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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
CMR INSTITUTE OF TECHNOLOGY**

#132, AECS LAYOUT, ITPL MAIN ROAD, KUNDALAHALLI,  
BENGALURU — 560 037, KARNATAKA, INDIA

+91 80 28524466 / 77 | <http://www.cmr.it.ac.in/>

## Vision

To be a center of excellence in computer science and engineering education producing competent professionals for a successful global career contributing to the society.



Dr. Sanjay Jain  
(Principal)



Dr. B. Narasimha Murthy  
(Vice Principal)

## Mission

- To build a faculty team with industry and academic exposure, capable of molding students into competent professionals, supported by adequate computing and software resources.
- To prepare the students for a global career in computing by enriching the curriculum with a blend of theory and practice.
- To develop industry relevant programming and soft skills through training programs, vibrant student clubs and student internships.
- To engage with industry and institutes of repute and collaborate in academics, research and development involving faculty and students.

## Editorial Note

*I thank the respective coordinators from the department for all the reports on various events conducted and The timely updates to the ERP sheet. This has greatly aided in organizing the data required for the newsletter. I thank the faculty, students, and alumni for the contribution of various technical and non-technical articles and photographs for the newsletter. My profound sense of gratitude to the department in giving me an opportunity in editing the newsletter.*



Mr. Kartheek G C R  
Assistant Professor  
Dept. of CSE

## Social Media

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[https://twitter.com/CMRIT\\_Bengaluru](https://twitter.com/CMRIT_Bengaluru)

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[https://www.youtube.com/channel/UCpi96paEf16WS-Xf0\\_xyL9Q](https://www.youtube.com/channel/UCpi96paEf16WS-Xf0_xyL9Q)

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## MESSAGE FROM HOD

Dear Stakeholders,

I hope this message finds you and your family well, and in the best of your spirits.

While the COVID-19 pandemic has threatened to bring our lives to a standstill, we have committed to doing everything to keep the learning of our students going during this time. Last one and half years been very challenging. As you are aware, during the lockdown period, we have streamlined our online learning sessions to our best in order to enable students to cope with the semester in a better manner. With all your support and cooperation we, the department of computer science and engineering at CMRIT have proved ourselves to be no less than the tech-savvy software industry. I'm looking forward to returning to the offline lessons as soon as possible.

This newsletter captures the various achievements, of both students and faculty from February to August this year. The students and the faculty have made the best use of the online platforms to organize and take part in various activities including student club events, hackathons, and industry guest lectures. I congratulate all the coordinators, winners and the participants for their admirable efforts in the various events. With cooperation from our students, faculty team, and all the stakeholders, we have been able to turn the odds into opportunities. With this, I truly believe we would be able to win the battle against the pandemic. Stay safe; Stay well!



**Dr. Shreekanth M. Prabhu**  
**HOD**

## ABOUT THE DEPARTMENT

The department of Computer Science & Engineering has been in existence from the inception of CMRIT in 2000. The department is a recognized research centre under VTU and offers doctoral programs in computer sciences.

The Department of Computer Science & Engineering is permanently affiliated to Visvesvaraya Technological University (VTU), Belgaum and is also recognized by Govt. of Karnataka and approved by AICTE, New Delhi. UG program is approved by the National Board of Accreditation (NBA), New Delhi.

The department aims to provide students with a strong foundation in Computer Science and enable them to integrate their knowledge with other disciplines for carrying out innovative discoveries.

Many of the computer science graduates from CMRIT step directly into computer related career positions in both private and government agencies, while some choose to continue their education in graduate degree programs.

