessions were conducted by Mr. Sagar Juneja.

- The first activity for students under this project is to go through awareness seminars by the experts from Chitkara University. The key objective of these awareness seminars is to sensitize and motivate school children about the importance and benefits of learning concepts of Science, Technology, Engineering and Mathematics (STEM). Three seminars for each

school have been planned under this project. During April 29-30, Dr. Jyotsna Kaushal (Professor, CURIN), Dr. Varsha Singh (Assistant Professor, CURIN) and Dr. Mohit Kakkar (Assistant Dean, Applied Sciences) conducted seminars for Baby Convent School, Banur. During May 17-18, Dr. Satyam K. Agrawal (Professor, CURIN), Dr. Pooja Mahajan (Associate Professor, Applied Sciences) and Dr. Arun Upmanyu (Associate Professor, CURIN) conducted one seminar each at Shemrock World School, Zirkapur.

Similar seminars have been planned in other schools as well.

The duration of this project is two years and at the end of this project a model will be proposed for STEM education popularization in schools.

Cyber Security Research Group, Chitkara University Signed a MOU with C-DAC Mohali for Honeypot Project

In the month of April 2022, Cyber Security Research Group, Chitkara University signed a MoU with Centre for Development of Advanced Computing (C-DAC), Mohali for a consultancy project on Honeypot server installation.

C-DAC is an autonomous society under the Department of Electronics & Information Technology, Government of India. The C-DAC Honey-Net (Deployment of Honeypot Sensors for Attack Data Capturing and Analysis) is an initiative by C-DAC, Mohali for the deployment of Honeypot sensors (open source) to build a Honeypot network to capture the targeted cyber-attacks and do the analysis. This activity envisages active involvement of R&D, academic institutions, and the organizations that are interested in cyber situation awareness for research and analysis. The main aim is collection and analysis of cyber-attack data captured through honeypot sensors deployed at the participating Institution. The system aims to provide effective capturing of targeted cyber-attacks, indicators of compromise, and a repository of India-specific cyber-attack data for effective and timely dissemination of cyber threat intelligence information to CERT-In and participating organizations.

The duration of the project is two years and the team from Chitkara University will be working with C-DAC Mohali team for data analysis and R&D activities in this domain. Dr. Meenu Khurana - Director (Research), CURIN, Dr. Sudesh Kumar Mittal - Professor, CURIN, Dr K.R. Ramkumar - Associate Professor, CURIN, and Dr Ishu Sharma - Assistant Professor, CURIN are working on this project from Chitkara University.

Patents Filed

72 Patents Filed by CURIN Faculty Members and Scholars in Q2

A total of 229 patents (including industrial designs) have been filed by different departments of Chitkara University during April - June 2022, out of which 72 have been filed by CURIN faculty members and researchers. The details of these 72 patents are given below -

S.No.	Title	Inventors	Application Number
1	A kiosk for travel management	Priya Jindal, Ansh Jindal, Rajit Verma, Sandhir Sharma, Sachin Ahuja	202211031525
2	A pharmaceutical nanoparticles formulation for management of diabetic nephropathy comprising thuja occidentalis	Shrey Kumar Bhargava, Thakur Gurjeet Singh	202211028368
3	A topical gel formulation comprising microsponges of basil oil and process of preparation thereof	Ritu Rathi, Manju Nagpal, Sandeep Arora, Varinder Singh, Thakur Gurjeet Singh	202211024801
4	AI-enabled multipurpose wheelchair with commode	Naveen Kumar, Rajesh Kumar Kaushal, Surya Narayan Panda, Mamta Janagal, Sanjeev Verma	202211028080
5	An α-Amylase and α–Glucosidase inhibiting compound for management of diabetes	Manjinder Singh, Varinder Singh, Thakur Gurjeet Singh, Sandeep Arora, Maninder Kaur	202211033588
6	Apparatus and method for cleaning a water storage tank	Anoop Kumar Singh, Gurdyal Singh, Gurpreet Singh, Rakesh Goyal	202211030593
7	Apparatus and method for detection of adulteration in saffron	Kanwal Preet Kour, Deepali Gupta, Kamali Gupta	202211026003
8	Apparatus to measure interpupillary distance and near point of convergence	Sachitanand Singh, Krishna Kumar Gupta, Jai Prabhat Ranjan, Sheifali Gupta, Rupesh Gupta	202211030699
9	Augmented reality kiosk for interactive marketing and shopping	Ansh Jindal, Priya Jindal, Sandhir Sharma, Sachin Ahuja	202211031720
10	Automated fare collection system in public transport	Vatsala Anand, Rupesh Gupta, Sheifali Gupta	202211030702
11	Automated fault detection system for electrical appliances	Mudita, Deepali Gupta	202211025774
12	Automated system to alert and impose penalty on a vehicle for inappropriate driving pattern	Vandana Mohindru Sood, Sushil Narang, Sachin Ahuja, Amandeep Kaur, Umesh Kumar, Susheela Hooda, Anshu Singla, Kamal Deep Garg	202211020752
13	Borewell motor monitoring and leakage detection system	Vikas Lamba, Susheela Hooda, Rakesh Ahuja, Vikas Solanki, Sachin Ahuja, Ochin Sharma, Srikanta Kumar Mohapatra, Rishu Chhabra, Kamali Singla, Amandeep Kaur	202211022492

14	Device for diabetic retinopathy and hypertensive retinopathy and method thereof	Dimple Nagpal, Surya Narayan Panda, R.P.S. Bedi, Sudarson Jena, Usha Desai	202211020566
15	Device for restraining mouth of animal	Onkar Bedi, Saksham Sharma, Gaaminepreet Singh, Manish Kumar, Sandeep Arora, Prateek Srivastava	202211020994
16	Eyewear with detachable audio system	Shagun Sharma, Kalpna Guleria	202211026001
17	Foot warming sock assembly	Shalli Rani, Shruti	202211029407
18	Herbal immunity booster composition and a method for preparing the same	Sumit Agarwal, Sandhir Sharma, Dhiresh Kulshrestha, Priya Jindal, Sachin Ahuja, Rishu Bahrdwaj, Abhishek Anand	202211022491
19	Kiosk for managing mergers and acquisitions	Priya Jindal, Sandhir Sharma, Sachin Ahuja, Ansh Jindal	202211020753
20	Learner support system and method thereof	Neha Tuli, Shivam Sharma, Archana Mantri	202211020288
21	Mental health screening kiosk	Aashish Kumar, Mansi Chitkara, Gulshan Dhillon, Rubina Dutta, Shikha Goel	202211026258
22	Method for adsorption of gases emitted from fume hood	Jyotsna Kaushal, Mohit Kapoor, Partha Khanra	202211029570
23	Motor-driven wheelchair using GPS navigation	Chaitanya Singla, Bidush Kumar Sahoo, Rajat, Vikas Solanki, Sachin Ahuja	202211030929
24	Smart personal protective equipment	Shalli Rani, Himanshi Babbar	202211030093
25	Sorting and treatment of saffron corms for preservation	Deepali Gupta, Kanwal Preet Kour, Malvinder Singh, Kamali Gupta	202211032444
26	System and method to monitor and control electrolyte level in battery	Rajwinder Kaur, Jasminder Kaur Sandhu, Jaswinder Singh, Gurpreet Singh, Ravinder Singh	202211024802
27	System for preventing unauthorized access to projectors and method thereof	Ravneet Kaur, Ishu Sharma, Ramkumar Ketti Ramchandran	202211028774
28	Treatment of vehicular exhaust with tin oxide filter	Aashish Kumar, Mansi Chitkara, Gulshan Dhillon, Adhish Singh	202211036910

