A Quarterly Newsletter

Department of Computer Science and Engineering	September 30, 2021
July – September, 2021	

What we have done in this quarter collectively as a TEAM!!

The LNM Institute of Information Technology, Jaipur

Email: hod.cse@lnmiit.ac.in

From the Desk of the Head of the Department

The insatiable curiosity of humans has always led us to probe new frontiers. Had we be satisfied with roaming on land, the Wright brothers would not have thought of flying. We would not have ventured into developing rockets, launching satellites or exploring space. The journey of Yuri Gagarin into outer space and the stepping of Neil Armstrong on moon was "one small step for man, one giant step for mankind", but reserved only for a chosen few. Our quest for the elusive has now resulted in Elon Musk's SpaceX to launch four civilians into orbit, setting the path to commercial space transportation. The integration of multidisciplinary technologies for the success of these high-tech spacecrafts – robust software, trustworthy integrated chips, deep-space communication, propulsion systems, navigation systems, thermal, chemical and environmental support – is the result of tremendous planning and team-effort and form the basis of any successful project. The need for interdisciplinary research has increased manifold, opening new vistas to traverse. As quoted by Stephen William Hawking:

"Remember to look up at the stars and not down at your feet. Try to make sense of what you see and wonder about what makes the universe exist. Be curious. And however difficult life may seem, there is always something you can do and succeed at. It matters that you don't just give up."

Exploration is the key!!! Wishing you an amazing journey ahead.

Dr. Preety Singh

HoD, CSE

Computer Science: Fact Check

(From the desk of the editor)

History in Computing

- **Ten computer codes that transformed the science**
  (*Source: https://www.nature.com/articles/d41586-021-00075-2*)
    - Language Pioneer: Fortran Compiler (1957)
    - Signal Processor: Fast Fourier Transform (1965)
    - Molecular Cataloguers: Biological Databases (1965)
    - Forecast Leader: The General Circulation Model (1969)
    - Number Cruncher: BLAS (1979)
    - Microscopy must-have: NIH Image (1987)
    - Sequence Searcher: BLAST (1990)
    - Preprint Powerhouse: arXiv.org (1991)
    - Data Explorer: IPython Notebook (2011)
    - Fast learner: AlexNet (2012)

Computing News from Around the World

- **Computer model to reduce COVID-19 infections and deaths:** Scientists at NTU Singapore developed 'optimal strategies' computer model that could significantly reduce future COVID-19 infections and deaths. The model, called *NSGA-II*, could be used to alert local governments in advance on possible surges in COVID-19 infections and mortalities, allowing them time to put forward relevant counter measures more rapidly.

- **Baby detector software embedded in digital camera rivals ECG:** University of South Australia researchers have designed a computer vision system that can automatically detect a tiny baby's face in a hospital bed and remotely monitor its vital signs from a digital camera with the same accuracy as an electrocardiogram machine.

- **Discovery could improve reliability of future smart electronics:** An undergraduate student from the University of Surrey has discovered a way to suppress hot-carrier effects that have plagued devices that use thin-film transistor architecture -- such as smartwatches and solar panels.

- **Opening a path toward quantum computing in real-world conditions:** The quantum computing market is projected to reach $65 billion by 2030, because of its potential to solve incomprehensibly complex problems. Drug discovery is one example. To understand drug interactions, a pharmaceutical company might want to simulate the interaction of two molecules. The challenge is that each molecule is composed of a few hundred atoms, and scientists must model all the ways in which these atoms might array themselves when their respective molecules are introduced. Only a quantum computer can represent, much less solve, such an expansive, dynamic data problem.

New faculty members joining the department

- **Dr. Nilotpal Chakraborty, Assistant Professor**
  Research Area: Smart grid, Electric Vehicles, Cyber-Physical Systems, Scheduling, and Optimization

  He obtained the B.Tech degree in Information Technology from Assam University, Silchar, India in 2010, the M.Tech degree in Systems Management from Devi Ahilya University, Indore, India in 2014, and the Ph.D. degree in Computer Science and Engineering from the India Institute of Technology Patna, India. He has been a Postdoctoral Researcher at Aalborg University, Denmark for one year until May 2020, and worked at EMAX Group, Brussels, Belgium as an IT Solution and innovation expert until June 2021. He has also been a visiting researcher at the Indian Institute of Technology Kanpur, India. His research interests include smart grid, electric vehicles, cyber-physical systems, scheduling, and optimization. He has authored a number of reputed journal and conference publications and has also been a reviewer for journals, including but not limited to, IEEE Transactions on Systems, Man, and cybernetics, IEEE Transactions on Transportation Electrification, IEEE Transactions on Intelligent Transportation Systems, IEEE Transactions on Industrial Informatics, IEEE Systems Journal, etc.

