LNMIIT
The LNM Institute of
Information Technology

A QUARTERLY
NEWSLETTER:
DEPARTMENT
OF COMPUTER
SCIENCE &
ENGINEERING

APRIL

2021

WHAT WE HAVE DONE IN THIS QUARTER
COLLECTIVELY AS A TEAM!!

Department Newsletter
(January - March 2021)

From the desk of Deputy HoD, CSE:

The last year has been challenging for all of us. While the classrooms have become virtual, it has also given an opportunity to explore new paradigms in teaching and learning. We are happy that the fraternity rose up to the demands of this extraordinary situation and made the transition to the new normal in education.

Restrictions due to the pandemic have created new challenges for organizing technical activities in a fully online format to keep abreast with the latest in technology. In this quarter, the 3rd International Workshop in Multimedia Applications (IWMA 2021) and two expert talks were organized wherein the participants benefitted from the research experience of renowned professionals in the areas of Intelligent Multimedia Systems and Artificial Intelligence. The addition of a supercomputing unit to our existing infrastructure is a matter of great pride for all of us. A one-week training program was organized to expose the faculty and students to the environment of the Nvidia DGX-1 server.

The Department also welcomed Prof. C. Pandu Rangan, who joined our department as a Visiting Professor after his excellent tenure at IIT Madras. His research interests include Algorithms, Cryptography, AI, Theoretical Computer Science among others. His profound knowledge and experience will expose our students to a new perspective of problem-solving.

With contribution and collective effort of all, we enter the new academic year with the resolution to embrace digital technology in our lives and to introduce new programs and courses aligned with the current industrial practices and requirements.

Dr. Rajbir Kaur
Assistant Professor & Deputy HoD
Computer Science & Engineering

New faculty members joining the department

- **Prof. C. Pandu Rangan, Visiting Professor**
 **Research Area:** Algorithms

  Prof. Pandu Rangan received the B.Sc. and M.Sc. degrees from University of Madras in the years 1975 and 1977, respectively. He completed his PhD in Applied Mathematics (Computer Science) from IISc, Bangalore in 1984. He has served in the Department of Computer Science & Engineering at IIT Madras since June 1982 and retired with a tenure of excellence in the year 2020. His research is in the design of pragmatic algorithms for the practical problems in the fields of graph theory, combinatorics and computational geometry. He has worked on different sponsored research projects in the fields of cryptography, AI, and theoretical computer science. In the year 1990, he was responsible to setup the Theoretical Computer Science (TCS) lab and had been in-charge of the lab at IIT Madras. In his wonderful career, he has served as the editor for different reputed journals and committees which were responsible to produce qualitative works in their respective fields and conferred with respectable awards and honours in his brilliant career.

- **Dr. Suvidha Tripathi, Assistant Professor**
  Research Area: Biomedical Image Processing, Pattern Recognition, Computer Vision, Applications of Deep Learning

  She received her Bachelor's degree in Computer Science & Engineering from Mata Vaishno Devi University, Jammu and Kashmir in 2013 and Masters in Software Engineering from Birla Institute of Technology, Mesra, Ranchi in 2015. She completed her Doctorate (Information Technology) from Indian Institute of Information Technology, Allahabad in 2020. During her PhD, she has interned in Bioinformatics Institute, Singapore and collaborated two research papers with the PI and co-supervisor, Dr. Hwee Kuan Lee.
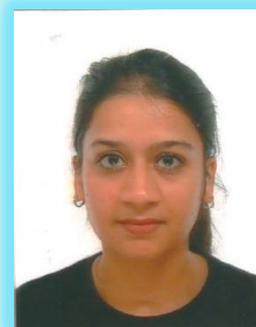
- **Dr. Navneet Pratap Singh, Assistant Professor**
  Research Area: Numerical Linear Algebra, Iterative Solvers, Preconditioners, Model Order Reduction, Dynamical Systems, Machine Learning

  He received the B.Tech. degree in Computer Science & Engineering from U. P. Technical University, Lucknow, Uttar Pradesh, India and the M.Tech. degree in Modelling and Simulation (Applied Mathematics) from Defence Institute of Advanced Technology, Pune, Maharashtra, India. He completed his PhD degree from the Indian Institute of Technology, Indore, India, in the field of numerical linear algebra. During the PhD programme, he did a joint research project with Technische Universität Braunschweig, Germany. He is also a recipient of DAAD fellowship during his internship at TU Braunschweig, Germany.

