

### COVER STORY

**A+ NAAC Accreditation Bagged by Chitkara University**  
*Research Ecosystem at Chitkara University Remained  
One of the Strongest Pillars in this Exemplary Success*

Volume 2021, Issue 3  
R&D Activities During  
July – September 2021



**CHITKARA UNIVERSITY  
IS NOW  
NAAC A+  
ACCREDITED**

**4<sup>th</sup> CURIN Day  
Celebrated on  
September 15, 2021**



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# A+ NAAC Accreditation Bagged by Chitkara University

Research Ecosystem at Chitkara University Remained One of the Strongest Pillars in this Exemplary Success

Chitkara University has been awarded the rating of A+ by the prestigious National Assessment and Accreditation Council (NAAC), which places it among the 5% of higher education institutions (HEIs) in India to be granted such a coveted grade. The University scored a Cumulative Grade Point Average (CGPA) of 3.26 on a 4-point scale after the NAAC Peer team visited the University during August 30 - September 1, 2021. Chitkara University has been accredited with A+ grade for the period of five years upto September, 2026.



The research ecosystem of Chitkara University remained one of the strongest pillars in this exemplary success as mentioned by Dr. Ashok K. Chitkara – Chancellor, Chitkara University. He said, “It is the hard-work of our students, staff and faculty that resulted in securing this recognition. Moreover, the university has a well-defined research promotion policy which has resulted in the development of state-of-the-art advanced facilities. CURIN has multi-disciplinary advanced facilities supported by research funding from government agencies such as DST, DRDO etc. to the tune of 37.24 crore. The research scholars and faculty members are provided seed money for undertaking research and filing patents.”



## Here is the Research Dashboard of Chitkara University

Total Number of Publications	-	2391
Total Number of Patents	-	1202
Total Number of Start-ups	-	125
Total Extramural Funding	-	INR 44 Crores
Total Industry Consultancies	-	INR 28 Crores

Established in 1994, NAAC is an autonomous body of UGC which assesses and accredits Higher Education Institutions (HEIs). NAAC has identified a set of seven criteria to serve as the basis of its assessment procedures: Curricular Aspects; Teaching-learning & Evaluation; Research, Innovations & Extension; Infrastructure & Learning Resources; Student Support & Progression; Governance, Leadership & Management, and Institutional Values & Best Practices.

Chitkara University has been awarded 3.8 grade point for Curricular Aspects, 3.06 for Teaching Learning and Evaluation, 2.71 for Research, Innovations and Extension, 3.56 for Infrastructure and Learning Resources, 2.85 for Students Support & progression, 3.62 for Governance, Leadership and Management and highest grade point of 3.95 for Institutional Values and Best Practices. The overall grade awarded to the University is 3.26 on a 4-point scale with A+ grade.

**Source: Chitkara University Website**





# Research@CURIN

## High Impact Research Papers Published by CURIN during July - September 2021

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

*The researcher papers that have been discussed in this issue are the ones which have been published during July - September 2021.*

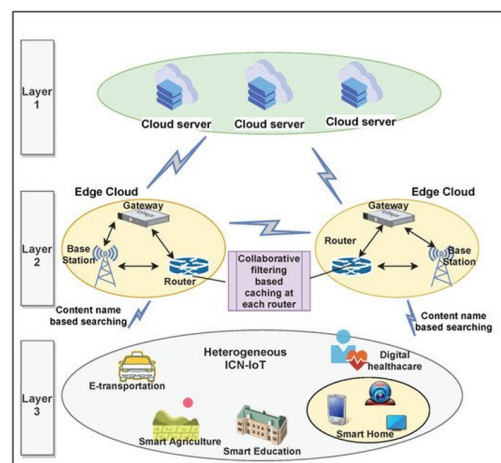
*A complete list of publications by CURIN faculty members and scholars during this period is available in a separate section.*

### Edge Computing for Improvement of IoT Networks for Meet Future Demands

*By: Dr. Shalli Rani - Associate Professor, CURIN*

This article is based on the research paper titled “Edge Caching Based on Collaborative Filtering for Heterogeneous ICN-IoT Applications” published by Divya Gupta and Dr. Shalli Rani from Chitkara University, Punjab in MDPI journal entitled Sensors.

The development in internet of things (IoT) technology have received a lot of attention in recent years. Today, research into various forms of delivering IoT as a solution is drawing both industry and academia, as well as receiving more attention than ever before. Unlike Wireless Sensor Networks (WSNs), IoT gives nodes and their connections a wide scope to grow. Smart grids, smart education, intelligent transportation systems, e-healthcare, smart industries, smart agriculture, smart cities, smart homes, and wearables are just a few of the applications that have benefited from recent advances. IoT has now become a bridge between humans and the actual world for information transmission, thanks to a multitude of applications from many disciplines. These diverse IoT applications have caused problems in current wireless communication networks, resulting in the creation of a heterogeneous IoT for today's real-world information environment. These complicated and different requirements of heterogeneous IoT activities may be calculated by appropriate exploitation of cloud computing technology, where a network cloud has excess of these resources, due to restricted resource restrictions, such as storage and computing with IoT devices. Several IoT devices now have advanced functionalities, thanks to the ever-increasing evolution of IoT technology. However, because of the large amounts of data created by these heterogeneous IoT devices and the extremely high latency given during IoT to cloud connection, simultaneous access by several IoT devices has necessitated a large amount of bandwidth. As a result, the traditional single cloud computing approach is unable to meet all of these quality of experience (QoE) standards. In this process of improvements, edge computing has been expanded as a layer between cloud and IoT to give important solutions. The edge cloud provides adequate resources for computing and storage.



The illustration has been borrowed from the published paper

Although the many qualities given by this edge computing paradigm have produced diverse solutions in various fields, it still confronts obstacles, and research in this subject is still in its infancy. Intelligent computation and communication

are lacking in edge computing. Artificial intelligence (AI) technology deployed in the edge cloud may be used to make intelligent decisions for various calculations depending on various circumstances. In addition, traditional network architecture's inflexible design philosophy hinders its ability to meet future demands. ICN is envisioned as a viable architecture for bridging the gap and therefore IoT networks, also known as ICN-IoT are maintained. For higher user QoE, effective in-network caching methods are required. We propose an improved ICN-IoT content caching technique in this article by leveraging artificial intelligence based collaborative filtering on the edge cloud to support heterogeneous IoT. This content caching method based on collaborative filtering would intelligently cache contents on edge nodes for cloud database traffic control. The experiments were carried out to compare the suggested approach against a number of benchmark strategies, including LCE, LCD, CL4M, and ProbCache. In contrast to the best-considered LCD, the analytical findings show that our suggested method performs better in terms of higher cache hit ratio, less content retrieval time, and reduction in average hop count. We believe that the proposed method will help to the success of relevant studies in this field.

## Extraction of Retinal Vasculature Map of Fundus Image using Modified Pixel Level Snake

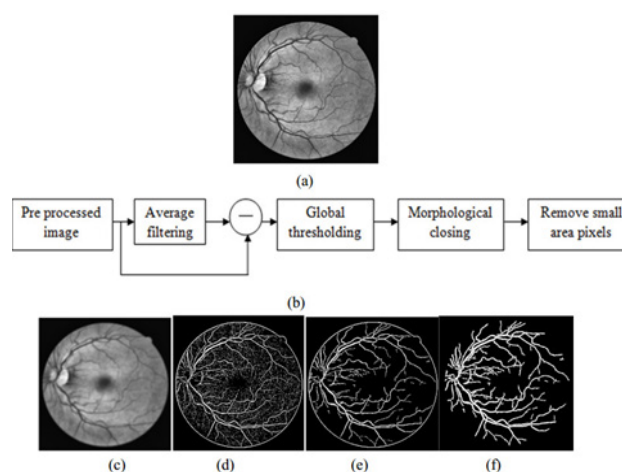
By: Dr. Sheifali Gupta – Professor, CURIN

This article is based on the research paper titled "Modified Pixel Level Snake using Bottom Hat Transformation for Evolution of Retinal Vasculature Map" published by Dr. Meenu Garg and Dr. Sheifali Gupta from CURIN, Chitkara University, Punjab, in journal entitled Mathematical Biosciences and Engineering.