- **Dr. Anugrah Jain, Assistant Professor**
  Research Area: Fault Tolerant Network-on-Chip, Interconnection Networks, Reversible Computing and Reversible Circuits

  He received the B.Tech. degree in Computer Engineering and the M.Tech. degree in Computer Science and Engineering from Rajasthan Technical University, Kota, India in 2011 and 2014, respectively. Recently, he has completed the PhD degree in Computer Science and Engineering from the Malaviya National Institute of Technology Jaipur, Rajasthan, India. He has worked on scalable and reconfigurable routing for fault-tolerant 2D mesh network-on-chip. His research outcomes are published in reputed international SCI Journals and Conferences. In his free time, he likes travelling and is more inclined towards photography.

- **Dr. Anshul, Assistant Professor**
  Research Area: Data Science

  He received the B.Tech. degree in Computer Science & Engineering from UPTU, Lucknow in 2009 and M.Tech. in Computer Science & Engineering from Aligarh Muslim University, Aligarh in 2011. Recently, he has completed the PhD degree from IIT BHU, Varanasi in the field of Data

Science & Machine Learning. His PhD thesis entitled "Learning Optimal Decision Criteria for Early Classification" has garnered him with excellent publications in reputed international SCI journals and conferences.

New Courses Offered

1. **Title:** Design Patterns for Machine Learning
   Instructor: Dr. Bharavi Mishra
   Level: UG
   Course Description: In present era, machine learning can be used to solve different engineering problems where some problems are recurring too frequently. In this scenario, the design patterns provide a usable, sustainable, and understandable solutions to commonly occurring problems. This course covers some of the best-known patterns which are useful for enterprises as well as academic researches.

2. **Title:** Applied Graph Theory
   Instructor: Dr. Nilotpal Chakraborty
   Level: UG
   Course description: This course is on Graph Theory and focuses on problem solving using the basic and advanced notions of graphs and their in-depth study and analysis in various fields of Computer Science. The course aims to provide an in-depth understanding of graphs, their fundamental principles and various computational models underlying its theory, mathematical analysis, proofs, and algorithmic techniques. It will also provide the opportunity to apply the knowledge and showcase the understandings by modeling various real-life problems through case studies and projects.

3. **Title:** Web Security
   Instructor: Dr. Mohit Gupta
   Level: UG
   Course Description: The course starts with the basics of client-side and server-side programming languages, technologies, and an overview of web security. It builds upon it by exposing various common vulnerabilities in implementation using languages on the both client and server sides, technologies and the underlying issues. Further, it provides exposure to numerous defense mechanisms for the discussed vulnerabilities. The later part of the course discusses web browser security issues, associated CVE, and defense mechanisms.

4. **Title:** Generative Adversarial Networks and its Applications
   Instructor: Dr. Indra Deep Mastan
   Level: UG
   Course Description: Generative Adversarial Networks (GANs) are powerful deep learning tools that have attracted exciting applications such as synthesis of realistic faces and arts. This course provides insights into how to develop applications using GANs. This is a research-based course and knowledge of machine learning or deep-learning is desirable for the students taking this course. The basic understanding of Keras and Tensorflow is also desirable. The course discusses an overview of deep-learning tools, introduces two famous Deep Generative Models, namely Generative Adversarial Networks (GANs) and Variational Autoencoders (VAE), dive into GANs and discuss key concepts needed to develop applications, and let the students learn

the exciting real-world applications and advanced topics such as Deep Generative Models for Graph Neural Networks.

5. **Title:** Information Security and Privacy
    Instructor: Dr. Shweta Bhandari
    Level: PG
    Course Description: The course aims to provide a basic understanding of information security and privacy. This course allows to understand the different threats that may exist in the system and ways to begin reasoning about potential attacks. The concepts of security policies and models that formulate these policies to work well in practice are discussed. The course dives into the core concepts of cryptography and explores different notions of privacy. In addition, the core concepts of software validity and rights are also discussed in this course. The course tries to familiarize the students towards developing the security mindset while remaining ethical.

6. **Title:** Modern Network Technologies
    Instructor: Dr. Rajbir Kaur, Dr. Sunil Kumar
    Level: PG
    Course Description: The course covers the fundamental aspects of modern networks, with emphasis on emerging technologies and architectures. The course introduces the students to the concepts of virtualization, Software-Defined Networks (SDN), Network Function Virtualization (NFV), and emerging trends in the area. The goal of this course is to introduce the students to state-of-the-art technologies and architectures. In this course, the different emerging trends are looked upon and discussed with profound innovative ideas that have recently been developed.