New Research Scholars

Two research scholars joined the Ph.D. Programme in 2020-21 (Even Semester)

- Mr. Vinay Verma
- Mr. Bhuvnesh Malik

Infrastructure

A new supercomputing unit, **Nvidia DGX-1 server,** was added to the existing computing infrastructure. This has support for deep learning framework and will provide the necessary computing environment for researchers working in this domain.

New Courses offered

1. **Title:** *Topics in Approximation and Randomised Algorithms*
   Instructor: Prof. C. Pandu Rangan
   Course description: Complexity Theoretic studies on sequential deterministic algorithms have revealed lots of their limitations in arriving at an efficient solution to a number of important problems. Approximation algorithms break through these barriers by trading off exactness to efficiency. Randomised algorithms attempt to overcome the limitations of deterministic algorithms by using randomness as a powerful resource. This course aims to discuss on some of the fundamental paradigms of these advanced areas of research in algorithms.

2. **Title:** *Major Inventions of ICT: Concepts, Technologies and Applications*
   Instructor: Prof. Ravi Prakash Gorthi
   Course Description: This course aims to offer an overview of the major inventions of the Information and Communications Technologies (ICT). This course offers insights into (i) why: the motivation, the problems that these inventions attempted to address, (ii) what: the concepts and techniques. This course also discusses the impact of these inventions on the technological progress and their applications.

3. **Title:** *Big Data Analytics*
   Instructor: Prof. Vishv Malhotra
   Course Description: The course is designed for advanced and motivated undergraduate students who can self-learn an emerging technology and discipline under instructional guidance. The students will learn, train, and demonstrate applications within Apache Spark ecosystem. The learning environment will be based on teamwork. Small groups of student teams will be assigned learning tasks and will be required to select and complete group projects to support and demonstrate their levels of learning outcomes.

4. **Title:** *Introduction to Game Theory*
   Instructor: Mr. Nirmal Kumar Sivaraman
   Course Description: This course introduces the game theory to the students. The students will be able to learn the fundamental concepts of game theory. Also, they learn about different games and possible strategies. They learn how to map a real-life scenario on to an appropriate game and find the equilibrium.

5. **Title:** *Blockchain Foundation & Smart Contract*
   Instructor: Dr. Mohit Gupta
   Course Description: Blockchain is an emerging technology which provides solution to various fields. Its primary objective is to support decentralization. This course starts with the basics of consensus mechanism in a distributed system and fundamentals of distributed systems such as failure models, synchronous and asynchronous communication. It also deals with some of the famous results in distributed consensus algorithms such as FLP impossibility result and DLS consensus result. After the discussion of the basics of distributed consensus, the course discusses the basics of Bitcoin. The second part of the course has a discussion on scalability issues and solutions such as Payment Channel Network. The course also covers programming language Solidity and security issues in Solidity and Bitcoin.

6. **Title:** *Systems Engineering*
   Instructor: Dr. Animesh Chaturvedi
   Course Description: This course will introduce the fundamental concepts of systems engineering, its principles, foundations, state-of the-art, technologies, and its communities. The main focus will be on system life cycle stages: requirement, development, testing, maintenance, and evolution.

Research Publications

Journals

- Ram Prakash Sharma and Somnath Dey, "*A comparative study of handcrafted local texture descriptors for fingerprint liveness detection under real world scenarios*", *Multimedia Tools and Applications*, Springer, pp. 1-20, January 2021.
- Sivleen Kaur, Sheetal Chaturvedi, Aabha Sharma, and Jayaprakash Kar, "*A Research Survey on Applications of Consensus Protocols in Blockchain*", *Security and Communication Networks*, Hindawi, vol. 2021, January 2021.