Accurate segmentation of the vasculature map of the fundus image plays a crucial role in the diagnostic procedure of various retinal disorders like hemorrhage, microaneurysms, exudates or lesions. As vascular diseases present a challenging health problem for society, so an efficient vascular segmentation algorithm is needed for understanding and analysis of vascular diseases in a better way. Segmentation of blood vessels using manual method and semi-automatic method is tedious and time consuming task because high skills and training is required in both these methods. Moreover, these segmentation techniques are susceptible to errors. With the use of fully automatic segmentation techniques, problems of manual segmentation and semi-automatic segmentation can be overcome. These automatic techniques are helpful in the advancement of computer-aided diagnostic systems which are used for identification of various ophthalmic disorders. Segmentation of vessels in an accurate manner is a tedious job because of the less variations in the contrast between vasculature and surrounding tissue, presence of noise in the retina image; variation in the vessel width, shape, branching angle and brightness of image and presence of lesions, exudates, hemorrhage and other pathologies.

This article offers an unsupervised method for the extraction of vasculature map for normal fundus images as well as pathological images. Since the methodology used for extraction of vessels is unsupervised, no training is required. In this article, the methodology for evolution of vessels using Modified Pixel Level Snake (MPLS) algorithm based on Black Top-Hat (BTH) transformation is proposed.

Here, initially bimodal masking is used for extraction of the mask of the retinal fundus image. Then adaptive segmentation and global thresholding is applied on masked image to find the initial contour image. Finally, MPLS is used for evolution of contour in all four cardinal directions using external, internal and balloon potential to extract the vasculature map in accurate manner. This work is implemented using MATLAB software. DRIVE and STARE databases are used for checking the performance of the system. Various metrics such as sensitivity, specificity and accuracy are evaluated to check the performance of the system. The average sensitivity of 76.96%, average specificity of 98.34% and average accuracy of 96.30% is achieved for DRIVE database. This technique can also segment vessels of pathological images accurately; reaching the average sensitivity of 70.80%, average specificity of 96.40% and average accuracy of 94.41%. Further extracted vasculature maps can be used to find the features of retina such as macula or fovea or optic disk or for the automatic identification of pathological elements like hemorrhage, microaneurysms, exudates or lesions accurately. It can also be helpful for the assessment of various retinal vascular attributes like length, diameter, width, tortuosity and branching angle.



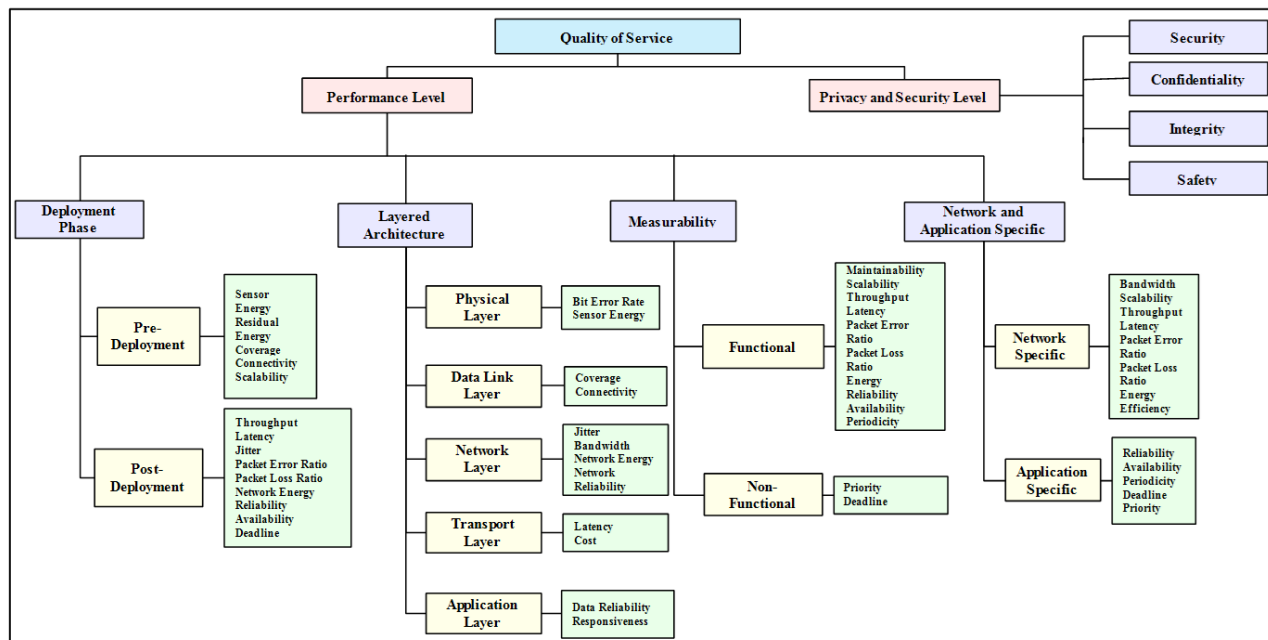
The illustration has been borrowed from the published paper

## Review of QoS parameters of WSNs and QoS Enhancement Methods using Machine Learning

By: Aina Mehta and Meena Pundir - Research Scholars, CURIN

This article is based on the research paper titled “A Systematic Review of Quality of Service in Wireless Sensor Networks using Machine Learning: Recent Trend and Future Vision” published by Meena Pundir and Dr. Jasmininder Kaur Sandhu from CURIN, Chitkara University, Punjab in Elsevier journal entitled Journal of Network and Computer Applications.

Wireless Sensor Network (WSN) is a collection of distributed autonomous small devices which can sense the physical conditions of the environment. These networks have emerged as an innovative area due to its wide applicability for military surveillance, prediction of disaster, industrial monitoring, healthcare and lot many other applications. There is a need to satisfy Quality of Service (QoS) requirements in the network due to the dynamic behavior and heterogenous traffic flow of WSN. QoS is the most popular and significant parameter which enhances the performance of the network. In this paper, authors discussed a systematic review of QoS parameters in the light of Machine Learning. There is a requirement to maintain a trade-off between the QoS parameters based on their classification. The parameters are classified at two levels, namely Performance Level, and Privacy and Security Level [refer to the illustration]. The Performance Level is further classified into four categories: Deployment Phase, Measurability, Layered Architecture, Network-Specific and Application-Specific. There are two types of deployment phase: Pre-Deployment and Post-Deployment. Sensor Energy, Coverage and Connectivity are the examples of pre-deployment phase. On the other hand, Reliability, Throughput, Latency and Availability are the examples of post-deployment phase.



The illustration has been borrowed from the published paper

Measurability is divided into two parts: Functional and Non-Functional. The parameters which are measurable are known as functional, such as Reliability, Latency and Throughput. The parameters which are not measurable are non-functional, such as Deadline and Priority. Layered architecture is divided into five layers: Physical, Data-Link, Network, Transport and Application. Physical layer comprises of Sensor Energy and Bit Error Rate. Data link layer consist of Coverage and Connectivity. Network layer consists Bandwidth, Jitter and Throughput. Latency exists in transport layer. Application layer comprise Reliability and Availability. Network-Specific and Application-Specific is the last category. Network-specific parameters are Scalability, Maintainability, Throughput and Energy Efficiency. Reliability, Priority, Deadline, and Periodicity are considered at the user or application-specific level. Authors present a statistical analysis of the last decade on several ML techniques used in enhancement of the QoS parameters. This article concludes with the findings that energy efficiency is the most significant issue of QoS which generates a great interest towards itself. Also, reinforcement learning is mainly used to resolve this issue of energy efficiency. Deadline and priority are the least explored issues since these are used only in the hard real-time applications of WSNs and require certainty up to some extent.



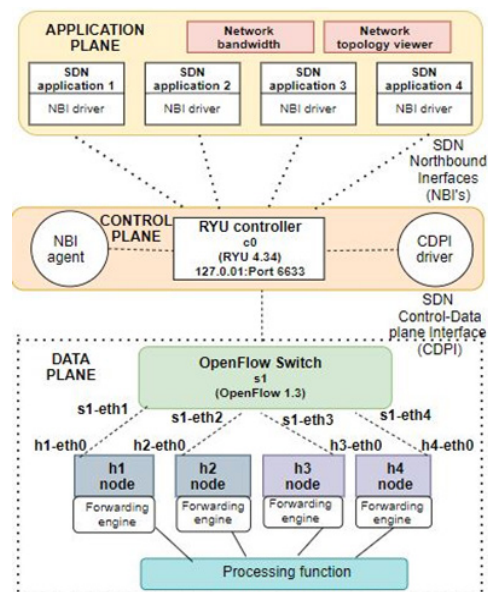
## Software-Defined Networking (SDN) Architecture to Meet the Bandwidth Requirements of Future Applications

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 network administrators and internet service providers. There has been rapid growth and development of many new applications in the domain of Internet of Things (IoT), and Cloud Computing, which requires 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 titled Software-Defined Networking. The new approach provides enhanced flexibility to build or configure the network easily, and offers a 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 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.