# INDUSTRY CONNECT ACTIVITIES ORGANISED

**Topic:** "Practitioner's Approach to Big Data Analytics"

**Presented by:** Dr. Jasma Balasangameshwara, Dayananda Sagar University

**Date:** 16/6/2021

**Topic:** "Project Management"

**Presented by:** Mr. Noel Anand Raj, General manager, Schneider Electric

**Date:** 17/7/2021

**Topic:** "SAP"

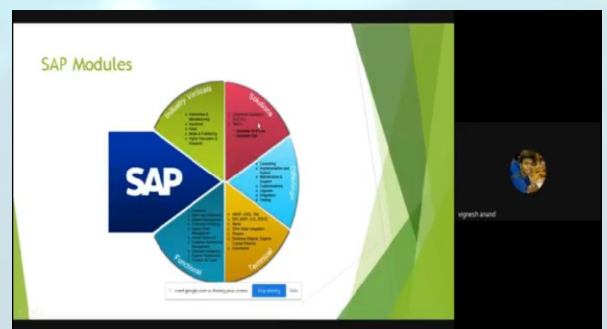
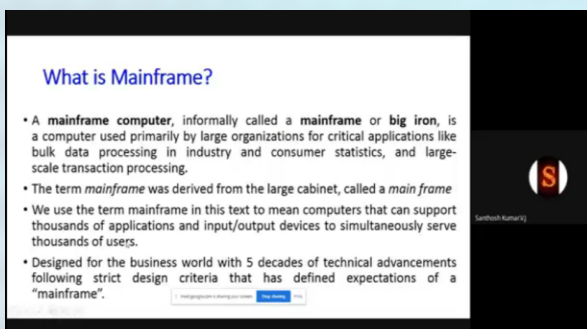
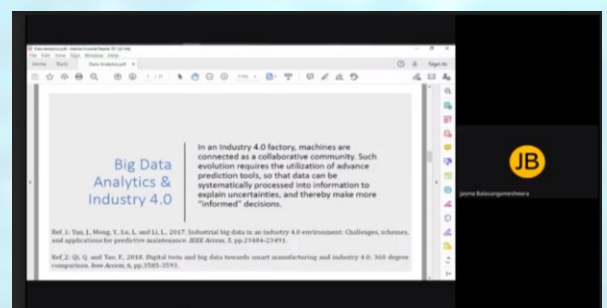
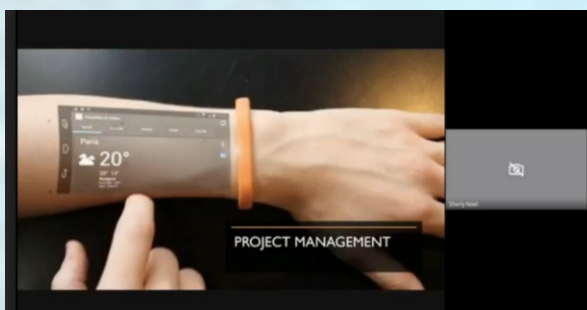
**Presented by:** Mr. Vignesh Anand, CTS

**Date:** 13/8/2021

**Topic:** "Mainframes"

**Presented by:** Mr. Santhosh Kumar V J, Maintec Technologies Pvt Ltd

**Date:** 14/8/2021





## FACULTY DEVELOPMENT PROGRAM

**Topic:** "Mobile Application Development"

**Resource Persons:** Mr. Darshan Murthy, Mrs. Anu Jose, Mrs. Priyadarshini A, Mr. Prasad B S, Mr. Shivraj B, Mr. Kartheek GCR, Mrs. Sreesevi N, Mrs. Anjali Gupta

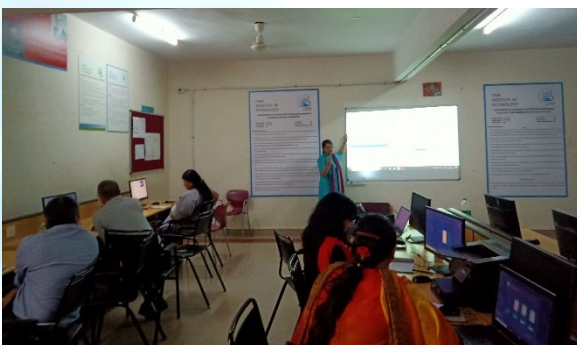
**Date:** 20-03-2021 to 26-03-2021

**Venue:** CMR Institute of Technology

**No. of audiences:** 41

### ABOUT THE FDP

The Mobile Application Development FDP was conducted with an aim to provide participants technical training on the concepts and programming methodologies needed to develop applications for mobile devices. Participants learned to use different android libraries. Instruction was aided with live programming which allowed participants to grasp concepts of the complete mobile application development life-cycle.