Conferences

- Kumar Manas, Mohit Jindal, and Preety Singh, "Low Complexity Video Compression for Fixed Focus Cameras", Proceedings of the 31st Data Compression Conference (DCC), 23 – 26 March 2021, Salt Lake City, USA.
- Ravi Gorthi, "*Relevance of Vedic Wisdom to Youth Seeking Corporate Career*", *Proceedings of the International Conference on World Association for Vedic Studies (WAVES)*, 1 – 3 January 2021, Online Mode.
- Ritik Bansal, Utkarsh Khandelwal, and Saurabh Kumar, "*Collaborative Deployment Strategy for Efficient Connectivity in the Internet of Things*", *Proceedings of the 2nd International Conference on Mathematical Modeling, Computational Intelligent Techniques and Renewable Energy (MMCITRE)*, 6 – 8 February 2021, Gandhinagar, Gujarat, India.

Others

- Yash Vekaria, Vibhor Agarwal, Pushkal Agarwal, Sangeeta Mahapatra, Sakthi Balan Muthiah, Nishanth Sastry, and Nicolas Kourtellis, "*Differential Tracking Across Topical Webpages of Indian News Media*", arXiv e-prints, March 2021, Link: https://arxiv.org/abs/2103.04442.

Talks and Invited Lectures

## (A) Invited Lectures by External Experts

- The LNM Distinguished Lecture by **Dr. Sriram Rajamani** (MD, Microsoft Research India)
  Area: *Models and Programs: Better Together*
  Date: 09.01.2021

The LNM Distinguish Lecture by Dr. Sriram Rajamani
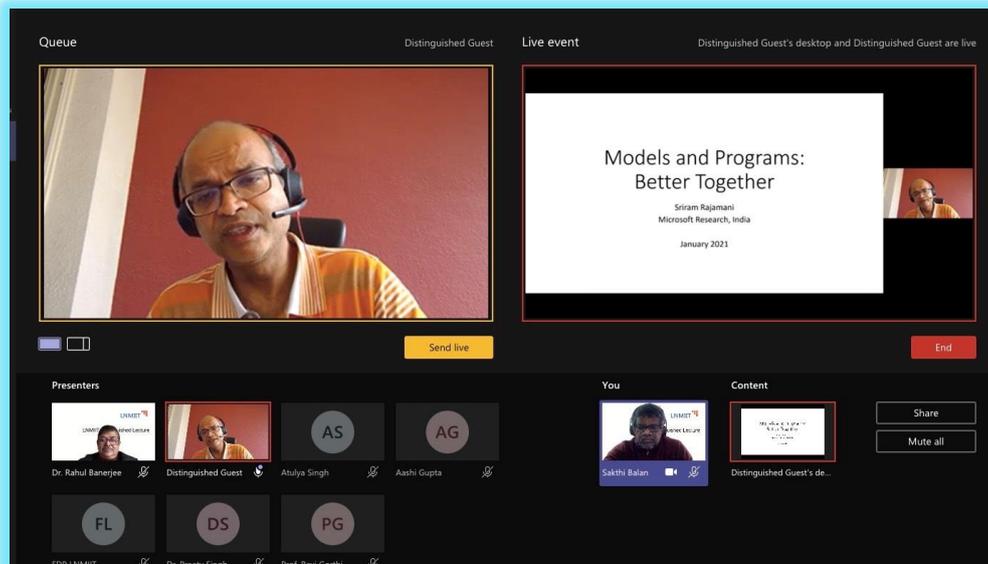
- The LNM Distinguished Lecture by **Dr. C. Mohan** (Ex-Scientist, IBM Almaden Research Center and presently a Visiting Professor, NUS)
  Area: *Artificial Intelligence (AI): Past, Present and Future*
  Date: 06.03.2021