Recent Collaborations / MoUs

- The Department signed an MoU with *Celebal Technologies* for Academia – Industry collaboration for internship opportunities and placements, training workshops on latest technologies, and faculty development programmes in the fields of Data Science, Big Data, and Enterprise Cloud.
- The *Center for Cryptography, Cyber Security & Digital Forensics (C3-SDF)*, Department of CSE, LNMIIT has collaborated with *IRT SystemX France*, *University of Luxembourg, Belgium*, *Pondicherry Central University*, and *Bosch India* to organize the 2nd International Workshop on Post-Quantum Cryptography (IWPQC) during 10 – 11 December, 2021. The workshop is supported by the "*Research Exploratory Project*" at IRT SystemX, Palaiseau France, and Indocrypt 2021.
- The Department signed an MoU with *Episource India Private Limited* for collaboration in joint research and industry projects, internships and to support academic activities with industry perspective. The identified areas are Data Science, Data Engineering, Sotware Development, Computer Vision, Machine Learning, Natural Language Processing, Document Analysis, Healthcare Analytics and Project Management.

Research Publications

Journal

- Nitin Singh Rajput, Rahul Banerjee, Dheeraj Sanghi, Gokulakirshnan Santhanam, Kapil Singhal, "*Swarm intelligence inspired meta-heuristics for solving multi-constraint QoS path problem in vehicular ad hoc networks*", Ad Hoc Networks, Elsevier, vol. 123, pp. 102633, 2021.
- Jayaprakash Kar, "*ELDA: an efficient and low-cost protocol for data authentication for IoT*", Wireless Network, Springer, vol. 27, pp. 3969 – 3978, 2021.
- Jayaprakash Kar, Xiaoguang Liu , Fagen Li "*CL-ASS: An efficient and low-cost certificateless aggregate signature scheme for wireless sensor networks*", Journal of Information Security and Applications, Elsevier, Vol. 61, pp. 102905, 2021.

Conference

- Shirish Singh, Harshit Singhal, and Bharavi Mishra, "*Leveraging Compiler Optimizations for Code Clone Detection*", Proceedings of the 33rd International Conference on Software Engineering & Knowledge Engineering (SEKE), 1 – 10 July 2021, Pittsburgh, USA.
- Shirish Singh, Kushagra Chaturvedy, and Bharavi Mishra, "*Multi-View Learning for Repackaged Malware Detection*", Proceedings of the 10th International Workshop on Security of Mobile Applications (IWSMA), 23 – 26 August 2021, Vienna, Austria.
- Vikas Bajpai, Anukriti Bansal, Ramit Agarwal, Shashwat Kumar, Namit Bhandari, and Shivam Kejriwal, "*Rainfall Estimation and Prediction using Artificial Intelligence: A Survey*", Proceedings of the 2nd Congress on Intelligent Systems (CIS), 4 – 5 September 2021, Bengaluru, Karnataka, India.
- Anukriti Bansal, Prerana Mukherjee, Divyansh Joshi, Devashish Tripathi, and Arun Pratap Singh, "*Multi-task Learning for Newspaper Image Segmentation and Baseline Detection Using Attention-Based U-Net Architecture*", Proceedings of the 16th International Conference on Document Analysis and Recognition (ICDAR), 5 – 10 September 2021, Lausanne, Switzerland.

Book Chapter

- Pramod Gaur, Vatsal Malaviya, Abhay Gupta, Gautam Bhatia, Bharavi Mishra, Ram Bilas Pachori, and Divyesh Sharma, "*An Optimal Model Selection for COVID 19 Disease Classification*", In: Biomedical Signal and Image Processing with Artificial Intelligence, Springer, Singapore.

Talks / Invited Lectures / FDPs

(A) Expert lectures delivered by CSE faculty members

- Expert lecture by **Dr. Sudheer Sharma** during the AICTE – ATAL sponsored Faculty Development Program on "*Computational Foundation for Data Science (CFDS)*", organized by Department of Computer Science, Banaras Hindu University, July 26 – 30, 2021.
  Area: *Statistical Foundations for Data Science*
  Date: 26.07.2021

- Expert lecture by *Dr. Vineeta Jain* during the AICTE – ATAL Faculty Development Programme on "*Cyber Security oversight for Information Protection*", organized by Department of Computer Applications, Cochin University of Science and Technology (CUSAT), July 12 – 16, 2021.
  Area: *Cyber Security*
  Date: 14.07.2021