## FACULTY PUBLICATIONS

Dr. Paras Nath Singh, Aarthi S.	Quantum Circuits – An Application in Qiskit-Python
Dr. Paras Nath Singh	Object Detect through Region Proposal Based Techniques
	Searching String in Bigdata-A Better Approach by Applied Machine Learning
	Better Application of Bayesian Deep Learning to Diagnose Disease
	“I-Care” - Big-data Analytics for Intelligent Systems
	Speech to Indian Sign Language Translator
	Masked & Unmasked Face Recognition Using Support Vector
	Reverse Image Search Improved by Deep Learning
Poonam Tijare, Jhansi Rani P	A Survey on Event Detection and Prediction Online and Offline Models Using Social Media Platforms
	Detecting Trending Event Topics Using Sentiment Driven Derivatives Method on Twitter
	Correlation between K-means Clustering and Topic Modelling Methods on Twitter Datasets
Smitha N, Hemanth Kumar H S	A Review on Movie Recommendation System Using Machine Learning
Hemanth Kumar H S, Anil D, Smitha N	Comparison of various Machine Learning and Deep Learning Models for Emotion Recognition using Twitter
Sreedevi N	Landslide Hazard Zonation Mapping using Power Method based AHP for Saklespur, India
Vivia John	Generations of wireless networks
Dr. Manoj Challa	An Efficient Approach towards Translation of Tulu Written Letters to Kannada Character Based on Optical Character Recognition
	Fault-Tolerant Cluster Head Selection Using Game Theory Approach in Wireless Sensor Network

## FACULTY PUBLICATIONS

Sagarika Behera, Dr. Jhansi Rani P	FPGA-Based Design Architecture for fast LWE Fully Homomorphic Encryption
Dr.P.Kavitha	Road Trip Recommendation System Using User Preferences
	Optimized Node Clustering based on Received Signal Strength with Particle Ordered-filter Routing Used in VANET
	Automated Diabetic Retinopathy Detection and Classification Using Stochastic Coordinate Descent Deep Learning Architectures
	Comprehensive literature survey for deep learning approaches to agricultural applications
Sherly Noel	Hand Gesture Recognition using Double CNN and Transfer Learning.
	A Smart IoT based real-time system to Minimize Mishandled Luggage at Airports
Dr. Prem Kumar Ramesh	Towards a Unified Ontology for IoT Fabric with SDDC
	Crop Recommender System Using Machine Learning Approach
Savitha N J	Classification of Magnetic Resonance Images Using k-neighbour Algorithm
	Aspect-Based Sentiment Analysis for Tourist Reviews
	An Efficient Dynamic Key Generation Architecture for Distributed Wireless Networks
Dr. Shanthi M. B	A Hybrid Approach to Detect Image Forgery using Merkle and Region-Quad-Tree
	Location Dependent Safety Application for Women
	Touch-Free Finger Sensing using Laser Light for Keys and Keyboards
Anjali Gupta	3D Framework for Brain Tumor Segmentation Using Anisotropic Filtering
	Recruiting and Retaining Women in Undergraduate Computing Majors