The LNM Distinguish Lecture by Dr. C. Mohan
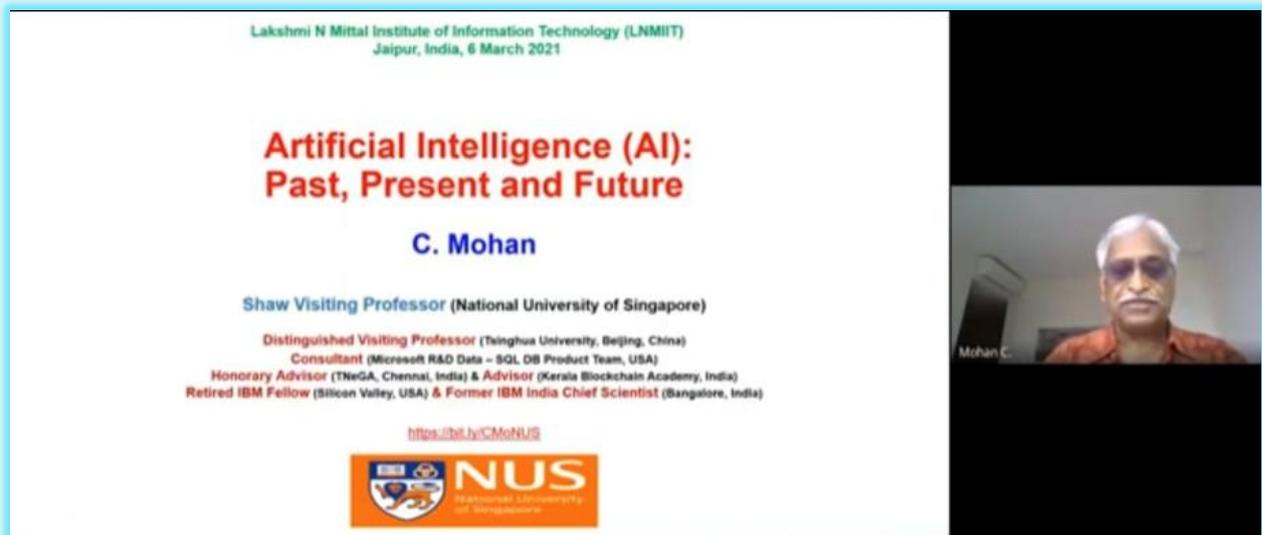
(B) Expert lectures delivered by LNMIIT Colleagues

- Expert Lecture by **Dr. Rajbir Kaur** during the *"Training Programme on IoT"*, organized by Malaviya National Institute of Technology, Jaipur, Rajasthan, India.
  Area: *Communication Technologies and Protocols for IoT Devices*
  Date: 12.02.2021

- Expert Lecture by **Prof. Rahul Banerjee** during the *"3rd International Workshop on Multimedia Applications (IWMA 2021)"*, organized by The LNM Institute of Information Technology, Jaipur, Rajasthan, India.
  Area: *Privacy and Security Challenges in Internet-based Multimedia Systems and Services*
  Date: 04.03.2021

- Expert Lecture by **Dr. Aloke Datta** during the *"3rd International Workshop on Multimedia Applications (IWMA 2021)"*, organized by The LNM Institute of Information Technology, Jaipur, Rajasthan, India.
  Area: *Hyperspectral Images and its Applications*
  Date: 06.03.2021

- Hands-on Session by **Dr. Preety Singh** during the *"3rd International Workshop on Multimedia Applications (IWMA 2021)"*, organized by The LNM Institute of Information Technology, Jaipur, Rajasthan, India.
  Area: *OpenCV for Computer Vision*
  Date: 03.03.2021

- Hands-on Session by **Dr. Rajbir Kaur** during the *"3rd International Workshop on Multimedia Applications (IWMA 2021)"*, organized by The LNM Institute of Information Technology, Jaipur, Rajasthan, India.
  Area: *Collecting and Analyzing IoT Data using ThingSpeak*
  Date: 04.03.2021