(B) Invited Lectures by External Experts

- A Webinar on "*Executive Summary – Few Research Problems*", organized by Department of Computer Science & Engineering, The LNMIIT, Jaipur
  Speaker: Dr. Amitava Mukherjee, Adjunct Professor at School of Nano Science and Engineering, SUNY Polytechnic Institute, Albany, USA
  Date: 08.07.2021
  Time: 11:00 am – 12:30 pm
  Topic: A discussion on the research problems in the fields of design of structural controllability for complex network architecture, design of fault tracking framework for SDN, design of mobile healthcare protocol for real-time ECG/EEG monitoring application, modeling the physical channel of a nano-network, Q-routing based information centric networking, and adoption of analytics in healthcare.

(C) FDPs attended

- Dr. Rajbir Kaur attended AICTE – ATAL sponsored Faculty workshop on "*Embedded Systems – An Application-driven Approach*", organized by STMicroelectronics and Arm Education, during 25 – 27 August, 2021.
- Dr. Preety Singh attended AICTE – ATAL sponsored Faculty Development Programme on "*Artificial Intelligence for Computer Vision*", organized by IIT Roorkee, during 12 – 16 July, 2021.

Awards / Recognition

- *Dr. Preety Singh* recognized by IEEE as an IEEE Senior Member.
- *Dr. Subrat Kumar Dash*, *Dr. Sakthi Balan Muthiah*, *Dr. Sunil Kumar*, *Dr. Saurabh Kumar* and *Mr. Vikas Bajpai* awarded for their exemplary contributions, worthy and outstanding performances, and distinctions received at both the National and International levels, during the *19th LNMIIT Foundation Day*, held on 14 September 2021.
- *Arishta Jain (18UCS002)* and *Hemakshi Manchandia (18UCS141)* from B.Tech - Y18 bacth are awarded the Grace Hopper Celebration (GHC) Student Scholarship to attend the Virtual Grace Hopper's Celebration 2021. Grace Hopper Celebration is one of the world's largest gathering of women technologists.

Highlights from the Webinar

Featured Faculty

Name of the Faculty: Prof. Vishv Malhotra

Designation: Distinguished Professor

Faculty Speaks:

The department has suggested that I write my world experiences for the students. The current times may look bewildering and unusual! The pandemic has split the world where physical travels have been severely restricted. On the other hand, technology has enabled us to remain connected. We have experienced and lived through this transition and feel that we will not be seeing such a shift again soon.

I may compare these bewildering changes to a few that I can remember. I was a teenager in the mid-sixties when the country experienced severe famine. We negotiated the disaster and adapted better agricultural practices to be more productive. I also remember the early 1980s when a Prime Minister was killed, and the country descended into chaotic riots. The social fabric changed rapidly. I may have missed experiencing some later significant events as I was outside the country.

While I narrate these monumental shifts, I have lived, accepted, and adopted major changes in my professional discipline changes. I wrote my first program in 1973. A few lines of Fortran code – I should say a program made of a deck a few cards. Admittedly, it was no exciting work. I stayed in my original engineering discipline and completed my master's degree in electrical engineering. However, my first job was as a programmer. Programming required no special qualification😊

A year later, I was bored and decided to be back as a research student at a university. This time in computer sciences. Many learned people of the day viewed the discipline as a collection of a few tricks!

I have worked under the label since those times; no two years have been the same since. Each year the discipline had advanced. Every year, the professionals in the field have new details to learn, new skills to develop and be prepared for a new world.

I said that Computer Sciences and Technologies were viewed as a collection of a few tricks in those days. This brings me to an interesting article by Robert Strohmeyer in PCWorld (https://www.pcworld.com/article/155984/worst_tech_predictions.html). I pick a few quotes from the article:

1. "I think there is a world market for maybe five computers." Thomas Watson, president of IBM, 1943

2. "Television won't be able to hold on to any market it captures after the first six months. People will soon get tired of staring at a plywood box every night." Darryl Zanuck, executive at 20th Century Fox, 1946

3. "There is no reason anyone would want a computer in their home." Ken Olsen, founder of Digital Equipment Corporation, 1977

4. "Almost all of the many predictions now being made about 1996 hinge on the Internet's continuing exponential growth. But I predict the Internet will soon go spectacularly supernova and in 1996 catastrophically collapse." Robert Metcalfe, founder of 3Com, 1995

5. "Two years from now, spam will be solved." Bill Gates, founder of Microsoft, 2004

The message is loud and clear. The world is full of surprises and rapid changes; Tomorrow may be very different from today. Enjoy every day! May you all be the creator of a glorious future.