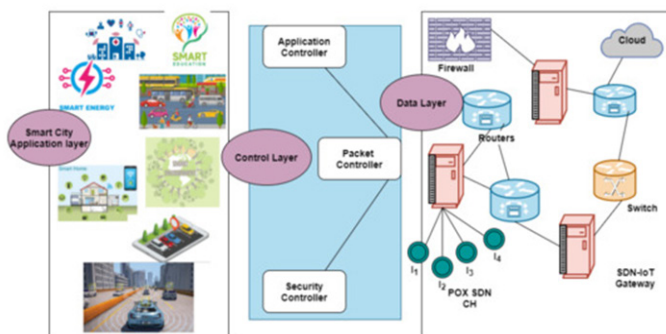
The illustration has been borrowed from the published paper

## Software-Defined Networking in Industrial Internet of Things Applications

By: Himanshi Babbar – PhD Scholar, CURIN

This article is based on the research paper titled "Cloud Based Smart City Services for Industrial Internet of Things in Software-Defined Networking" published by Himanshi Babbar and Dr. Shalli Rani from CURIN, Chitkara University, Punjab in MDPI journal entitled Sustainability.

Industrial Internet of Things (IIoT) applications have unique and difficult network session limitations. Due to these limits, a high standard of reconfigurability is required so that the system may properly assess the effects of an event and adapt the network. In contrast to traditional networks, Software Defined Networking (SDN) separates the control and data planes to provide network configuration that is configurable with smart city requirements that have the greatest impact on the system, but suffer reliability issues. The SDN-IIoT based load balancing algorithm is proposed in this study to address the problem, and it is not application specific. The proposed architecture is based on quality of service (QoS) i.e. an SDN-IIoT load balancing scheme that deals with server load. Huge loads on servers render them subject to system halts and as a result defects, posing a dependability issue for real-time applications. If the load on one server exceeds the threshold value, the load is shifted to another server. The suggested scheme is more efficient than existing schemes due to load distribution. Furthermore, the implementation architecture was designed using the POX controller, and the findings were tested using the Mininet emulator, which supports Python programming. Finally, the performance is assessed using several QoS metrics, including data transfer, response time, and CPU utilization, revealing that the proposed method outperforms the existing LBBSRT, Random, Round-robin, and Heuristic algorithms by 10%.



The illustration has been borrowed from the published paper

# 4<sup>th</sup> CURIN Day Organized

With a Theme of Celebrating the Culture of Research, Innovation and Entrepreneurship at the University

4<sup>th</sup> CURIN Day was organized on September 15, 2021 and was attended by all the faculty members, research scholars as well as administrative staff of the team CURIN.

CURIN stands for Chitkara University Research and Innovation Network; and faculty members from different departments of the university who have strong inclination toward research are part of team CURIN.

This year's CURIN Day was organized with a theme of **Celebrating the Culture of Research, Innovation and Entrepreneurship** at the university and was attended by more than 100 people.



Dr. Archana Mantri – Vice Chancellor, Chitkara University, Punjab (former Pro VC, CURIN), Dr. S.C. Sharma – Registrar, Chitkara University, Punjab and Dr. K.K. Mishra – Director, IQAC, Chitkara University, Punjab graced the occasion with their presence.

The event began with the cake cutting ceremony, followed by a panel discussion on the topic **CURIN Past, Present and Future**. The panel discussion session was moderated by Dr. Rajnish Sharma – Dean (Research) and the panelists were Dr. S.N. Panda – Director, Research, Dr. Sachin Ahuja – Director, Research, Dr. Rahul Pandey – Assistant Professor, Dr. Amanpreet Kaur – Assistant Professor, Dr. Meenakshi Dhiman – Assistant Registrar, PhD Program and Mr. Chanpreet Singh – Project Manager, NewGen IEDC.







This was followed by a quiz session wherein audience was asked questions about CURIN's achievements and milestones. Top 3 winners were awarded in the quiz. The names of the winners are Dr. Neha Tuli – Asst. Prof., Dr. Sheifali Gupta – Professor, and Mr. Nikhil – Research Scholar.



The event also witnessed the release of a quarterly newsletter of CURIN titled Res Novae. Res Novae features all the research and development activities of CURIN.





Dr. Rajnish Sharma (Dean, Research) , Dr. S.N. Panda (Director, Research) , Dr. Sachin Ahuja (Director, Research), Mr.Sagar Juneja (Asst. Dean) coordinated the event and they were ably supported by Mr. Kuldeep Singh and Mr. Lovit Kumar – Office Assistants, CURIN.



## Nine New Industry Consultancy Projects Kickstarted during July - Sep 2021

CURIN facilitated 9 consultancy projects that have been initiated by various faculty experts from different departments of the university during July - September 2021. As per the consultancy policy of Chitkara University, 90% of the consultancy fee is retained by the project heads (faculty experts).

# Patents Filed by CURIN Members and Scholars

## 12 Patents

have been granted to  
Chitkara University during  
July – September 2021

### 47 Patents Filed by CURIN during July – September 2021

A total of 119 Patents have been filed by different departments of the university during July – September 2021, out of which 47 have been filed by CURIN faculty members and researchers. Details of the patents filed by CURIN are as follows –

Sr. No.	Title	Applicant(s)	Application Number
1	A TOPICAL FORMULATION FOR SKIN INFECTIONS COMPRISING EUGENYL ACETATE AND AN EXTRACT OF CURCUMA LONGA	Varsha Singh	202111040071
2	AUTOMATIC CONTROLLING OF INDICATOR LIGHTS AND PARKING LIGHTS IN AUTOMOBILE	Shalli Rani, Himanshi Babbar	202111036013
3	DEVICE AND METHOD FOR SENSING LOAD IN A VEHICLE	Tarandeep Kaur Bhatia, Rahul Sharma, Sarvesh Tanwar	202111038117
4	DEVICE FOR FACILITATING REMOTE INTERACTIVE LESSONS	Naveen Kumar, Surya Narayan Panda, Rajesh Kumar Kaushal, Simranjeet Singh, Jyoti Sharma, Manish Sharma, Raj Gaurang	202111030343
5	DEVICE FOR MONITORING COMPRESSED MEDIAN NERVE	Varsha Singh	202111030344
6	HAIR NOURISHMENT APPLICATOR AND HAIR STYLING TOOL	Shalli Rani, Sachin Ahuja, Himanshi Babbar, Gurpreet, Kamini	202111041310
7	INTEGRATED WATER PURIFICATION SYSTEM	Jyotsna Kaushal, Mohit Kapoor, Partha Khanra, Harjeet Singh	202111030342
8	METHOD AND APPARATUS FOR FORMULATING FLY REPELLENT SOLUTION	Shalli Rani, Himanshi Babbar	202111030943
9	METHOD FOR RAPID DECOMPOSITION OF NITRILE WASTE INTO REUSABLE CARBON MATERIALS	Mohit Kapoor, Adhish Singh	202111033520
10	PASSENGER HEALTH MONITORING AND ASSISTIVE SYSTEM IN PUBLIC TRANSPORT	Amandeep Kaur, Sachin Ahuja, I.S. Sandhu, Jaiteg Singh, Bhanu Sharma, Umesh Kumar Lillhore, Sarita Simaiya, Susheela Hooda	202111038119
11	SILICIDE ON OXIDE-BASED ELECTROSTATICALLY DOPED (SILO-ED) CARRIER SELECTIVE CONTACT-BASED PERC PHOTOVOLTAIC DEVICE	Savita Kashyap, Rahul Pandey, Jaya Madan, Rajnish Sharma	202111041313
12	SYSTEM AND BOX FOR COLLECTION OF PHARMACEUTICAL ITEMS	Sumit, Deepali Gupta, Prateek Srivastava	202111041314
13	SYSTEM AND METHOD FOR DETECTING FACE MASK OF A USER	Neha Sharma, Sheifali Gupta, Himakshi Gupta, Deepali Gupta, Kamali Singla, Sonam Aggarwal	202111034739