- Hands-on Session by **Dr. Saurabh Kumar** during the *"3rd International Workshop on Multimedia Applications (IWMA 2021)"*, organized by The LNM Institute of Information Technology, Jaipur, Rajasthan, India.
  Area: *IoT Emulation with Cooja (Basic and Advanced)*
  Date: 04.03.2021

Organised Conferences / Seminar /Symposium/ Workshop

### (A) 3rd International Workshop on Multimedia Applications (IWMA)

IWMA 2021 was organized by the InterMedia Research Group and Department of Computer Science & Engineering, during 2nd – 6th March 2021 in virtual mode. Convenor of the workshop was Dr. Aloke Datta and Co-convenor was Dr. Nitin Kumar. Dr. Preety Singh and Dr. Rajbir Kaur were Organizing Chairs. Dr. Ram Prakash Sharma was the Publicity Chair.

- **Level:** International **| Duration:** 5 days
- **Experts:**
  - *Prof. Amit Sheth, USC*
  - *Prof. Sung-Bae Cho, Yonsei University, South Korea*
  - *Prof. Ashish Ghosh, ISI Kolkata*
  - *Prof. Rahul Banerjee, LNMIIT Jaipur*
  - *Prof. Susmita Ghosh, Jadavpur University*
  - *Prof. Kuntal Ghosh, ISI Kolkata*
  - *Dr. Satish Kumar Singh, IIIT Allahabad*
  - *Dr. Neeta Jain, MNIT Jaipur*
  - *Dr. B. N. Subudhi, IIT Jammu*
  - *Dr. Ankit Dubey, IIT Jammu*
  - *Dr. Pramod Gaur, BITS Pilani Dubai*
  - *Dr. Aloke Datta, LNMIIT Jaipur*
  - *Dr. Preety Singh, LNMIIT Jaipur*
  - *Dr. Rajbir Kaur, LNMIIT Jaipur*
 - *Dr. Saurabh Kumar, LNMIIT Jaipur*

Highlights from IWMA – 2021
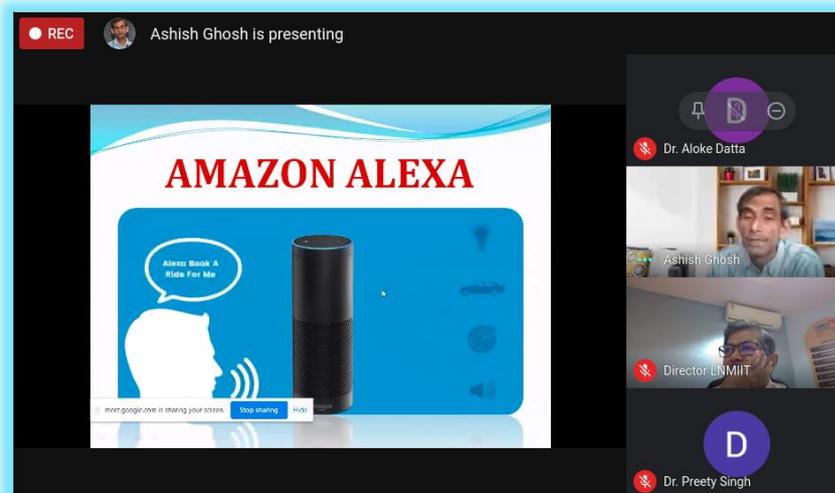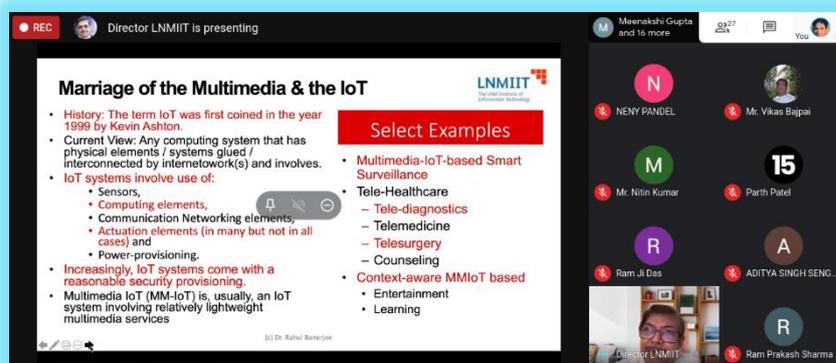
(B) Training Workshop for Nvidia DGX-1 server