## FACULTY PUBLICATIONS

Dr. Shyam P. Joy	A Job Recommendation System For Differently Abled Using Neural Networks
Savitha S	IoT And Machine Learning Based Accident Detection Systems: A Brief Survey.
	A Review on the Use of Machine Learning In IOT and Its Applications.
Rijo Jackson Tom, Vivia Mary John	Prediction of Bitcoin Price Using Bi-LSTM Network
Pratham Majumder	Fully Homomorphic Encryption based Privacy-Preserving Data Acquisition and Computation for Contact Tracing
	Run Length Distribution based Block Coding Scheme for Sustainable IoT Applications
	Dual-message Compression with Variable Null Symbol Incorporation on Constrained Optimization based Multipath and Multihop Routing in WSN
	Constrained Optimization based Energy Efficient Routing for Multipath and Multihop Propagation
Dr. Manoj Challa, D. Sudha	An Efficient Approach for Minimization of Energy and Makespan in Cloud Computing
Kiran Babu T S	Virtual Pinboard - A method for displaying information using web based augmented reality on smartphones.
	Coalition formation based cooperation strategy for routing in delay tolerant networks
Dr. Manoj Challa, Kiran babu T S	Prediction of Water Quality System for Aquaculture using Machine Learning.
Dr. Preethi Sheba	A review of IoT systems and machine learning techniques in crop yield prediction
	A Survey on the Effectiveness of Online Teaching– Learning Methods for University and College Students
Dr. Sreekanth Malladi	Applying Lowe’s “small-system” result to prove the security of UPI protocols
	Towards formal modeling and analysis of UPI protocols
Dr. Jhansirani P, Dr. Kavitha. P	Choosing the Best Set of Features for an ML Model for Software Risk Prediction Based on Model Accuracy.



## FACULTY PUBLICATIONS

D.Sudha	Energy and cost optimization mechanism for workflow scheduling in cloud.
	Energy-aware parameter tuning mechanism for workflow scheduling in the cloud environment
Dr.Jagadishwari V	Talkative Friend Algorithm for inferring ties in Social Networks
	Time series Covid 19 Predictions with Machine
	Sentiment analysis of Social Media Text-Emoticon Post with Machine learning Models
Hemanth Kumar H S	An Efficient and Robust Reliable data aggregation in WSNs
	An Empirical Comparison of Handwritten character recognition Using Machine Learning
Sagarika Behera	Monitoring the Movements of Wild Animals and Alert System using Deep Learning Algorithm
Karthek G C R	A Deep Learning Model for Face Expression Detection
	Detecting Deepfakes Using Deep Learning
Smitha N	An Efficient and Robust Reliable data aggregation in WSNs
	An Empirical Comparison of Handwritten Character Recognition Using Machine Learning
Manjula HT	An Approach To On-Stream DDos Blitz Detection Using Machine learning Algorithms
Shyamasree Ghosh	Can Quantum Computer break Block Chain Technology

## BOOK CHAPTER PUBLICATIONS

<b>Faculty</b>	<b>Chapter Title</b>	<b>Book Name</b>
Rubini PE	Study on Non-Intrusive Context Aware Transactional Framework to Derive Business Insights on Big Data	Theory and Practice of Mathematics and Computer Science
Dr. Paras Nath Singh	Deep Learning to Diagnose Disease	Blockchain Applications for Healthcare Informatics: Beyond 5G
	Data Science in Python	Data Engineering & Data Science
Sagarika Behera	Military Robots in Battlefield	Control, Automation and Smart City
Dr Shanthi M. B.	Wireless Networks of the Modern Era and Their Applications	Networking Technologies in Smart Healthcare: Innovations and Analytical Approaches
Prof. Kiran Babu TS	Data Science in Python	Data Engineering & Data Science

## PATENTS FILED

Dr. Paras Nath Singh	PROCESS OF LOW & GOOD CHOLESTEROL FOOD PRODUCT "MALPUA"
	SYSTEM AND METHOD THEREOF FOR DETECTING DATA FLOW USED IN MACHINE LEARNING MODELS FOR STOCK MARKET
	HIDE AND TARGET-A MULTIPURPOSE Z-SHAPED CATCHER
Manjula HT, Shyamasree Ghosh	A SMART LUNCH BOX FOR FOOD MONITORING SYSTEM
	A PRIVACY-PRESERVING SMART LIQUID CONTAINER WITH REMOTE MONITORING FOR SMART HOME APPLICATION
Vivia John, Rijo Jackson Tom	IOT- BASED SMART YOGA MAT FOR REAL TIME BMI DETECTION AND A SYSTEM THEREOF
	SYSTEM AND A METHOD FOR HEALTH MONITORING OF POWER SYSTEM COMPONENTS
	SYSTEMS, METHODS AND APPARATUS OF A GREETING FLOWER VASE FOR ANNIVERSARY WISHES
	SMART ENERGY MANAGEMENT IN POWER DISTRIBUTION SYSTEM
	IOT- BASED SMART PANTRY TRACKER AND A SYSTEM THEREOF
	SELF CLEANING MAT ROLL AND A SYSTEM THEREOF