Featured Alumni

Distinguished Alumni: Mr. Apoorv Purwar

Batch: Y14 (2010-2014)

Current Organization and Profession: SDE, Amazon, USA

Previous Ventures:

- MS in Computer Science, Columbia University, USA
- Machine Learning Engineer, Lazard Asset Management, USA
- Technology Analyst, Deloitte, India

Alumni Speaks: My four years at LNMIIT were among the best experiences of my life. From the wealth of knowledge I gained in the classrooms, to the character development in the hostels, every day at LNM helped me learn and be better. LNMIIT is among those rare institutions, where you don't just meet Professors but find Mentors; where you don't just meet Seniors but find Role Models; and where you don't just meet Classmates but find Family.

I am proud to be a part of the LNM family and am thankful for the fortune day in 2010 when I associated myself with this fine institution.

For the Students: The day you stepped into LNMIIT, you took a pivotal step in the journey of life. And, you should know that it was the right one! From this day on, all opportunities are open to you and it is now on you to grab the ones you desire.

In your days at LNM, sometimes you might feel lost. But the good news is that these are the years to be lost!
So take this time to learn and explore. Do things you wouldn't otherwise. Don't limit yourself to just academics – play a sport, dance, debate, or contest elections, without worrying about the results. Make mistakes, as many as you can. Make friends, a lot of them. Laugh and be laughed on. And at the end of it, you would have found yourself.

These years are something that will set the course of your life. So make yourself a promise – be a better version of yourself every day.

Featured Students

Name of the Student: Ms. Pooja Singhal

Batch: B.Tech. Y18 (18UCS072)

Achievement: Branch Topper (Girls)

CGPA: 9.5

Student Speaks: Hello, everyone. I am a B.tech Computer Science and engineering final year undergraduate student from the Y18 batch. I am thankful to the CSE department for providing me an opportunity to share my experiences with everyone. I really appreciate that the institute provides merit scholarships to students which has been a big motivating factor for me. The institute keeps the curriculum up-to-date by introducing various new courses according to the industry requirements which helps students find their personal fit. I personally had an inclination towards data science courses which also helped me bag an internship at Byju's this summer. The projects in college helped me develop the skill set which played a crucial role in giving my best in the internship. There is a vast variety of non-technical courses offered at LNMIIT, which helped me a lot in developing personal behavioural skills which are as important as technical skills in the real world. The institute also has a wide variety of clubs through which students can explore a plethora of skills and develop unique skills. I have been active in the entrepreneurship cell activities and open discussions organised by the literary club which helped me become a fine orator with profound communication skills. As our batch is currently going through the placement process, I would like to share my experience around it as well. The Training and placement cell provides intensive mentoring for all the profiles which has immensely helped us in building up our confidence and to achieve desired results from the process. The highly approachable and understanding nature of the professors and the Training and placement cell officers has also helped students emotionally to sail through the placements. The primary learning from my personal experience is that one size does not fit all and one must explore all career opportunities to find their personal fit and follow it.

Thank you to all my teachers and friends at LNMIIT who have helped me to develop a VISION.

Name of the Student: Mr. Parth Patel

Batch: B.Tech. Y18 (18UCS015)

Achievement: Branch Topper (Boys)

CGPA: 9.87

Student Speaks: This will be a self-reflection on my journey in The LNM Institute of Information Technology (LNMIIT), Jaipur.

A week before college applications were due, I decided to do Computer Science. I had so many different interests and Computer Science could be applied to any of those.

What sold me to pursue CSE at LNMIIT was that I got to see people who are passionate about the department, people who are passionate to bring new ideas, and it's inspiring to be part of this group of people. In my freshmen year, I met a professor who emphasised the statement "Computer Science is not about computer but computing!". This broaden my view of the computer, computing, informatics and computer science. I was able to see from a new perspective, the world of Computer Science. Here, at CSE, LNMIIT, the day does not end with the last lecture. Instead, everyone gets the opportunity to cement their understanding of the concepts through supervision with people who are experts in their fields. It is kind of cool to be able to interact with professors and learn something outside the class curriculum. Also, this last year has brought new challenges and new experiences in the form of a pandemic but, the department, the teachers, the community, all together have adapted to them and never given up on learning. The CSE department has given me an opportunity to strive to be creative, innovative and pursue activities that have a significant pay-off for the community and the society as a whole.

Editor

Dr. Saurabh Kumar
Assistant Professor
Department of Computer Science & Engineering
The LNM Institute of Information Technology, Jaipur