14	SYSTEM AND METHOD FOR PROVIDING PARKING ASSISTANCE	Amandeep Kaur, I S Sandhu, Sachin Ahuja, Devender Prasad, Ruchi Mittal, Chetna Kaushal, Monika Sethi, Vikas Rattan, Varun Malik	202111034740
15	SYSTEM FOR DETECTION, TRACKING AND ELIMINATION OF LOCUST SWARM	Narinder Pal Singh, Bhanu Sharma, Amanpreet Kaur, Naveen Kumar, Shubham Gargish, Archana Mantri, P.K. Parthasarthy, Tikka Prabhjot Singh	202111032675
16	SYSTEM FOR VEHICLE ACCIDENT DETECTION AND REPORTING	Mandeep Singh, Vishal Aggarwal, Shantanu Kumar Yadav, Sumeer Walia, Adarsh Aggarwal, Neeraj Kumar	202111036015
17	TWO-TERMINAL MONOLITHIC TANDEM SOLAR CELL WITH a-Si:H TOP SUBCELL AND PbS CQD BOTTOM SUBCELL	Savita Kashyap, Rahul Pandey, Jaya Madan, Rajnish Sharma	202111038118
18	WEARABLE DEVICE FOR AUTOMATIC STRESS MONITORING	Sarang Sharma, Sheifali Gupta, Soumya Ranjan Nayak, Deepali Gupta, Rupesh Gupta, Vatsala Anand, Simret Kaur, Prerna Jha, Aakash Sharma	202111042735
19	WEARABLE DEVICE TO RECOGNIZE MENTAL STATE OF USER	Ashish Gera, Sachin Ahuja, Chanpreet Singh, Harveen Kaur, Ravneet Kaur	202111038542
20	WRITING DEVICE FOR ERROR DETECTION AND CORRECTION	Tarandeep Kaur Bhatia, Arshdeep Singh	202111038116

## INDUSTRIAL DESIGN REGISTRATIONS

### ADJUSTABLE MASK

By- Shalli Rani, Bhanu Sharma, Dhruv Jindal

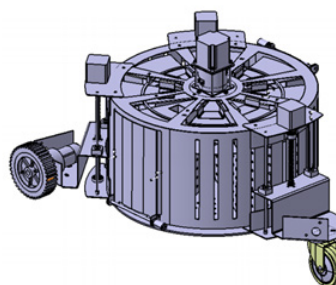
Application No. - 348861



### AUTOMATED RAT CAPTURING DEVICE

By- Rouble Gupta, Nitin Saluja, Varinder Singh, Chanpreet Singh, Chinky Rani, Satvik

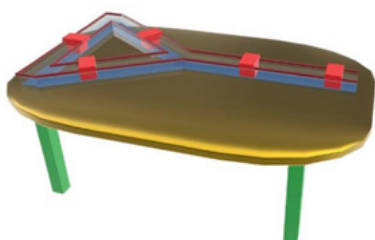
Application No. 346720



### AUGMENTED REALITY BASED TABLETOP ENVIRONMENT FOR EARNING BLOCKCHAIN

By- Harsha Chauhan, Deepali Gupta, Sheifali Gupta, Neha Tuli, Shivam Sharma, Nitin Goyal, Gifty Gupta, Jotesh Gupta, Jeevan Singh Dosad

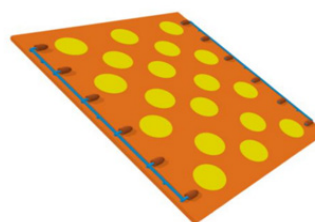
Application No. 349685



### AUTOMATIC FOOT PAD BODY SANITIZER

By- Deepika Sharma, Bhanu Sharma, Jaiteg Singh, Ruchi Mittal, Nitin Goyal, Vikas Rattan, Amandeep Kaur, Preetinder Singh Brar, Varun Malik

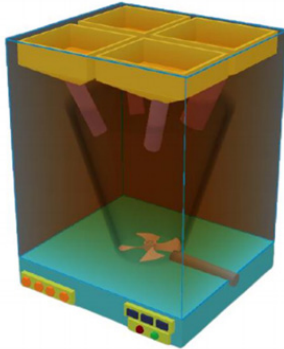
Application No. 346169





### AUTOMATIC SHAKE MACHINE

By- Varun Malik, Ruchi Mittal, Vikas Rattan, Sachin Ahuja, Jaiteg Singh, Amit Mittal, Amandeep Kaur, Geetanjali  
Application No. 346170



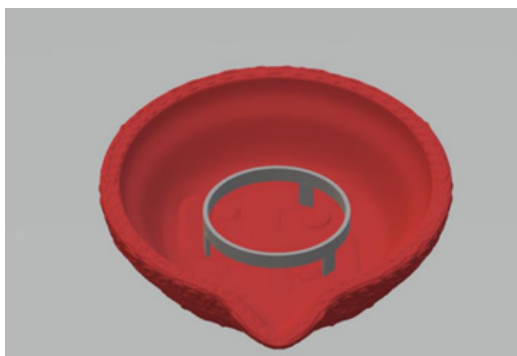
### CHAIR CUM DETACHABLE WALKING AID FOR DIFFERENTLY ABLED PERSONS

By- Priya Jindal, Jasmine Kaur, Sandhir Sharma, Sachin Ahuja, Ansh Jindal, Jeevan Singh Dosad  
Application No. 346929



### DIYA WITH WICK GUARD

By- Ruchi Mittal, Vikas Rattan, Varun Malik, Amit Mittal, Jaiteg Singh, Preetinder Singh Brar, Bhanu Sharma  
Application No. 345838



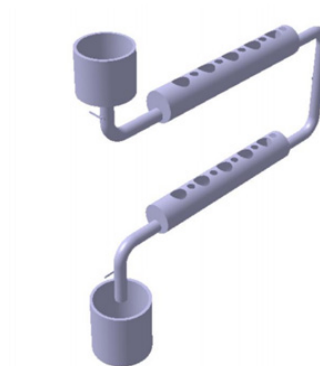
### DUAL CAMERA STAND FOR ONLINE CLASSES

By- Karthick B, Naveen Kumar, Bhanu Sharma  
Application No. 347674



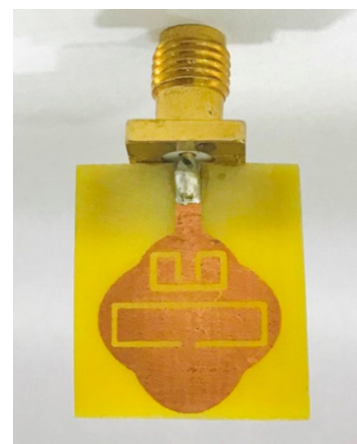
### HYDROPONIC DYE WASTE WATER TREATMENT SYSTEM

By- Jyotsna Kaushal, Pooja Mahajan, Navjeet Kaur, Sair Monish, Swarit  
Application No. 349252



### KAY SHAPED DUAL NOTCH UWB ANTENNA

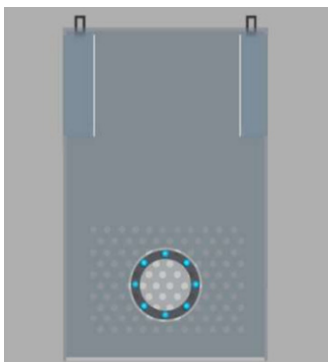
By- Manish Sharma, Sachin Ahuja, Dinesh H.A, Shankar Dass  
Application No. 346927



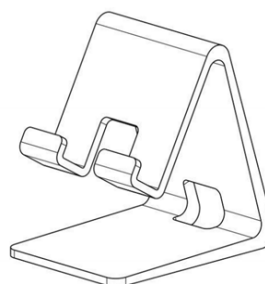
### LIZARD AND INSECT CATCHER

By- Naveen Kumar, Karthick B, Bhanu Sharma

Application No. 349526



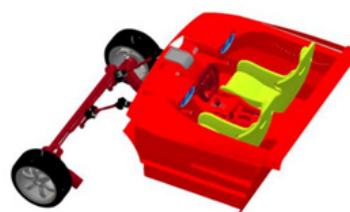
Application No. - 348027



### MOVABLE CAR STEERING

By- Shalli Rani, Bhanu Sharma, Dhruv Jindal, Sachin Ahuja, Isha Kansal, Amandeep Kaur, Harbani Sharma

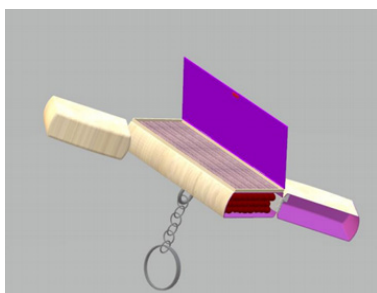
Application No. 349522



### MATCHSTICK BOX

By- Priya Jindal, Jasmine Kaur, Sandhir Sharma, Sachin Ahuja, Ansh Jindal, Ashwani Singh