INDUSTRIAL DESIGN REGISTRATIONS

29. Adjustable milk can handle

By: *Jaswinder Singh, Leema Nelson*

Application No. 364252-001

30. Antipodal Vivaldi antenna

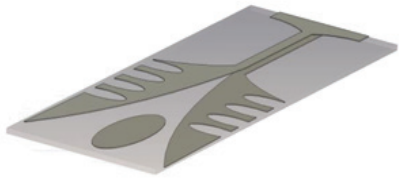
By: *Sagar Juneja*

Application No. 366675-001

31. Antipodal Vivaldi antenna with elliptical corrugations and elliptical metal director

By: *Sagar Juneja*

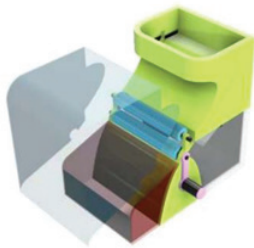
Application No. 366676-001



32. Automatic domestic pea sheller

By: *Deepali Gupta, Monica Dutta*

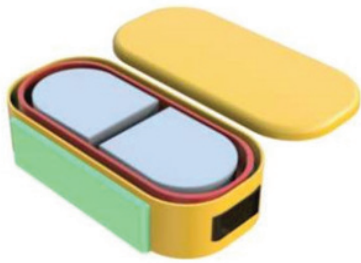
Application No. 366672-001



33. Battery operated heating tiffin with lid (Set)

By: *Amanpreet Singh, Jaiteg Singh, Amandeep Kaur, Deepali Gupta, Jasdeep Singh*

Application No. 365719-001



34. Black board accessories holder

By: *Rishu Bhardwaj, Jashandeep Singh, Sumit Aggarwal, Sandhir Sharma, Vikas Garg, Sachin Ahuja*

Application No. 362620-001

35. Blender cum mixer inbottle

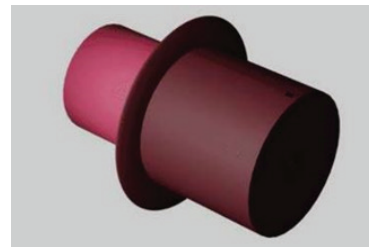
By: Ankit Rai Dogra, Vandna Sharma, Ridhima Gahrotra, Pankaj Kumar

Application No.364052-001

36. Board pin

By: *Anuj Kumar Jain, Nitin Jain, Rahul Bhandari, Amit Vajpayee , Varun Jindal, Vinay Kukreja, Raj Gaurang Tiwari, Arun Aggarwal*

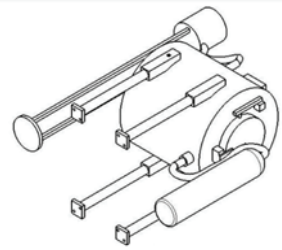
Application No. 366206-001



37. Case hardening heat treatment furnace with controlled environment

By: *Rakesh Goyal, Jashwara Sushanta, Punam*

Application No. 364099-001



38. Cloth drying stand for infants & toddler

By: *Deepika Chaudhary, Nishu Bali, Jaiteg Singh, Neelam Dahiya, Prateek Srivastva*

Application No. 363390-001

39. Convertible/integrated infant seats for four-wheelers

By: *Swati Goel, Kalpna Guleria, Surya Narayan Panda, Meena Rani*

Application No.366204-001

40. Corner cleaner

By: *Anoop Kumar Singh, Gurdyal Singh*

Application No. 364251-001

41. Curd settler

By: *Amandeep Kaur, Meenu Khurana, Poonam Panwar, Chetna Kaushal, Anshu Singla, Chetna*

Application No. 361843-001

42. Detachable occluder on retinoscope

By: Shankar Dass, Manish Sharma, Sachin Ahuja

Application No.362530-001

43. Extendable fruit plucker

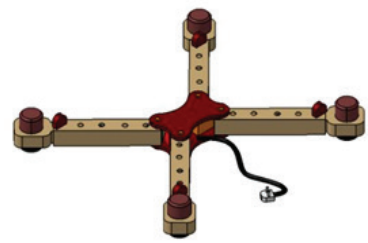
By: *Jasdeep Singh, Jasmeet Singh Kalsi, Maninderjeet Singh*

Application No.366677-001

44. Facile for deplacer

By: *Shubham Gargrish, Bhanu Sharma, Narinder Pal Singh, Neha Tuli, Shivam Sharma, Archana Mantri*

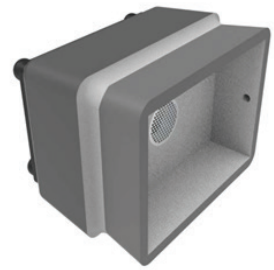
Application No. 363519-001



45. Flower pot

By: *Manjinder Singh, Anshika Prakash, Amit Mittal, Surya Narayan Panda, Ruchi Mittal*

Application No. 366918-001



46. Foldable desk with inbuild laptop cooling pad

By: *Amit Mittal, Anshika Prakash, Manjinder Singh, Surya Narayan Pandal, Ruchi Mittal*

Application No. 365181-001

47. Gaming cover for smart phones

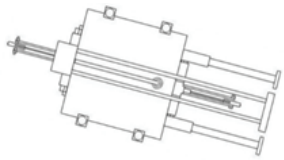
By: *Manjinderjeet Singh, Jasmeet Singh Kalsi, Jasdeep Singh*

Application No. 366917-001

48. Heat treatment furnace with controlled atmosphere and controlled speed

By: *Rakesh Goyal, Jashwara Sushanta, Punam*

Application No. 364098-001



49. Inhaler with LED enabled dosage monitoring

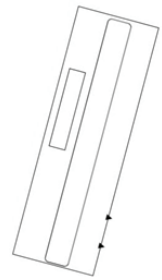
By: *Nishu Bali, Deepika Chaudhary, Jaiteg Singh, Sachin Ahuja, Ujjwal Singh*

Application No. 361846-001

50. Kids ruler

By: *Ashu Taneja, Rinku, Arun Lal Srivastav*

Application No. 362528-001



51. Mobile cover with earbuds case

By: *Amanpreet Singh, Amandeep Kaur, Deepali Gupta*

Application No. 365714-001

52. Mobile cover with solar mobile charging system

By: *Bhanu Sharma, Upasna Singla, Neeraj Singla, Sachin Ahuja, Narinder Pal Singh, Shubham Gargrish, Deepika Sharma, Neha Tuli, Shivam, Sheena, Krishan Dutt Sharma, Manoj*

Application No. 363758-001

53. Mobile stand for viewing multimedia in bus while traveling

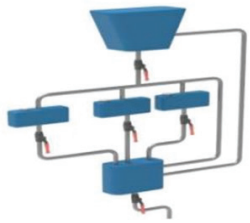
By: *Maninderjit Singh Khanna, Jaiteg Singh, Jaspreet Bajaj, Amanpreet Singh, Akhilendra Khare*

Application No. 365976-001

54. Mud therapy machine

By: *Dhiresh Kulshrestha, Sumit Agarwal, Abhishek Anad, Pradeep Kumar, Shveta Gupta, Sandhir Sharma, Ajit Bansal, Sachin Ahuja*