A 5-day training workhop was organized by Department of Computer Science & Engineering and Center for Machine Learning and Big Data Analytics during 9th – 13th March 2021 in Virtual mode. Main organizers were Dr. Subrat Dash, Dr. Sakthi Balan Muthiah, Dr. Ram Prakash Sharma and Dr. Animesh Chaturvedi.

- o **Level:** National **| Duration:** 5 days
  Topics: Introduction to DGX, Nvidia GPU Cloud (NGC), Hands-on sessions on docker, regression, clustering, neural networks, CNN, image classification, object detection, and image segmentation.

Highlights from Nvidia training workshop
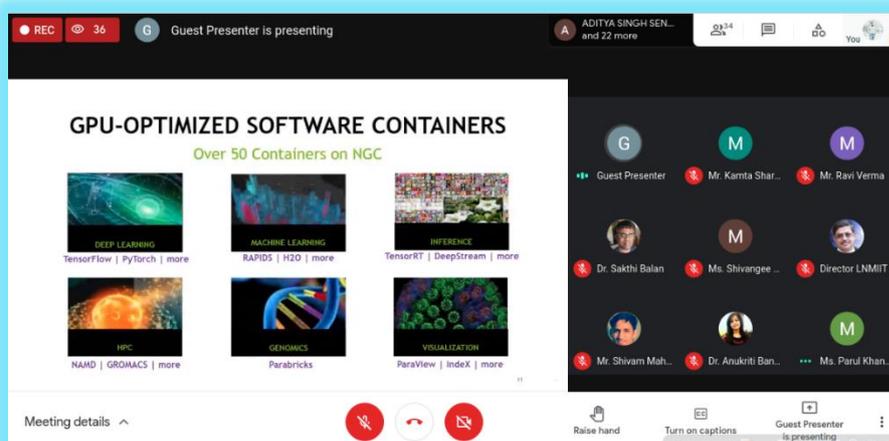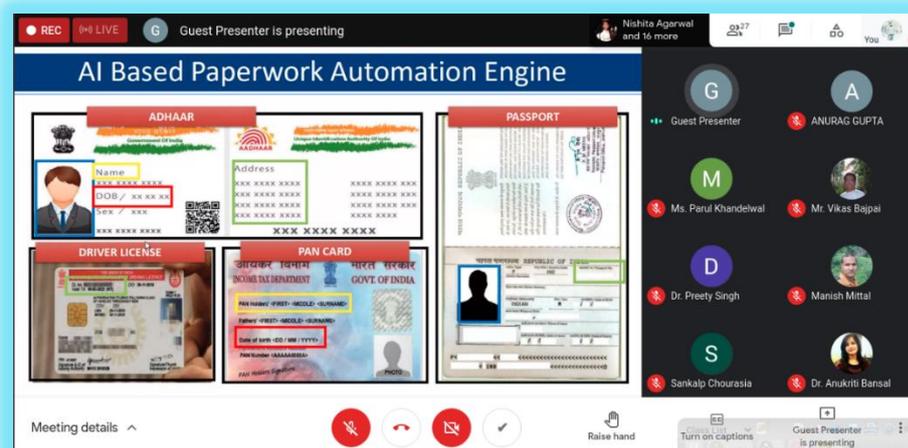
Student Achievements/Awards /Recognition

- Divyansh Singh (Y18 batch) presented and published research paper implementing a solution for garbage segregation using deep learning. Details of the publication are as follows:

  Divyansh Singh, "Polyth-Net: Classification of Polythene Bags for Garbage Segregation Using Deep Learning", Proceedings of the International Conference on Sustainable Energy and Future Electric Transportation (SEFET), 21-23 January 2021.