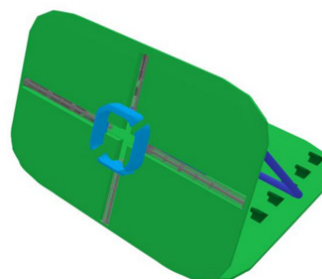
Application No. 346574



### MULTIPURPOSE STAND FOR MOBILE, TABLET AND PHONE

By- Ashwani Singh, Bhanu Sharma, Archana Mantri

Application No. 347846



### MICKY SHAPED DUAL NOTCH UWB ANTENNA

By- Manish Sharma, Surya Narayan Panda, Sachin Ahuja, Siba Kumar Udgata, Naveen Kumar, Rajesh Kumar Kaushal

Application No. 347185



### PORTATIVE CHILLER CUM FOOD WARMER

By- Jasmine Kaur, Priya Jindal, Sandhir Sharma, Sachin Ahuja, Ansh Jindal, Jeevan Singh Dosad, Ashwani Singh

Application No. 348634



### MOBILE PHONE STAND

By- Chanpreet Singh, Sagar Juneja

### SMART STAND FOR TWO WHEELERS (SET)

By- Meena Rani, Kalpna Guleria, Surya Narayan Panda, Sachin Ahuja

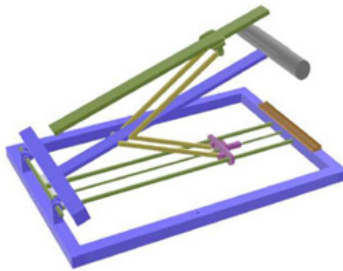
Application No. 349139



### SMART TWO DIRECTIONAL MOVABLE MOUNT FOR SOLAR PANELS

By- Madhur Chauhan, Sheifali Gupta, Mamatha Sandhu, Deepali Gupta, Rupesh Gupta

Application No. 349523



### SOLAR POWERED MULTIPURPOSE CANOPY

By- Chanpreet Singh, Sagar Juneja

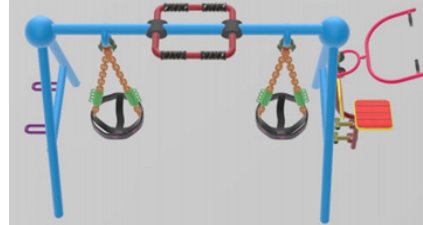
Application No. 349524



### SWING WITH OPEN GYM

By- Priya Jindal, Jasmine Kaur, Sandhir Sharma, Sachin Ahuja, Ansh Jindal, Jeevan Singh Dosad, Ashwani Singh

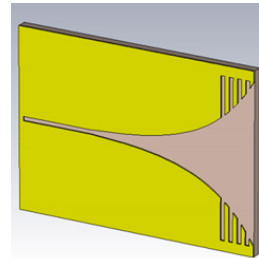
Application No. 348745



### TAPERED SLOT ANTENNA

By- Sagar Juneja

Application No. 347033



### TREADMILL

By- Ashish Gera, Neeraj Kumar, Adarsh Kumar Aggarwal, Ereena Bagga, Jay Prakash Kant, Bharat Kumar Bugata, Jitender Kumar

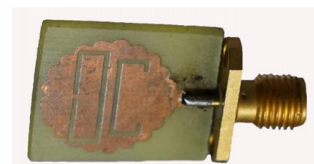
Application No. 346343



### UWB-X BAND FLOWER-FRACTAL ANTENNA

By- Manish Sharma, Surya Narayan Panda, Sachin Ahuja, Prabin Kumar Panigrahi, Naveen Kumar, Rajesh Kumar Kaushal, Sarappadi Narasimha Prasad

Application No. 346650

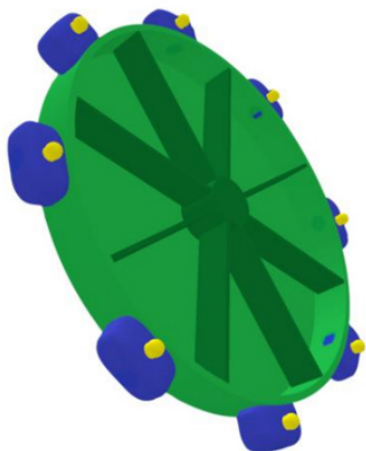




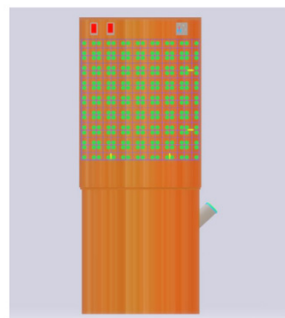
## WALL HANGING CONTAINER FOR PULSES/ GRAIN

By- Ashwani Singh, Bhanu Sharma, Archana Mantri

Application No. 346725



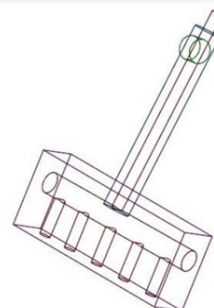
Application No. 346344



## WIPER

By- Sakshi, Chetan Sharma

Application No. 346777



## WATER AND ELECTRICITY EFFICIENT AIR COOLER

By- Vikas Solanki, Sachin Ahuja, Anupam Baliyan, Vinay Kukreja

## List of Patents Granted to Chitkara University during July – September 2021

Sr. No.	Title	Inventor
1	AN EFFICIENT FIRE EXTINGUISHING APPARATUS	Sheifali Gupta, Sachin Ahuja, Rupesh Gupta, Aishwarika Raj Sharma, Poonam
2	COOLER WITH CARBON FILTER	Sakshi, Rishi Baadshah, Vinay Kukreja
3	DETACHABLE WOODEN LAPTOP STAND	Akshay Sharma, Suryamani, Inderbir Singh
4	HACKSAW FRAME	Shalom Akhai, Prateek Srivastav, Venktesh Sharma, Amit Bhatia
5	HEIGHT ADJUSTABLE FOLDING ARM REST TABLE WITH SLIDABLE HOLDERS	Punnet Bawa, Pranav Garg, Virender Kadyan, Pranav Kumar
6	HEMIPLEGIC CANE	Shreya Sharma, Nishtha Chauhan
7	MULTIPURPOSE KNIFE	Kapil Bhardwaj, Sanket Naik
8	REAL TIME REFLECTING DEVICE	Neha Tuli, Shivam Sharma, Gurpreet Singh, Gurwinder Singh, Archana Mantri, Narinder Pal Singh
9	SANITIZER DISPENSER FOR HANDS FREE OPERATION	Gurpreet Singh, Vijay Kumar, Varun Batra, Ravinder Singh
10	SMART CLUTCH TOOTH PICK	Tania Bose
11	SNACKS SERVING CARTON	Suryamani, Rakesh K Sindhu, Inderbir Singh
12	WEARABLE HAND SANITIZER DEVICE	Surya Narayan Panda, Simranjeet Singh, Naveen Kumar, Rajesh Kumar Kaushal, Kirti Pradhan, Kailash Kumar Panda

# Newgen IEDC Awareness Sessions Conducted For Students and Faculty Members

As many as seven sessions and three-day awareness drive conducted

Chitkara University has a Gol sponsored New Generation Innovation and Entrepreneurship Development Centre (NewGen IEDC) under which grant of INR 2.87 crores has been received for the period of five years to support innovative student projects with prototyping funding. So far we have already supported more than 70 student projects with funding of over 1 crore and a total of 200 students and faculty members have been benefitted by this funding.

In order to get more project ideas from the students, Chitkara University NewGen IEDC conducted several awareness sessions for the students and faculty members of different engineering departments of the university. These sessions were conducted in the last week of September 2021 and about 500 students as well as faculty members attended them. The sessions were delivered by Mr. Sagar Juneja – Asst. Dean, CURIN and Coordinator, Chitkara University NewGen IEDC with support from Mr. Chanpreet Singh – Project Manager, CURIN and Co-coordinator Chitkara University NewGen IEDC.

In addition Chitkara University NewGen IEDC did an awareness drive about Prototyping Funding and Fabrication Facility Support available for the students to build innovative projects. This three-days drive was carried out during September 28-30, 2021 outside Square One and witnessed footfall of around 750 students. Mr. Lovit Kumar – Senior Office Executive, Chitkara University NewGen IEDC coordinated this awareness drive.



# Strategic Framework of Personalized Healthcare

Being Worked at the Centre for Life Sciences, Molecular Biology & Bioinformatics  
Division, CURIN, Chitkara University

By: Dr. Varsha Singh, Assistant Professor, CURIN

Personalized healthcare (PH) is a promising way to make the clinical diagnosis of diseases more specific, and individualized. From this standpoint, there are reasons to be optimistic for the future. By 2030, PH and its associated tools and practices will transform the healthcare industry as it will be extensively adopted to make the clinical practice more precise. The healthcare and pharmaceutical industry will, in the future, identify the right incentives and financial models to integrate PH into daily clinical practice. This perspective demands immediate attention and a concerted action plan for complete PH implementation.