Application No. 362752-001



55. Multipurpose bicycle for women with baby carrier

By: *Ruchi Kawatra, Rajat, Vikas Solanki, Srikanta Kumar Mohapatra, Bidush Kumar Sahoo, Varun Kansal, Sachin Ahuja*

Application No. 3622255-001

56. Multi-purpose water gun

By: *Neelam Dahiya, Sheifali Gupta, Sartajvir Singh, Puninder Kaur, Nishu Bali, Deepika Chaudhary*

Application No. 363389-001

57. Multi-size vial holder for magnetic stirrer

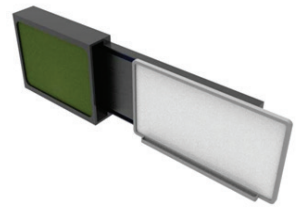
By: *Vandna Sharma, Pankaj Kumar, Ankit Rai Dogra*

Application No. 363932-001

58. Notice board cum white board

By: *Jyotsna Kaushal, Prateek Srivastava*

Application No. 366868-001



59. Pedestal fan with sound bar and LED light

By: *Mohit Kumar Kakkar, Jasdev Bhatti, Reetu Malhotra, Narinder Pal Singh*

Application No. 365078-001

60. Pedestal fan with speaker

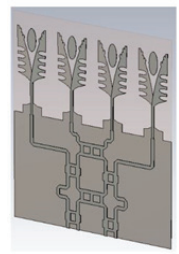
By: *Mohit Kumar Kakkar, Jasdev Bhatti, Arun Upmanyu*

Application No. 362871-001

61. Planar multibeam endfire antenna array

By: *Sagar Juneja*

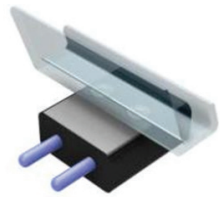
Application No. 366674-001



62. Portable mobile holder clamp on adapter

By: *Ankit Rai Dogra, Vandna Sharma, Pankaj Kumar*

Application No. 365082-001



63. Portable mobile stand

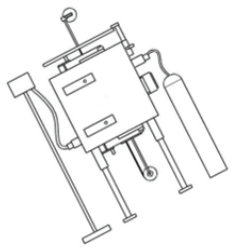
By: *Anjali Xess, Ravi Dandotiya Deepika Puri, Ruchi Sharma, Siddharth Bedi, Vatsala Anand*

Application No. 366062-001

64. Rotary job holder case hardening furnace

By: *Rakesh Goyal, Jashwara Sushanta, Punam*

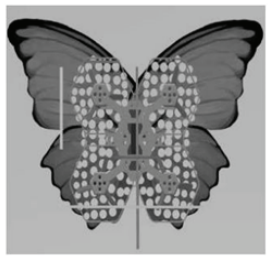
Application No. 364097-001



65. Self-controlled unmanned aerial vehicle for farming applications and canopy photography

By: *Amit Mittal, Jolly Masih, Abhay Singh Lodhi*

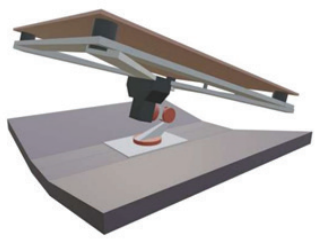
Application No. 366921-001



66. Smart book stabilizer stand

By: *Narinder Pal Singh, Amanpreet Kaur, Bhanu Sharma, Jagwinder Singh, Shubham Gargrish, Archana Mantri*

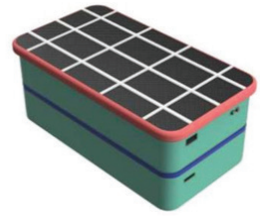
Application No. 363931-001



67. Solar energy based portable food warmer

By: *Amandeep Singh, Devesh Bathla, Sandhir Sharma, Sachin Ahuja*

Application No. 365401-001



68. Solar thermal based clothes drier for toddlers

By: *Prateek Srivastava, Vivek Kumar*

Application No. 366678-001

69. Spices storage cum measuring dispenser

By: *Vandna Sharma, Parul Malik, Ankit Dogra, Pankaj Kumar*

Application No. 365081-001

70. Flexi chair

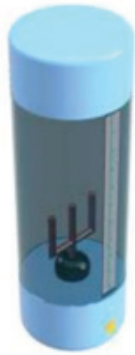
By: *Deepak Thakur, Tanya Gera, Jaiteg Singh, Sachin Ahuja*

Application No. 366205-001

71. Vortex mixer bottle

By: *Vandna Sharma, Ankit Rai Dogra, Parul Malik, Pankaj Kumar*

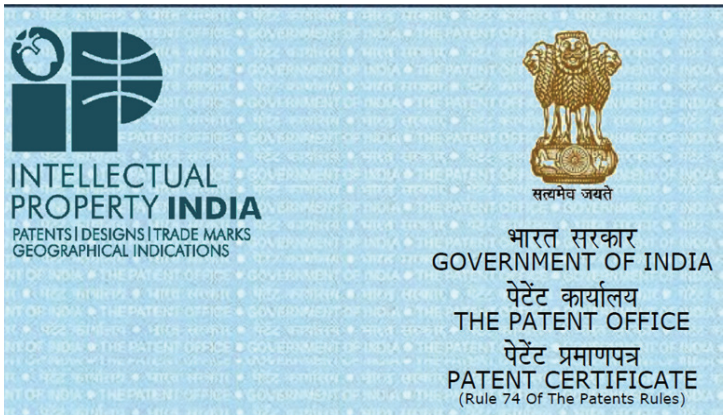
Application No. 364051-001



72. Wirelessly connected earphones and spectacles with GPS tracker

By: *Shagun Sharma, Kalpna Guleria*

Application No. 362523-001



The Patent Office has Granted **29 Patents** to Chitkara University in Q2, 2022.

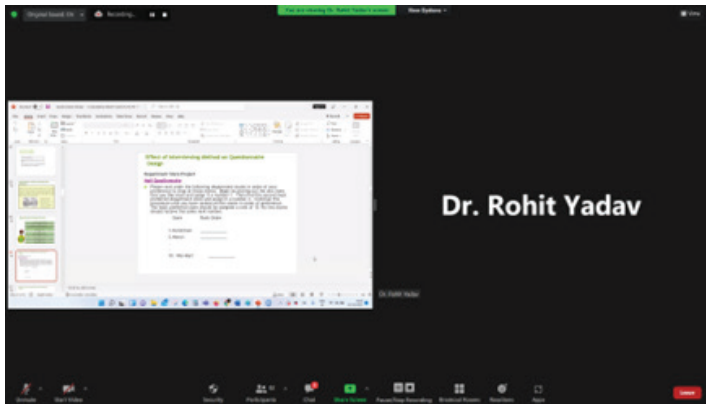
15 New Consultancy Projects Kick-started

CURIN facilitated **15 consultancy projects** that have been initiated by various faculty experts from different departments of the university during April - June 2022. As per the consultancy policy of Chitkara University, 90% of the consultancy fee is retained by the project heads (faculty experts).