# MOU

**Company Name:** Imarticus Learning.

**Collaboration:** Seminars/FDP for faculty on latest Data science technologies, Seminars and Hackathons for students in Data science

**Duration:** 24/2/2021 to 24/2/2024

**Objective:** Skill updation in Data Science and coding competitions for students.

**Company Name:** Proton expert systems and Solutions.

**Collaboration:** Student internships and Faculty Consultancy projects in Data Science domain

**Duration:** 24/2/2022 to 24/2/2022

**Objective:** Student internships and Faculty Consultancy projects in Data Science domain



**Company Name:** Cyber Diplomat LLC.

**Collaboration:** Organize workshops on next generation internet standards and provide education on cybersecurity

**Duration:** 26/7/2021 to 26/7/2026

**Objective:** Encourage research in the field of cyber security and Establish a Center of excellence in cybersecurity at CMRIT.



## TECH TALKS

Savitha S	Sequence Alignment in bioinformatics
Dr. Shyam P Joy	Analysis of key agreement protocols with respect to partial forward secrecy
Dr. Manoj Challa	"Cyber Security" which covers Cyberthreat evolution, Cyberattacks, Darkweb, and towards 2025 - smart security solutions.
Dr. Jagadishwari P	Link Prediction in Social Networks and LCF Algorithm for Link Prediction Dynamic Social Networks
Vivia John	Introduction to quantum computing and its applications
Manjula HT	Apache spark use-cases and applications
Savitha N J	Edge Computing and its Applications
Shyamasree Ghosh	Can Quantum computing break Bitcoin?
D.Sudha	Deep Learning for Deep Fakes
Rubini PE	Ensemble Learning Techniques
Poonam Tijare	Topic modelling techniques
Dr. P N Singh	Quantum Circuits & Quantum Computing in Python and accessing IBM'S Quantum Computer
Dr. Prem Kumar Ramesh	Recent Research Trends in Computer Architecture
Dr. Kavitha P	Deep Learning and its Applications