Centre for Life Sciences, CURIN, Chitkara University, is presently working on implementing a part of this futuristic strategy combining molecular biology, biochemistry of biomarkers, cell signaling, clinical data (both primary and secondary),

and social, and environmental data. Although working on a small scale through preliminary development of the strategic framework, we are designing a PH approach for diagnosing multiple organ dysfunction due to non-communicable diseases in the early stage. We work on the same idea of PH, which will, in a way, contribute to the next generation of healthcare diagnosis and prediction analysis, which global healthcare system wishes to achieve by 2030. Our goal confirms that the PH method should be used in clinical utility based on the characteristics of an individual, resulting in improved diagnostic, treatment, and prevention effectiveness, increased economic value, and equal access for all in terms of predicting the biomarkers active in the human circulatory system which can predict multiple organ failure. The prediction-based methods have been approved previously by Food and Drug Administration (FDA) for various diseases such as cardiovascular, Alzheimer's, and type-2-diabetes.

This illustration shows the in-flow strategies for decision making process to provide personalized assessment and





treatment for patients for prevention of chronic diseases and symptoms leading to multiple organ dysfunction.

**Here is a glimpse of the technology that is going to be involved in building the personalized healthcare framework.**

Today we have adequate digital technology that can enable the clinicians, healthcare professionals, and even the individuals themselves to analyze their clinical data more precisely at the level of genomics. One can foresee linking health data of the previous generations with the next generations, and thus enabling early prediction of the health status. It also results in higher level of participation in healthcare decisions and data sharing for the purpose of research. Individual genetic risk profiles for common diseases can be determined thanks to the global initiatives to research genomic variances in millions of people, leading to individual-specific biomarker expression, emphasizing prevention. Such an example was seen in the recent COVID-19 pandemic, where symptoms and risks in every individual were different. There is no better and live example of how future pandemics can affect individuals with non-communicable diseases differently due to their genomic, proteomic, and metabolomic profiles. Individuals at risk of getting a disease can use monitoring technologies to supplement genomic risk assessments. PH is more of an evolution form of medicine in a biotechnology and data-rich era than a paradigm shift. This evolution necessitates significant changes in healthcare delivery, including new skills for healthcare personnel by using the unique PH delivery tools. This evolution is reflected in the vision our Centre wants to contribute to. The work being done supports coordinated research aimed at advancing the implementation of PH and establishing research activities to promote the use of PH in healthcare. Our Centre contributes in the development of preliminary and personalized prediction methods in patients with non-communicable disease and their risk of developing multiple organ failure.

The 2030 vision and the fundamental viewpoints of cross-cutting concerns can help policymakers and the healthcare community to plan future programs and actions to support PH implementation, particularly with individuals with non-communicable diseases. At the Centre for Life Sciences, Chitkara University we also implement innovation policy perspective proposals to orient policymakers for the required changes, at least in the BIMSTEC nations. The same perspective was provided by us, from the healthcare innovation perspective, collaborating with the National Institute of Advanced Studies (NIAS), IISc Campus, Bangalore. Centre for Life Sciences can serve as a communication platform for existing and future initiatives and program related to PH, thereby paving way to this vision of PH in 2030.

## Award and Recognition

On the occasion of the 54<sup>th</sup> Engineers' Day, acknowledging the contribution rendered to the nation as a Tech Samaritan during COVID-19 Pandemic, the Institution of Engineers (India), Haryana State Centre facilitated Dr. Deepali Gupta Professor, CURIN, Chitkara University with a Certificate of Appreciation on September 15, 2021. Dr. Deepali was among the three academicians who received this recognition and the other two were Dr. Mayank Dave, Professor, National Institute of Technology, Kurukshetra and Mr. Anil Bhudhiraja, Principal, Seth Jai Parkash Polytechnic, Damla.

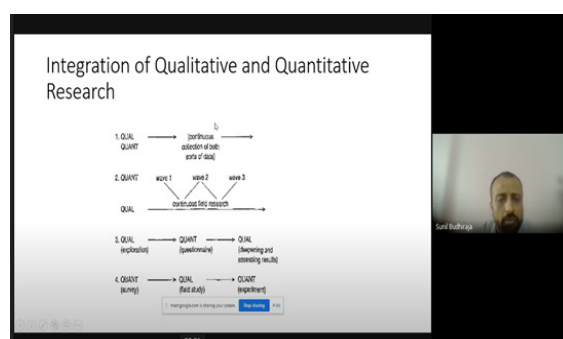
As we know the Birth Anniversary of Sir Mokshagundam Visvesvaraya is celebrated as Engineers' Day since 1968 as a tribute to this great Indian Civil Engineer and statesman. He received India's highest honour, the Bharat Ratna, in 1955.

# Expert Lectures Organized and Delivered by DRC, CBS

*Two Invited Talks Organized and Three Invited Lectures Delivered by the Faculty Members of DRC, CBS during July – September 2021*

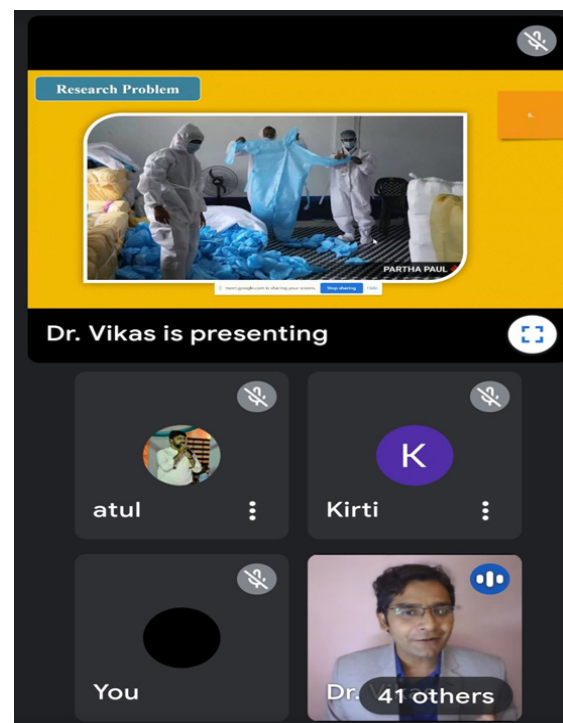
## Invited Talks

- An online expert lecture was organized by Doctoral Research Centre (DRC), Chitkara Business School (CBS), Chitkara University for research scholars, faculty members and industry practitioners to understand Qualitative Research Methods on August 14, 2021. The resource person was Dr. Sunil Budhiraja, Assistant Professor, Tata Institute of Social Sciences, Mumbai. Dr. Budhiraja discussed various methods of qualitative data collection like documents, archival records, direct observation, participant observation, interviews and physical records.
- Keeping in mind the significance of Problem Identification in writing research papers and thesis, yet another online expert lecture was organized by DRC, CBS on September 26, 2021 for the research scholars, so that they can focus on identifying good research problems for their PhD work. The resource person was Dr. Vikas Arya, Assistant Professor, Rabat Business School, Morocco who explained about problem identification with the help of case studies. He also gave an insight into how to select appropriate base papers for the purpose of problem identification. The session was coordinated by Dr. Deepika Jhamb, Associate Professor, DRC, CBS.



## Expert Lectures Delivered

- Dr. Amit Mittal, Dean, DRC, CBS was invited as a resource person for delivering technical sessions in AICTE – ATAL Faculty Development Programme on Research Methods using SPSS. It was held during July 26-30, 2021 at Amity University, Gurugram.
- Dr. Amit Mittal delivered expert lectures on the topics 'Role of Research in Knowledge Creation: Defining the Research Problem' and 'Why Manuscripts get Rejected?' at the Department of Management, Chaudhary Bansi Lal University, Bhiwani, Haryana during September 6-18, 2021.
- Dr. Amit Mittal was invited as a resource person by Telkom University, Indonesia to deliver a lecture on the topic of Market Sensing: How to Gain a Competitive Advantage in Unpredictable 5G Market. It was held on September 24, 2021.