Workshop and Seminar Organized by DRC, CBS for the Phd Scholars and Young Researchers

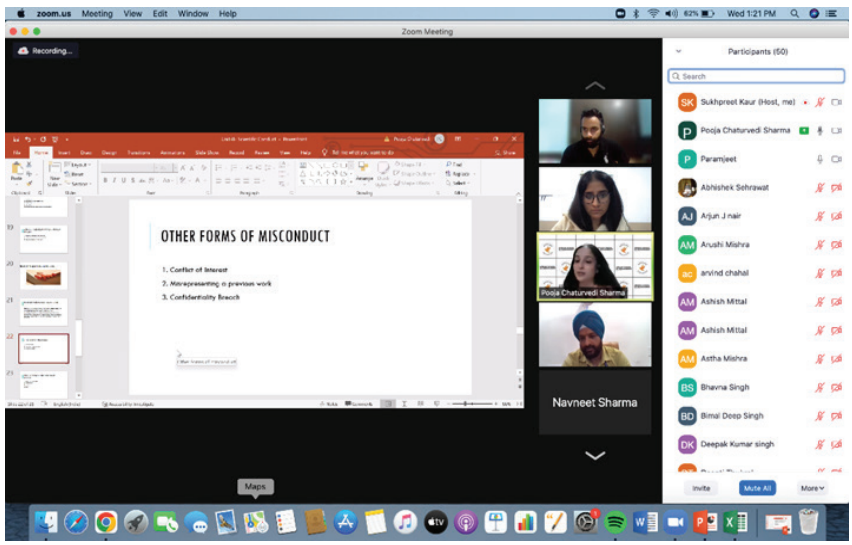
To promote research ethics, compliance etc. and to aid scholars in their research work

One day Seminar on Questionnaire Design: Tools and Techniques



Doctoral Research Centre (DRC), Chitkara Business School (CBS) organized a one-day seminar titled Questionnaire Design: Tools and Techniques with an objective to help the research scholars in developing new skills that may further simplify their research work. This seminar was held on April 2, 2022 and was delivered by Dr. Rohit Yadav, Assistant Professor at Faculty of Commerce and Management, SGT University, Gurugram. He discussed about the various surveying techniques by focussing upon the questionnaire as an important tool. Scholars were able to understand the techniques involved in designing of questionnaire for different types of surveys in a comprehensive manner. Dr. Yadav focused on the composition of questions and gave various tips for framing them. It helped the research scholars to get a better understanding of how to frame scale items to achieve their research objectives. The seminar also enabled the participants to explore the technicalities associated with framing adequate scale items to justify the conceptual framework. The seminar was attended by 108 research scholars.

Four-day Workshop on Research and Publication Ethics



In order to apprise the research scholars about different indexing and citation databases, open and close access publications, and plagiarism related concerns, DRC, CBS organized a four-day workshop on Research and Publication Ethics. Resource persons of this workshop were Dr. Sanjeev Kulkarni (Chitkara University, Punjab), Dr. Sukhpreet Kaur (Chitkara University, Punjab), Dr. Pooja Chaturvedi Sharma (Apeejay School of Management, New Delhi), and Dr. Sumanta Dutta (St. Xavier College, Kolkata). They discussed the topics like redundant publications and how to deal with duplicate and overlapping publications. Researchers were also informed about the consequences of selective reporting and misinterpretation of data. Additionally, predatory publishers and journals were also discussed. In the workshop, participants also learnt about H-index, I-index and altmetrics. Further, researchers were told about the significance of impact factor of journals as per Journal Citation Report, SNIP, SJR, IPP, Cite Score etc. The workshop was held during June 29-July 2 and was attended by 55 research scholars.

Expert Sessions Conducted by Faculty Members of DRC, CBS

1. Dr. Amit Mittal - Dean and Professor, DRC, CBS chaired a session in the national seminar titled Achievements@75 organized by Gautam Buddha University, Greater Noida on April 30, 2022. Dr. Mittal also delivered an expert talk on Research Methodology during the one-week faculty development program (FDP) organized by GNA, University, Phagwara during 22-27 June 2022.
2. Dr. Urvashi Tandon – Associate Professor, DRC, CBS conducted a two-day workshop on the Introduction to SPSS for Statistical Analysis for the B.Com students during 20-21 April 2022. It was organised by Centre for Global Education, Chitkara University, Punjab.
3. Faculty members from DRC, CBS including Dr. Urvashi Tandon, Dr. Arun Aggarwal, Dr. Balraj Verma, and Dr. Sukhpreet Kaur conducted expert sessions during the five-day FDP on Research Design and Innovations held during 6-10 June 2022 for research scholars of Chitkara School of Planning & Architecture. This FDP aimed to acquaint the researchers and faculty members with theories and processes of innovation, sampling and selection of research tools and to aid them in enhancing their analytical skills.
4. Dr. Urvashi Tandon delivered a session on Exploratory and Confirmatory Factor Analysis in the five-day workshop on Research Methodology & Data Analysis: Building Effective Research Skills that was organized by Chitkara University College of Nursing, Himachal Pradesh during June 6-11, 2022.

UPCOMING CONFERENCE

Website - chitkara.edu.in/cse-can

CURIN Organized 4th Edition of Novate+ 2022 and Awarded Prototyping Funding of INR 50 Lacs

Sponsored by DST Supported Chitkara University NewGen IEDC and TEC

CURIN, Chitkara University organized the 4th edition of NOVATE + 2022 on the theme Biggest Confluence of Academia and Industry for Working on Joint Projects. Novate+ is an annual flagship event of Chitkara University where innovative project ideas are invited and shortlisted ideas receive prototyping funding for their implementation. In addition to funding support, this platform also provides mentoring, expert guidance and collaboration opportunities. The students and faculty members were encouraged to reach out to industry to understand their challenges and submit joint project proposals in the competition. During March – May 2022 more than 50 industry-academia joint projects were received, out of which 29 entries were shortlisted to compete in the finals to win prototyping funding of upto INR 50 lacs sponsored by New Generation Innovation and Entrepreneurship Development Centre (NewGen IEDC) and Technology Enabling Centre (TEC). Both these centres have been set up by Department of Science and Technology (DST), Government of India at Chitkara University with a total funding support of more than 3.5 Crores.

The jury round of the event was held on June 6, 2022 and Dr. Archana Mantri - Vice Chancellor, Chitkara University and the Chief Coordinator of both NewGen IEDC and TEC at Chitkara University was present at the inauguration ceremony to motivate the participating teams. She shared the journey of Novate+ with the participants and encouraged them

to have meaningful collaborations with the industry. Additionally, during the inauguration ceremony, jury members who were invited both from industry and academia also shared their experiences and views on converting prototyping into start-ups. Three different panels of jury critically analyzed each of these 29 project proposals. The jury comprised of following experts – Mr. Shivansh Sethi (CEO & Founder- Aiotize Pvt. Ltd.), Dr. Jagreet Kaur (Director – Xenonstack Pvt. Ltd.), Mr. Deepak Nair (Research & Design, Consultant), Dr. Sachin Ahuja (Director, Research, Chitkara University), Mr. Sanjay Bhatnagar (Visiting Faculty, Chitkara University), Dr. Varsha Singh and Dr. Neha Tuli (Assistant Professors, CURIN and Entrepreneurs).

On the basis of the recommendation of the jury, 13 projects were awarded prototyping funding for developing their projects.

NOVATE+ 2022 was convened by Mr. Sagar Juneja – Assistant Dean, CURIN and Co-Coordinator (NewGen IEDC and TEC). He was ably supported by Mr. Chanpreet Singh - Project Manager, CURIN and Mr. Lovit Kumar, Senior Office Executive, CURIN.