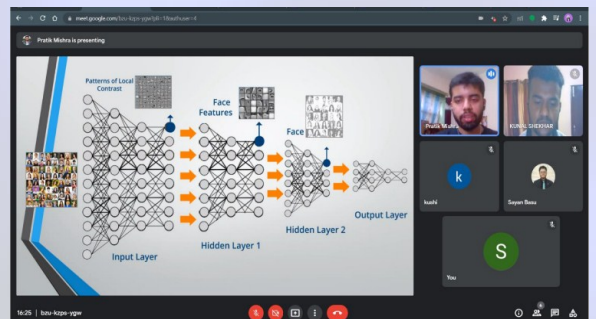
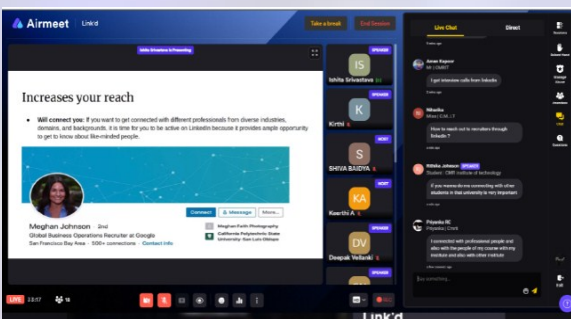
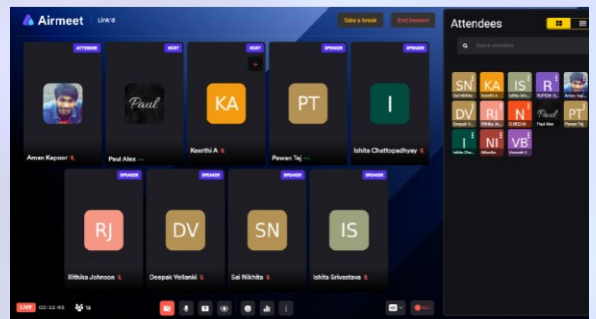
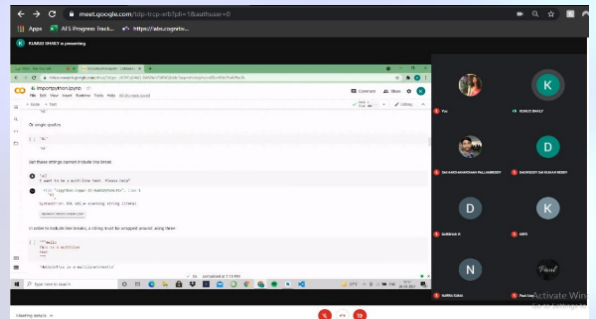
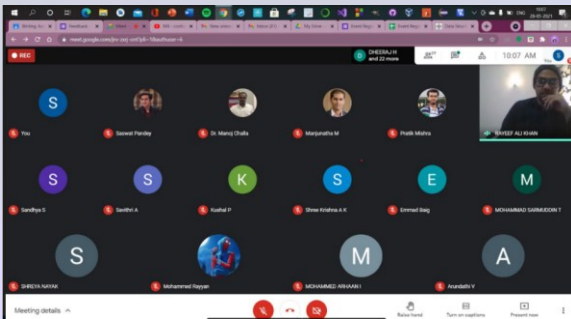
## CLUB ACTIVITIES

Club Name	Event Title	Date	# of Participants
<b>MINDSPARK</b>	Py Coding Competition in HackerRank	28.04.21	9
	Mind Pictography	12.05.21	16
	Networking Crossword	02.06.21	25
	Quiz on Data science	16.06.21	12
<b>ACE</b>	Link'd	05.05.21	16
	import Python	26.05.21	8
	Technical Pictionary	09.06.21	14
	CODERUN	01.07.21	10
<b>CYBERNAUTS</b>	TECH-BATE - The Technical Debate	01.06.21 to 05.05.21	28
	HACK-IT-ON	28.05.21	14
	Intellinauts - AN OPENCV WORKSHOP	30.06.21	25
	HACKOVERFLOW - Intercollege hackathon	14.07.21 to 15.07.21	45
<b>HACKEREARTH</b>	Code Fiesta	05.05.21	13
	Crack the code	26.05.21	50
	Apticode	16.06.21	34
	Code Run Time Alert	08.07.21	15



# CLUB ACTIVITIES

Club Name	Event Title	Date	# of Participants
<b>MOZIETY</b>	Debug that code	26.05.21	20
	Web Apps with Django	17.06.21	15
	Get set code v2.0	08.07.21	20
	React JS	28.07.21	10



## FACULTY AWARDS & ACHIEVEMENTS

NAME	Award / Event	AWARDED BY	DATE
Dr. Paras Nath Singh	Maulan Abul Kalam Azad Excellence Award of Education 2020	Chairman, AICTE, organized by ShikshakKalyan	28.02.21
	AICTE-SLAP	AICTE	11.03.21
	Appreciation of precious contribution in SLA project	AICTE	07.04.21
	Nominated as Reviewer of AICTE SLAP	AICTE	11.05.21
	Best paper Award	ICIIC-2021	07.08.21
Pratham Majumder	TPC member and reviewer	ICDSA 2021, Jadavpur University	11.04.21
Vivia Mary John	Star Performer	CSE, CMRIT	15.04.21
Hemanth Kumar H S	Star Performer	CSE, CMRIT	15.04.21
Dr. Shanthi M. B.	Innovation Ambassador Training	Ministry of Education (MoE)	31.07.21
Dr. Kavitha	Received Appreciation Letter for Risk index project	Eurofins Pvt.Ltd,Bengaluru	22.07.21
Poonam Tijare	Presented a paper in "International Division, IRF Conference"	International Research Forum for Engineers and Researchers (IRF)	25.07.21
Sagarika Behera	231 st Place in ICPC Asia Gwalior-Pune Regional Contest	ICPC Foundation	18.08.21
	310th Place in ICPC Asia Gwalior-Pune Regional Contest	ICPC Foundation	18.08.21
Dr.Kavitha P	Presented a project in 5th National Level IEEE Project Competition-2021	GSSSIETW in association with IEEE Bangalore Section and IEEE Mysore Subsection	26.06.21
Preethi S H	Presented a paper in ACM/CSI/IEEECS Research and Industry Symposium	IIIT Kottayam, ACM,CSI, IEEECS	03.05.21