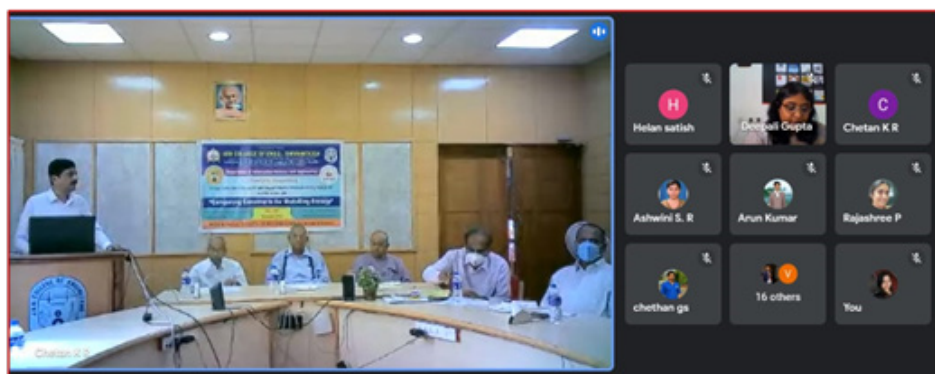
Dr. Amit Mittal served as an Advisory Committee Member in the National E-Conference organized by the Faculty of Commerce and Business Studies, Motherhood University, Roorkee on August 14, 2021. The theme of the conference was Research and Innovation in Commerce, Management & Social Sciences for Sustainable National Development.

# CURIN Faculty Members Invited as Resource Persons in Multiple Events

*Session Chairs in Conferences, Invited Speakers, Keynote Speakers etc.*

## Keynote Address during AICTE - ATAL FDP

Dr. Deepali Gupta – Professor, CURIN was invited to deliver a keynote address in the inaugural ceremony of the five-day AICTE-ATAL Faculty Development Program on Computing Constructs for Modelling Biology organized by Jawaharlal Nehru National College of Engineering, Shivamogga, Karnataka during October 4-8, 2021. Around 28 participants got an opportunity to learn various topics like Computational Biology, Bio-python and Bioinformatics in this program.



## CURIN Faculty Members Chaired Sessions in International Conferences

Dr. Shalli Rani, Associate Professor, CURIN chaired a session in the Multidisciplinary International Conference on Futuristic Trends for Sustainable Ecosystem (FTSE-2021) that was conducted by Rai University, Ahmedabad, Gujarat on August 27, 2021. The conference focused on topics like Automatic attendance system based on CNN HOG model, Pattern recognition, Bio-Informatics, Covid detection on correlation factors, Emergency vehicle detection etc.

Dr. Shalli and Ms. Divya Gupta (Research Scholar, CURIN) were invited at the International Conference and Expo on Nanotechnology and Nanomaterials to share their research work that they have published in MDPI Journal entitled Sensors, and it was titled Edge Caching Based on Collaborative Filtering for Heterogeneous ICN-IoT Applications. The Conference held in Brussels, Belgium during September 16-18, 2021, and it provided a virtual interdisciplinary platform to the researchers, practitioners and educators from different universities to discuss the most recent solutions adopted in the fields of

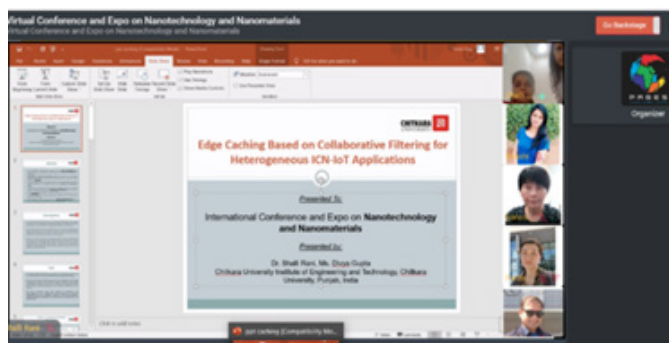




Nanotechnology and Nanomaterials. The conference featured poster presentations, workshops, special sessions by National and International speakers.

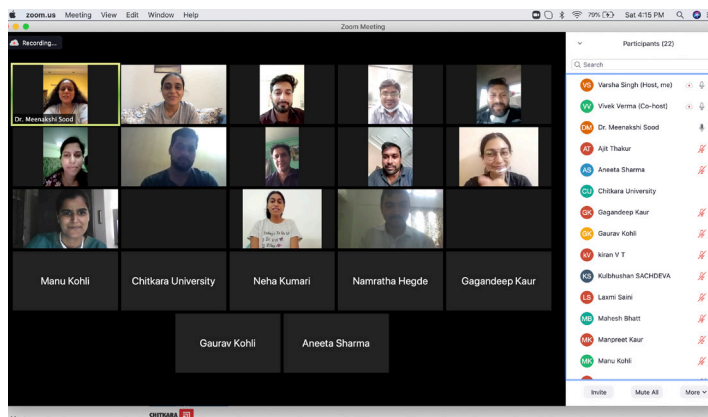
Dr. Deepali Gupta, Professor, CURIN chaired a session in the International Conference on Reliability, Infocom Technologies and Optimization (ICRITO 2021) on September 4, 2021. It was organized by Amity University, Noida and co-sponsored by IEEE.

Dr. Deepali also chaired a session in the 6<sup>th</sup> International Conference on Signal Processing, Computing and Control (ISPPC-2k21) on October 8, 2021. The conference was sponsored by IEEE Delhi section and was held at Jaypee University of Information Technology, Solan, H.P. During the session seven papers were presented on the theme of Emerging Areas of Soft Computing, Internet of Things and Artificial Intelligence.



### Workshop on Data Analysis for Healthcare Professionals

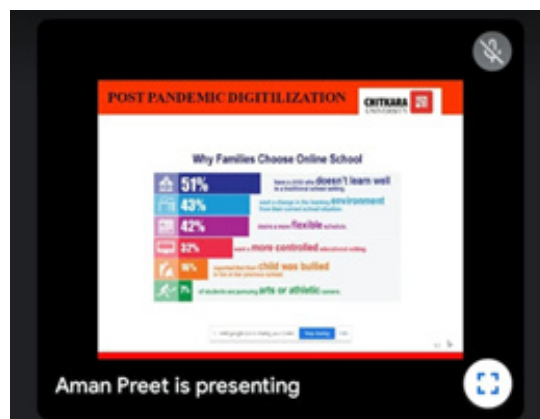
Doctoral Research Centre, Chitkara School of Health Sciences (CSHC) in collaboration with CURIN organized a six-day workshop on Data Analysis for Healthcare Professionals from September 20 to 25, 2021. The workshop focused on the course work designed for researchers working in field of healthcare. Participants learned about systemic waste of resources, track individual practitioner performance, track the health of the population and identify persons at a risk of chronic diseases in the context of the health care system, which is becoming increasingly data reliant. The model risks were taught by the experts Dr. Vivek Verma, Assistant Professor, Department of Statistics, Assam University and Dr. Jitender Kumar, Assistant Professor, Department of Statistics and Operational Research, Kurukshetra University. They effectively made the participants understand structured learning for healthcare professionals to learn and implement data analytics in their day-to-day research. The workshop was coordinated by Dr. Meenakshi Sood (Professor & Dean, DRC, CSHS) and Dr. Varsha Singh (Assistant Professor, DRC, CSHS).



### Invited Talk on the Topic Digital Manifestation in Women's Lives: Pre and Post Pandemic

Dr. Amanpreet Kaur, Assistant Professor (Research) from Immersive and Interactive Laboratory (IITL), CURIN was invited as one of the speakers during a three-days workshop on the Role of Artificial Intelligence and Internet of Things Applications to Fight COVID Pandemic. It was organised by SRM Institute of Science and Technology, Tamil Nadu in sponsorship with IET from September 23 to 25, 2021. Around 50 participants from different universities and colleges attended the talk delivered by Dr. Amanpreet on the topic Digital Manifestation in Women's Lives: Pre and Post Pandemic. She shared the ideas on the opportunities of increasing self-reliance in women due to digitalization.

She also participated in webinar on Augmented Reality, Virtual Reality organized by Department of Computer Science, Punjabi University, Patiala in collaboration with National Institute of Electronics and Information Technology (NIELIT), Ropar on July 14, 2021.



# List of Publications

CURIN faculty members and scholars have published research papers/ book chapters in SCI and Scopus indexed journals, conferences and books. The list contains all the publications during July 2021 – September 2021.