CHITKARA UNIVERSITY

NOVATE+ 2022

Biggest Confluence of Academia and Industry for Working on Joint Projects

Winners

Each winning project may now avail prototyping funding of upto INR 2.5 Lacs to develop their project ideas

S.No.	Team Lead	Project Title
1	Sachitanand Singh	Blind Mobilizer
2	Priti Panwar	Designing of Microbial Fuel Cell Coupled Constructed Wetland for the Remediation of Dyes
3	Yogesh Duggar	Developing Silicon Molds for Plastic Casting
4	Ajay Goyal	Development of Indigenous Inline-Optical Density (OD) Meter and Turbidity Sensor
5	Kamal Gulati	FoRo (Fog on Road)
6	Vikas Khullar	IoT and AI based Portable/Fixed Venue Entry System for Visitors with Vehicles
7	Mansi	IoT based Device to Secure the Rolling Shutters
8	R R Guru	Low-cost Tram Line Track with Convertible Wheel Chair and Stretcher for Inter Hospital Building Patient Transportation
9	Jasmeet Singh	Mystery Boxes for Children
10	Sushant Jashwara	Portable Heat Treatment and Muffle Furnace
11	Gaytri	Quantum Dot Dispersed Polymer Dispersed Liquid Crystal (QD-PDLC) for Smart Window Applications
12	Bhaumik Sethi	Racks & Jars
13	Rajat Takkar	To Develop an Energy Efficient Liquid Crystal Display Device and its Study on Electro-Optical and Dielectric Behaviour

*List is sorted in alphabetical order of the Project Title

Other Activities of NewGen IEDC and TEC during April – June 2022

- An invited talk on product designing titled 'The Journey of Creating the Products for the Real World' was conducted on April 1, 2022 and the invited speaker was Mr. Vayasteja Rao – Founder and Creative Designer, Anology Design, Bengaluru. The objective of the talk was to understand the challenges and complications encountered while converting prototypes into market-ready products. He also gave suggestions on how to make the products sustainable and eco-friendly. Around 48 participants including both the faculty members and students attended the session and learnt the intricacies of product designing.

- On April 4, Chitkara University NewGen IEDC and Chitkara University Fabrication Facility conducted a workshop on Laser Cutting and 3D Printing for the students of Chitkara Design School. More than 25 students attended workshop and learnt the operations of 3D printer, laser cutting machine as well as designing of products on CAD & CURA software. The session was delivered by Mr. Chanpreet Singh – Project Manager, CURIN. The same workshop was repeated on April 11 for Chitkara School of Planning and Architecture (CSPA).

  On April 12, another workshop titled 'Textile and Print Technology for Interior Spaces' was conducted for CSPA wherein Mr. Chanpreet Singh taught how to convert the virtual design models in the form of stencils and dies for textile printing. The workshop was attended by more than 20 students.

- Chitkara University NewGen IEDC conducted a session on prototype building for students of Chitkara International School on April 25, 2022. The session was held on two consecutive days where students came to know how NewGen IEDC supports the new ideas and convert them into a commercialized product. Mr. Sagar Juneja - Assistant Dean, CURIN and Co-Coordinator (NewGen IEDC and TEC) gave a brief overview about NewGen IEDC and the fabrication facilities available at the centre and Mr. Chanpreet Singh conducted the hands-on session on laser cutting and 3D printing. The session was attended by close to 20 students.

- An expert talk on Funding Opportunities for Developing Innovative Projects was delivered by Mr. Sagar Juneja in a session that was organized by the Matrix club (student club) of Chitkara University on April 27, 2022. The event was organized with the support from the Department of Computer Applications. Mr. Sagar discussed about how students can win prototyping grant from NewGen IEDC, what is a meaning of prototyping grant and pre-incubation funding. The main objective of the talk was to make the students aware about how they can convert their ideas into minimum viable products (MVPs) after obtaining prototyping grant from NewGen IEDC and later think about converting their MVPs into start-ups or commercialized products. The session was attended by about 100 students.

Quantum Safe Cryptography: Challenges and Opportunities

Insights into the Centre of Excellence of Cyber Security and Artificial Intelligence @CURIN, Chitkara University

By: *Dr. Ramkumar Ketti Ramachandran, Associate Professor, CURIN*

IBM Quantum is first-of-its-kind industrial stimulus for making a universal quantum computer for business, engineering, and science. The IBM processors such as Condor quantum computer, Eagle processor with 127 qubits steadfastly showing a future path towards a successful implementation of quantum computers. Leading players including IBM, The National Science Foundation, Amazon, and Microsoft have partnered on quantum computing research. Soon commercial quantum computers will come into market that will be 10,000 times faster than the classical computers. However, security is going to be a major concern since the standard security algorithms can be the first victim of this advanced technology. The quantum cryptanalysis can achieve speed from quadratic to exponential factors and most of the symmetric ciphers might be confronted successfully. Using Shor's algorithm, quantum computing may break currently available big keys for public-key cryptography. Public-key solutions like RSA, Diffie-Hellman, and ECC may need replacements.

Our team at Centre of Excellence of Cyber Security and Artificial Intelligence, CURIN is working on the development of quantum safe algorithms. Our main research goals are to develop a complete security framework that is quantum resilient, we use polynomials to perform encryption and decryption. A simple outline of our Post Quantum Cryptography is highlighted here for a better clarity. Polynomials are analyzed to be used as a dynamic key to encrypt and decrypt. A simple method of encryption is finding the first root of a given polynomial as cipher text and evaluating the root value for decryption process.

For Encryption

Let us assume, P_T: Plain Text, K_p : $\{ k_n x^n + k_{n-1} x^{n-1} - k_{n-2} x^{n-2} + \ldots + k_o x^o \}$ - Key polynomial, C_T : Cipher Text

Step 1 : $K_p : \{ k_n x^n + k_{n-1} x^{n-1} - k_{n-2} x^{n-2} + \ldots + k_o x^o \} = P_T$

Step 2 : $k_n x^n + k_{n-1} x^{n-1} - k_{n-2} x^{n-2} + \ldots + k_o x^o - P_T = 0$

Step 3 : Polynomial Interpolations to encrypt our data

Step 4 : Repeat Step 3 until it reaches two equal values $X_{n+1} = X_n$

Step 5 : Assign $C_T = X_{n+1}$

For Decryption

Step 1 : Receive C_T

Step 2 : Decrypt C_T with the help of key polynomial

Step 3 : P_T : Plain Text is calculated at receiver side

This algorithm is very simple to implement in a normal computing facility, the basic XOR is replaced with polynomial interpolations. Interestingly, this algorithm is working well for 15th degree polynomial for a given 15-digit plain text, algorithm stability is amazing, we are able to achieve 100% encryption and decryption successfully. We are currently performing the Kolmogorov-Smirnov test, along with NIST guidelines such as Random excursion test, random excursion variant test, ENT pseudo random number sequence test program, and PractRand. This work is sponsored by DRDO, India under ER&IPR scheme and we are working with CAIR Lab, DRDO, Bengaluru on this project. Dr.Sudesh Kumar Mittal (Professor), Dr. Ramkumar Ketti Ramachandran (Associate Professor) and Dr. Amanpreet Kaur (Assistant Professor) from CURIN are working on this project. Additionally they have Ms. Taniya Hassija and Ms. Vaneeta as JRFs in their team.

Some of the faculty members and research scholars from the CoE of Cyber Security and Artificial Intelligence, CURIN

CURIN Faculty Members Invited as Experts at Various Forums

Delivered experts talks, invited talks, keynote addresses, and chaired sessions in conferences

- Dr. S. N. Panda, Professor and Director, Research, CURIN was invited to deliver a lecture on Internal Quality Assurance in Higher Education Institutions in a workshop for the faculty members of S. A. Jain (PG) College, Ambala City on April 9. Around 60 faculty members participated in the workshop. On April 21 he was invited by the Women Empowerment Forum of S.D. College, Punjab to deliver a guest lecture on the topic of Cyber Security.