Featured Faculty

Name of the Faculty: *Dr. Sakthi Balan Muthiah*

Designation: Associate Professor, CSE

Achievement: Invited as a *research reviewer* for:

- International Conference on Knowledge Discovery and Data Mining (KDD) organized by ACM's Special Interest Group (SIG), Singapore, 14-18 August, 2021.
- 15th International Conference on Web and Social Media (ICWSM) organized by Association for the Advancement of Artificial Intelligence (AAAI) research group, 7-10 June, 2021.
- International Journal – Online Social Networks and Media, Elsevier Publications.

Faculty Speak:

Last one year of pandemic has led us through a lot of difficulties in our academic life. We are still in that phase and we do not know when we will be coming out of it. But to strike a positive note, let us all thank God that this pandemic, at least happened in 2020, but not 20 or even 10 years earlier. If it had happened then, we may not have had enough solutions to overcome this situation. Now, imagine, what might have been the situation faced by, especially, students, teachers and the Institute on the whole. I do not want to even think about it, it's scary! Everyone – institute, teachers, students and parents are going through a new phase in our lives. Almost every day, we are facing new challenges and new experiences. But as a human, we are adapting to the new challenges and trying our best to cope up to this new normal. Just think for a minute, when raising these questions in your mind – *what is our goal? what is our intention?* and *what we want to achieve by doing this?* Yes, *learning* it is! Whatever be the situation, the learning should not stop – academic life should move on. Learning, thereby gaining knowledge, is the

only way to move forward in this world. We owe a lot to the researchers, scientists, technologists, corporates, learning institutes and universities who have done decades of work to get vaccines (for Covid19 at record time – within one year!), and for providing us with all the necessary technological solutions so that we can learn, discuss, meet, write exams and evaluate virtually from our homes. Without their work, we will not be like what we are now in this pandemic era. So, students, my kind advice is, you may face difficulties, but these difficulties should not deviate you from the main focus, that is, learning. And also, remember the fact that success does not come overnight - means, it comes when you take smaller steps for a considerable number of times rather than taking one or two large steps at infrequent times. I am sure, we all will overcome this situation and continue our learning in this new normal world to make the world much safer, richer and peaceful.

Featured Alumni

Distinguished Alumni and Entrepreneur: **Aayush Kumar (Y-12 Batch)**

Current Organization and Profession: Founder and CEO – "OpsLyft"

Profile: He is an entrepreneur with a deep focus and passion for building software products that have a global impact. Right from the freshman year, he has been constantly engaging with organizations of all sizes and scale to learn and practice software engineering. His first job at Indix (acquired by Avalara) gave him an opportunity to solve friction between developer teams through DevOps. During the course of two and a half years of job, he successfully led and achieved milestones such as reducing AWS Costs by a million dollars annually, migrating 100+ internal and customer-facing applications from being standalone applications to a container/non-container based deployments using Kubernetes & Apache Mesos/Marathon, introducing Ansible & Terraform for Infrastructure as Code for newer projects and bringing the legacy infrastructure under them, standardized monitoring, and logging & alerting mechanisms throughout all the systems which reduced MTTR by 50% in all the production systems. Later he decided to take a leap of faith and started OpsLyft. At OpsLyft, the vision is to build a Unified DevOps Platform through a system of integrations operating through a layer of intelligence that can collectively address the use cases such as deployments, cloud cost management, incident management, value stream mapping, i.e. the mapping of the business impact of every infrastructure/code change, automation & governance, and cloud security. OpsLyft is currently working with some of India's largest companies like Inshorts, Meesho, Flipkart, Paytm, etc. It is headquartered in San Francisco and has offices in Asia.

Editor

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