- A. Anand, S. Rani, D. Anand, H. M. Aljahdali, and D. Kerr, "An Efficient CNN-Based Deep Learning Model to Detect Malware Attacks (CNN-DMA) in 5G-IoT Healthcare Applications," *Sensors*, vol. 21, p. 6346, 2021.
- A. Anjali, J. K. Sandhu, and D. Goyal, "User Profiling in Travel Recommender System using Hybridization and Collaborative Method," in *proceedings of the International Conference on Computing, Communication, and Intelligent Systems (ICCCIS)*, pp. 143-148, 2021.
- A. Dogra, A. Kumar, M. Kapoor, and N. Gupta, "Metal-Free g-C<sub>3</sub>N<sub>4</sub>/Graphite Composite Based Carbocatalyst for Epoxidation of Styrene," *ChemistrySelect*, vol. 6, pp. 7118-7122, 2021.
- A. K. Sharma, D. Debarshi Ghosh, N. K. Saluja, and T. G. Singh, "A Mathematical Model to Expedite Electroporation Based Vaccine Development for Covid-19," *Biointerface Research in Applied Chemistry*, vol. 12, pp. 1951-1961, 2021.
- A. Kumar, A. Kumar, S. Gupta, R. Rajpal, and P. Srivastava, "Exploration of Wall Angle and Tool Rotation on Surface Roughness in Negative Incremental Forming Process," in *Journal of Physics: Conference Series*, p. 012092, 2021.
- A. Shrivastava, I. Jaggi, N. Katoch, D. Gupta, and S. Gupta, "A Systematic Review on Extreme Programming," in *Journal of Physics: Conference Series*, p. 012046, 2021.
- A. Singh, A. Kaur, and D. Gupta, "Reviewing Trust Issues in Cloud Computing," in *Journal of Physics: Conference Series*, p. 012043, 2021.
- D. Gupta, S. Rani, S. H. Ahmed, S. Verma, M. F. Ijaz, and J. Shafi, "Edge Caching Based on Collaborative Filtering for Heterogeneous ICN-IoT Applications," *Sensors*, vol. 21, p. 5491, 2021.
- D. Gupta, S. Wadhwa, and S. Rani, "On the Role of Named Data Networking for IoT Content Distribution," in *proceedings of the 6th International Conference on Communication and Electronics Systems (ICCES)*, pp. 544-549, 2021.
- D. Gupta, "A Comprehensive Study of Recommender Systems for the Internet of Things," in *Journal of Physics: Conference Series*, p. 012045, 2021.
- D. Nagpal, S. Panda, M. Malarvel, P. A. Pattanaik, and M. Z. Khan, "A Review of Diabetic Retinopathy: Datasets, Approaches, Evaluation Metrics and Future Trends," *Journal of King Saud University-Computer and Information Sciences*, 2021.(in press)
- D. Thakur, K. Sharma, and R. Sharma, "Ultra Low-Power Low-Pass Filter Design for Wearable Biomedical Applications," in *Devices for Integrated Circuit (DevIC)*, pp. 629-632, 2021.
- H. Babbar, S. Rani, A. Singh, M. Abd-Elnaby, and B. J. Choi, "Cloud Based Smart City Services for Industrial Internet of Things in Software-Defined Networking," *Sustainability*, vol. 13, p. 8910, 2021.
- H. Babbar, S. Rani, D. Gupta, H. M. Aljahdali, A. Singh, and F. Al-Turjman, "Load Balancing Algorithm on the Immense Scale of Internet of Things in SDN for Smart Cities," *Sustainability*, vol. 13, p. 9587, 2021.
- H. Naz and S. Ahuja, "SMOTE-SMO-Based Expert System for Type II Diabetes Detection Using PIMA Dataset," *International Journal of Diabetes in Developing Countries*, pp. 1-9, 2021.
- J. Arora and K. Ramkumar, "Analysis of XML Data Integrity Using Multiple Digest Schemes," in *Information and Communication Technology for Competitive Strategies (ICTCS 2020)*, Springer, pp. 203-214, 2021.
- J. Kaushal and P. Mahajan, "Design and Evaluation of Hydroponic System for Tertiary Treatment of STP

- Wastewater: An Eco Friendly Approach," *Materials Today: Proceedings*, vol. 45, pp. 4914-4918, 2021.
- J. Kaushal and P. Mahajan, "Kinetic Evaluation for Removal of an Anionic Diazo Direct Red 28 by Using Phytoremediation Potential of *Salvinia molesta* Mitchell," *Bulletin of Environmental Contamination and Toxicology*, pp. 1-6, 2021.
  - K. Sharma, A. Pathania, J. Madan, R. Pandey, and R. Sharma, "Process Voltage Temperature Analysis of MOS Based Balanced Pseudo-Resistors for Biomedical Analog Circuit Applications," *Circuit World*, 2021.
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  - M. Dassi, J. Madan, R. Pandey, and R. Sharma, "Impact of Interfacial Charges on Analog and RF Performance of Mg<sub>2</sub>Si Source Heterojunction Double-Gate Tunnel Field Effect Transistor," *Journal of Materials Science: Materials in Electronics*, vol. 32, pp. 23863-23879, 2021.
  - M. Garg, S. Gupta, S. R. Nayak, J. Nayak, and D. Pelusi, "Modified Pixel Level Snake Using Bottom Hat Transformation for Evolution of Retinal Vasculature Map," *Mathematical Biosciences and Engineering*, vol. 18, pp. 5737-5757, 2021.
  - M. K. Kakkar, J. Singla, N. Garg, G. Gupta, P. Srivastava, and A. Kumar, "Class Schedule Generation Using Evolutionary Algorithms," in *Journal of Physics: Conference Series*, pp. 012067, 2021.
  - M. Nain and N. Goyal, "Energy Efficient Localization Through Node Mobility and Propagation Delay Prediction in Underwater Wireless Sensor Network," preprint at <https://doi.org/10.21203/rs.3.rs-307261/v1> (2021).
  - M. Pundir and J. K. Sandhu, "A Systematic Review of Quality of Service in Wireless Sensor Networks Using Machine Learning: Recent trend and future vision," *Journal of Network and Computer Applications*, pp. 103084, 2021.
  - M. Sethi, S. Ahuja, and V. Kukreja, "An Empirical Study for the Deep Learning Models," in *Journal of Physics: Conference Series*, pp. 012071, 2021.
  - N. Gupta, K. Gupta, M. Khurana, D. Gupta, A. Jain, and B. K. Dewangan, "A Walkthrough in Live Migration Strategies for Energy-Aware Resource Management in Cloud," in *Autonomic Computing in Cloud Resource Management in Industry 4.0*, Springer, pp. 283-299, 2021.
  - P. Bachhal, S. Ahuja, and S. Gargish, "Educational Data Mining: A Review," in *Journal of Physics: Conference Series*, p. 012022, 2021.
  - R. Popli, M. Sethi, I. Kansal, A. Garg, and N. Goyal, "Machine Learning Based Security Solutions in MANETs: State of the art approaches," in *Journal of Physics: Conference Series*, p. 012070, 2021.
  - R. Rampal, T. Goyal, D. Goyal, M. Mittal, R. K. Dang, and S. Bahl, "Magneto-rheological abrasive finishing (MAF) of soft material using abrasives," *Materials Today: Proceedings*, vol. 45, pp. 5114-5121, 2021.
  - P. Sharma, J. Madan, R. Pandey, and R. Sharma, "Impact of Ferroelectric Oxide Layer on Palladium Silicide Source Electrode based Double-Gate Junctionless TFET," in *Devices for Integrated Circuit (DevIC)*, pp. 229-232, 2021.
  - R. K. Kaushal, N. Kumar, and S. N. Panda, "Blockchain Technology, Its Applications and Open Research Challenges," in *Journal of Physics: Conference Series*, p. 012030, 2021.
  - R. Sharma and S. Rani, "Quantified Self: From Self-Learning to Machine Learning," *IT Professional*, vol. 23, pp. 69-74, 2021.
  - S. Akhai, P. Srivastava, V. Sharma, and A. Bhatia, "Investigating Weld Strength of AA8011-6062 Alloys Joined Via Friction-Stir Welding Using the RSM Approach," in *Journal of Physics: Conference Series*, vol. 1950, p. 012016, 2021.
  - S. Aggarwal, S. Gupta, A. Alhudhaif, D. Koundal, R. Gupta, and K. Polat, "Automated COVID-19 Detection in Chest X-Ray Images Using Fine-Tuned Deep Learning Architectures," *Expert Systems*, p. e12749, 2021.
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  - S. Kapoor and S. N. Panda, "Scheduling of Parallel Tasks in Cloud Environment Using DAG MODEL," *Intelligent Computing and Applications*, pp. 267-276, 2021.
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## Visit by Scientists from CDAC Mohali in IITL, CURIN

To explore the possibilities of future collaborations with CDAC Mohali on joint projects and research, Dr. Jaspal Singh and Ms. Suneet Madan - Joint Directors at Centre for Development of Advanced Computing (C-DAC), Mohali, Punjab visited Immersive and Interactive Laboratory (IITL), CURIN, Chitkara University on September 21, 2021. They had a healthy discussions with a research team at IITL.





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