Being a member of National Collegium of Assessor, National Assessment and Accreditation Council (NAAC), Dr. S. N. Panda was invited by NAAC to visit Dev Sanskriti College of Education and Technology, Chattisgarh with NAAC Peer Team as Chairperson during May 3-4, 2022.

एजुकेशन न्यूज

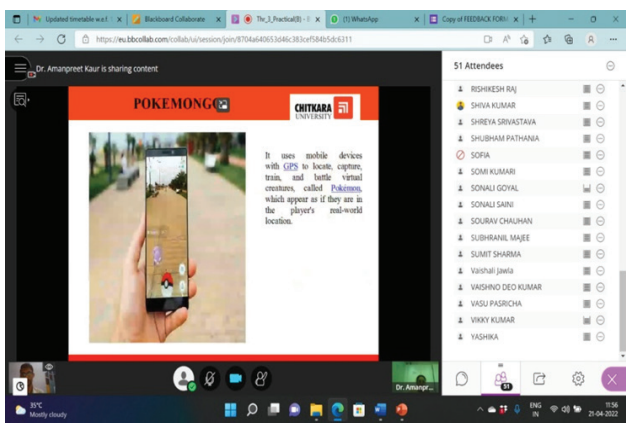
देवसंस्कृति कालेज को नैक मूल्यांकन में बी प्लस

दून। देवसंस्कृति कालेज आफ एजुकेशन एंड टेक्नोलाजी को राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद प्लस ग्रेड मिला है। मूल्यांकन में बी (नैक) 2.59 ग्रेड पाइंट दिए गए हैं। कॉलेज के लिए नैक मूल्यांकन का यह पहला अवसर था। इस उपलब्धि पर हेमवंद यादव विश्वविद्यालय एवं समिति वेदमाता गायत्री शिक्षण समिति के अध्यक्ष वासुदेव प्रसाद शर्मा तथा निदेशक ज्योति शर्मा ने प्राचार्य डा कुवंर सिंह गुरुपंच, आइक्यूएसी प्रभारी ममता दुबे, नैक समन्वयक ज्योति पुरोहित एवं पूरी टीम को सराहा।

उल्लेखनीय है कि नैक पीयर टीम ने 3 एवं 4 मई को महाविद्यालय का भ्रमण किया था। नैक पीयर टीम के चेयरमैन प्रो सूर्यनारायण पंडा, समन्वयक प्रो मन्तुन कुमार ज्योति सिंह तथा सदस्य प्रो पाटिल ने महाविद्यालय की अधोसंरचना का अवलोकन कर संतोष व्यक्त किया था। प्राचार्य ने शिक्षा संकाय की वर्षा शर्मा, रीना मानिकपुरी, प्रीति पांडे, अर्चना पांडे, प्रियंका पांडे, सरिता ताम्रकार, वंदना कोसरे, वाणिज्य संकाय से प्रीति जंघेल, आफरीन, कम्प्यूटर साइंस के जयहिंद कछरिया, लाइब्रेरियन योगेश साहू, धनेश यदु, गणेश प्रति धन्यवाद ज्ञापित किया है।

Dr. S. N. Panda delivered a keynote address on Innovation to Intellectual Property Protection in a national seminar on Intellectual Property Rights that was sponsored by the Director General of Higher Education, Haryana and hosted by MDSD Girls College, Ambala City, Haryana on June 28. He also delivered a lecture on Artificial Intelligence in Health Care Innovations in International Public Health Management Development Program organized by Public Health Department of PGIMER, Chandigarh during 20-25 June 2022. Apart from the participation of doctors from Indian Medical Association, more than 20 doctors from Nepal Medical Association also participated in this event.

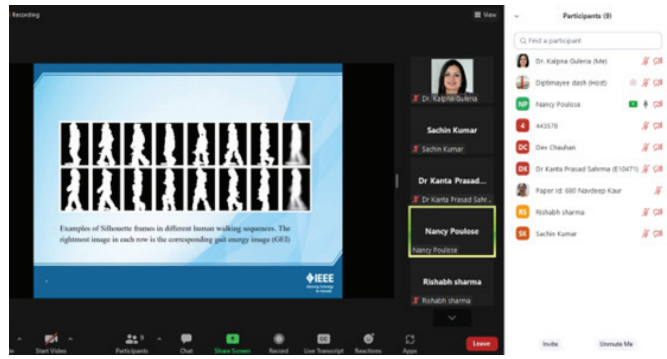
- Dr. Amanpreet Kaur - Assistant Professor, Immersive and Interactive Lab (IITL), CURIN was invited to deliver an expert talk on the topic Insights to Immersive and Interactive Technologies and Tools by University of Computing, Chandigarh University on April 21. The talk focussed on the tools and technologies available for the development of Augmented Reality, Virtual Reality and Mixed Reality applications. Session was attended by around 60 participants including students and faculty members.



On May 13, Dr. Amanpreet Kaur delivered an expert talk on the topic Implications of Metaverse at Chitkara University Institute of Engineering and Technology,

Chitkara University, Punjab that was attended by 125 students and faculty members of Computer Science and Engineering department.

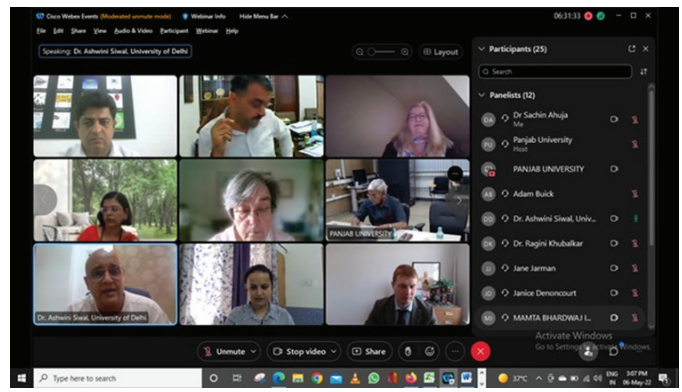
- On April 28, Dr. Kalpna Guleria - Associate Professor, CURIN chaired a paper presentations session on Deep Learning in IEEE sponsored 2nd International Conference on Advance Computing and Innovative Technologies in Engineering. The conference was organized by Galgotias College of Engineering and Technology, Noida, India. During this session, various researchers presented papers on optimization techniques in machine learning, deep learning and recent research trends in artificial intelligence, machine and deep learning.



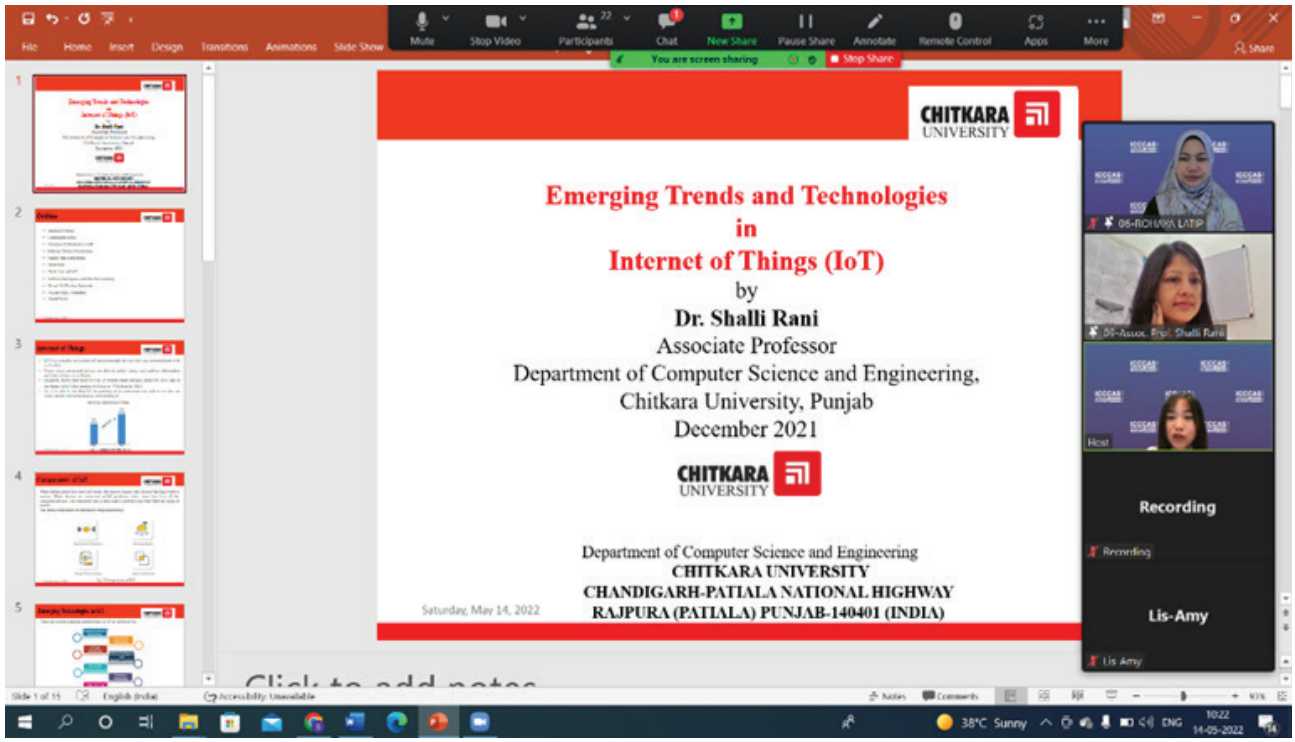
On April 29, in the same conference Dr. Amanpreet Kaur, Dr. Bhanu Sharma and Dr. Neha Tuli – Assistant Professors, Immersive and Interactive Lab (IITL), CURIN chaired paper presentations sessions. Dr. Naveen Kumar, Associate Professor, CURIN also chaired a paper presentations session as well as he presented a paper titled IoT Based Solution for the Safety of Rolling Shutters in this conference.

Dr. Amanpreet also chaired a session in the 2nd International Conference on Intelligent Technologies that was held during 24 - 26 June at KLE Institute of Technology, Hubballi, Karnataka, India.

- On April 29, Dr. Manish Sharma – Professor, CURIN was invited to deliver an expert talk on Innovation in 5G Technologies and Beyond at KIET Group of Institutions, Ghaziabad.
- Dr Sachin Ahuja – Director, Research, CURIN was invited as one of the panellists in the round table meet on Simulation of IP Ecosystem in Academic Sector on the 3rd day of India-UK International Virtual Conference on Intellectual Property organized by Panjab University, Chandigarh and Nottingham Trent University, Nottingham, UK on May 4-6, 2022. The panellists in the roundtable meet were various experts in IP domain from India and UK. The experts were apprised by Dr. Ahuja about the innovation ecosystem at Chitkara University and measures required to increase the IP awareness among the youth for innovating for a better future.



- Dr. Shalli Rani – Associate Professor, CURIN, delivered an invited talk in the 11th IEEE International Conference on Communications, Circuits and Systems on May 14. She discussed about the emerging technologies of IoT such as NDN, SDN, BlockChain, Quantum Computing, Twin Technologies etc. She also chaired a paper presentation session on Intelligent Image Processing and Communication in the conference.



Paper Presentations by Research Scholars

1. In IEEE sponsored 2nd International Conference on Advance Computing and Innovative Technologies in Engineering, research scholars of Dr. Kalpna Guleria, Shagun Sharma and Seema Gulati presented their papers. Shagun's paper was titled Deep Learning Models for Image Classification: Comparison and Applications and it introduced various deep learning based classification models along with the applications of these models in various domains. Seema's paper was titled Classification and Detection of Coronary Heart Disease using Machine Learning and it discussed about various models for heart disease detection on the Cleveland Heart Disease data-set and the results have been compared to check which algorithm is best suited for the classification and detection of coronary heart disease.
2. Swati Singh, PhD Scholar of Dr. Amanpreet Kaur presented her research paper titled Amalgamation of 3-Dimensions in Education Field using Augmented Reality Technology in the 7th International Conference on Communication and Electronics Systems organized by PPG Institute of Technology, Coimbatore, Tamil Nadu, India during 22-24 June 2022. In the same conference, Taniya Hasija, Junior Research Fellow (under DRDO funded project) presented her research paper titled A survey on NIST Selected Third Round Candidates for Post Quantum Cryptography.
3. Priyanka Datta, PhD Scholar of Dr. Archana Mantri – Professor and Head, IITL and Dr. Amanpreet Kaur presented her research paper titled Augmented Reality in Chemistry Education: An Exploratory Analysis in an International Conference on Advances in Data Science and Computing Technologies organized by Kazi Nazrul University, Asansol, West Bengal, India during 23-24 June 2022.

Invited Talk on Edge Computing and Its Applications

*Speaker – **Dr. Satish Kumar- Chief Scientist, Head iSenS, CSIR-CSIO***

On June 8, CURIN organized an invited talk on edge computing to understand this technology and its various applications. The invited speaker of the session was Dr. Satish Kumar who is a Chief Scientist at the Centre of Excellence for Intelligent Sensors and Systems (ISenS) in CSIR – Central Scientific Instruments Organisation (CSIO), Chandigarh. While introducing the speaker, Dr. P.K. Khosla – Pro Vice Chancellor, Research, Chitkara University discussed about the scenarios in which edge computing is an optimal solution. He also highlighted the differences between the cloud computing and edge computing technologies. Invited expert Dr. Satish Kumar discussed in detail how the convergence of global digital world (as more and more devices are getting inter-connected) is leading to generation of voluminous data, which results in the increase of data traffic to the servers. This is caused due to the transmission of enormous data back and forth in servers resulting in network congestion, transmission delays, reduction in throughput etc. This problem can be solved by edge computing technology that allows for the localization of critical decision making (or processing) capabilities at the nodes where the data is generated. The edge computing was discussed to be a distributed computing paradigm which brings computer data storage closer to the location where it is needed and is having the ability of processing critical data locally, then sending them to a central repository. It is becoming a new computing platform that coexists with the centralized cloud computing to process data distributed at the edge of the network. Some of the key benefits of this technology that were highlighted in the session are –

1. Faster response resulting in fast decision-making process
2. Reliable operations even with the loss of connectivity
3. Security compliance for strong internal control system in an organization
4. Easy scalability and interoperability between legacy & modern devices.

In view of these benefits, the demand for edge computing is increasing in all industrial, societal and strategic applications as discussed in the session. Additionally, participants were made familiar with the open opportunity of working on a series of next generation applications such as – artificial organoleptic systems, drone based scene understanding, drone based fault diagnosis, smart clothing for future patient monitoring, multi-sensing analysis for pilot cognition state, advanced photonic nose for diagnosis of diseases, IoT based elderly care, smart building automation, smart surveillance system, activity detection and recognition, multi-sensing based human body detection under debris etc. The session was attended by more than 100 faculty members and research scholars from CURIN, CSE and allied branches.

Diverse and Interactive Workshops Organized by CURIN

SciSkY Program by CUCIF

Chitkara University Central Instrumentation Facility (CUCIF) conducted a hands-on workshop on High Performance Computing using GPU Server on April 25 under their flagship program titled SciSkY 2.0. The aim of SciSkY is to deliver professional skills to the students, research scholars, and faculty members. Till date more than 500 students, scholars and faculty members have been benefitted from SciSkY.

Workshop on Ethical Guidelines for Human Research

Dr. Satyam Kumar Agrawal, Professor (Research), CURIN, organized a workshop on Ethical Guidelines for Human Research for Chitkara School of Health Sciences (CSHS) on May 6, 2022. The workshop was attended by around 20 faculty members and scholars from the Department of Optometry, CSHS. Dr. Agrawal discussed about the importance of ethics in human research. A special emphasis and discussion were done on the Declaration of Helsinki and its key points that every researcher undertaking human research should keep in mind. The workshop also featured how to write proposals involving ethical approvals and human research.

In the end, the participants were given a case study, which was analyzed and understood in detail. This helped the participants to understand the basics of ethics in planning, executing, conducting and concluding a research project involving humans.

Workshop on 'What is an Academic Conference?

A workshop on 'What is an Academic Conference?' was conducted by Dr. Meenu Khurana, Director Research, CURIN on May 25, 2022 for Alpha Teachers of Chitkara College of Education. Considering the fact that research is important

in education sector, the workshop focused on enhancing contribution of these academic conferences in education. Participants including faculty and students were given insights about academic conferences in education and how they should make their research work suitable for publication in such conferences. This informative, engaging and interactive workshop was attended by about 25 students and 5 faculty members.

Awareness Workshop on the Occasion of World Environment Day 2022

On the occasion of World Environment Day 2022, Center for Water Sciences, CURIN organized an awareness workshop on June 4, 2022 for the nearby villages and support staff of Chitkara University. More than 50 people of different age groups enjoyed the story-based quiz on water testing, clean air, healthy food, and pesticide free farming that was organized on the theme Only One Earth (the theme of the World Environment Day 2022). The quiz was conducted by Dr. Jyotsna Kaushal - Professor and Head, Center for Water Sciences. Dr. Sagar Patil from Chitkara School of Health Sciences demonstrated the blood pressure & diabetes checking kits & natural ways of curing these health problems. Dr. P.K. Khosla – Pro Vice Chancellor (Research) motivated participants to grow more trees to make the environment free from different types of pollution. Towards the end of the workshop, plant saplings were distributed to the participants.

List of Publications

CURIN faculty members and scholars have published 69 research papers/book chapters in SCI and Scopus indexed journals, conferences, and books. This alphabetically sorted list contains those publications that have been indexed in Scopus during April - June 2022.

1. A. Haldiyan, D. Ghosh, and N. K. Saluja, "Analysis of Six Stage Marx Electroporator Circuit Based on Pulsed Parameters," AIP Conf Proc, vol. 2357, 2022.
2. A. Hashmi, A. Juneja, N. Kumar, D. Gupta, H. Turabieh, G. Dhingra, R.S. Jha, and Z.K. Bitsue, "Contrast Enhancement in Mammograms Using Convolution Neural Networks for Edge Computing Systems," Scientific Programming, 2022.
3. A. Kaur, P. Datta, and A. Mantri, "Educational Applications of Immersive Technology: A Technical Report," ECS Trans, vol. 107, no. 1, pp. 8163–8174, 2022.
4. A. Sharma and A. Rai, "Fused Deposition Modelling (FDM) based 3D & 4D Printing: A State Of Art Review," Mater Today Proc, vol. 62, pp. 367–372, 2022.
5. B. Sharma, S. Gargrish, A. Kaur, and A. Mantri, "Effect of Virtual Reality-Based Pre-Lab Training Simulator on Students' Learning and Skills in Laboratory Work: A Comparative Exploration," AIP Conf Proc, AIP Conf Proc, vol. 2357, 2022.
6. C. Mangla, S. Rani, and N. Herencsar, "An Energy-Efficient and Secure Framework for IoMT: An Application of Smart Cities," Sustainable Energy Technologies and Assessments, vol. 53, p. 102335, 2022.
7. C. Monga, K. R. Ramkumar, and S. Jain, "Comparative Analysis of Different Polynomial Interpolations for Implementing Key Management Techniques in MANETs," International Journal of Cloud Computing, vol. 11, no. 2, pp. 157–170, 2022.
8. D. Gupta, S. Rani, and S. H. Ahmed, "Popularity based Heterogeneous Caching for Enhanced Cache Capacity Utilization in Information Centric Networking," AIP Conf Proc, vol. 2357, 2022.
9. D. Nagpal and S. N. Panda, "Performance Analysis of Diabetic Retinopathy using Diverse Image Enhancement Techniques," Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization, 2022.
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14. H. Chauhan, D. Gupta, S. Gupta, and M. J. Haque, "A Smart Cradle System to Monitor Infants for Healthcare Baby Wards Based on IoT and Blockchain," 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021, pp. 606–609, 2021.
15. I. Seth, K. Guleria, and S. N. Panda, "Introducing Intelligence in Vehicular Ad Hoc Networks Using Machine Learning Algorithms," ECS Trans, vol. 107, no. 1, pp. 8395–8406, 2022.
16. I. Sharma, "Evolution of Unmanned Aerial Vehicles (UAVs) with Machine Learning," Proceedings of International Conference on Advances in Technology, Management and Education, ICATME, pp. 25–30, 2021.
17. J. Madan, A. Khanna, P. K. G. Bedi, R. Gautam, and R. Pandey, "Numerical Simulations of PbS Colloidal Quantum Dots Solar Cell with ZnO: PEIE-based Electron Transport Layer," Indian Journal of Physics 2022, pp. 1–6, Apr. 2022.
18. K. Kour, D. Gupta, and K. Gupta, "IoT and Fog Enabled Model for Saffron Cultivation in Precision Farming," 3rd International Conference on Advances in Computing,

Communication Control and Networking, ICAC3N 2021, pp. 614–619, 2021.

19. K. Sharma, D. Goyal, and R. Kanda, "Intelligent Fault Diagnosis of Bearings based on Convolutional Neural Network using Infrared Thermography," Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology, 2022.
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28. M. Sharma, H. Malhotra, S. N. Panda, and S. Malhotra, "Single Band 5G mmWave Two Port MIMO Antenna with Omnidirectional for High Speed Wireless Applications," 2021 International Conference on Computing, Communication and Green Engineering, 2021.
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31. M. Uppal, R. Kaur, D. Gupta, and K. Gupta, "Determinants of COVID-19 disease severity in patients having diabetes," AIP Conf Proc, vol. 2357, no. 1, May 2022.
32. M. Zhang, J. Fan, A. Sharma, and A. Kukkar, "Data Mining Applications in University Information Management System Development," Journal of Intelligent Systems, vol. 31, no. 1, pp. 207–220, Jan. 2022.
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47. S. Bhardwaj and S. N. Panda, "Performance Evaluation Using RYU SDN Controller in Software-Defined Networking Environment," Wireless Personal Communications, vol. 122, no. 1, pp. 701–723, 2021.
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