## STUDENT AWARDS & ACHIEVEMENTS

<b>NAME</b>	<b>Award / Event</b>	<b>AWARDED BY</b>	<b>DATE</b>
Suma N G (1CR18SCS04)	VTU Gold Medal	VTU	30.03.21
Abhishek Singh (Student)	Serve_to_Save	servetosave organisation Gaya, Bihar	3.05.21
Pratik Mukesh Baruka (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
Vaishnavi Patil (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
Yashwanth Jain (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
Arpan Abhishek (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
S Swetha Shree (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
C K Amrutha (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
Rahul S Mahendrakar (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
Zain Ahmed (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
Abhishek Datta (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
Rithika F Johnson (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
Rashmi M (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21
Rishita Raha (Student)	Shortlisted for Business plan presentation in MANTHAN-2021	FKCCI- KARNATAKA	30.07.21



## STUDENT AWARDS & ACHIEVEMENTS

<b>NAME</b>	<b>Award / Event</b>	<b>AWARDED BY</b>	<b>DATE</b>
Rucha Patani (Student)	Presented a paper in "International Division, IRF Conference"	International Research Forum for Engineers and Researchers (IRF)	25.07.21
Navya R (Student)			
Saiprasad Revankar (Student)			
Sarvesh Nadiger (Student)			
Alajangi Niharika (Student)	231 st Place in ICPC Asia Gwalior-Pune Regional Contest	ICPC Foundation	18.08.21
Aman Kapoor (Student)			
Ankit Yadav (student)			
Akhil Anand (Student)	310th Place in ICPC Asia Gwalior-Pune Regional Contest	ICPC Foundation	18.08.21
Diya Jain (Student)			
Harsh Dhiman (Student)			
Sakshi Raina (1CR19CS145)	Presented a project in 5th National Level IEEE Project Competition-2021	GSSSIETW in association with IEEE Bangalore Section and IEEE Mysore Subsection	26.06.21
Rajneesh Khare (Student)			
Nitin Zachariah (1CR16CS107)	Presented a paper in ACM/CSI/IEEECS Research and Industry Symposium	IIIT Kottayam, ACM,CSI, IEEECS	03.05.21
Chaitra Ankesh (1CR16CS037)			
Aliva Mohanty (1CR18CS400)			
Bhuvaneshwari R D (1CR18CS401)			

# AWARDS & ACHIEVEMENTS



## PLACEMENTS

Company	Student Name	Package
Ellucian	Sumathi M	7.06LPA
	Anusha D	
	Chaithanya C	
	Hithesh Kumar C M	
PLANETSPARK	Harshith S Reddy	6.5 LPA
Thomson Reuters	Prateek Kumar Singh	6.04 LPA
	Mamtha M V	
	Aparna Adiga G	
	Shreya R	
Novozymes	Rageshwari	6LPA
	Harshini P	
	Sai Krishna Teja	
PwC	Aditya A V	6LPA
	Mohammad Abdussamad	
	Sheikh Junaid	
	Rachana V	
	Varshitha R	
Impelsys	Aaditya Ranjan	5.5LPA
	Sarvesh Nadiger	
	Abhishek S	
	Sajal Singh	
	Chaithanya C	



## PLACEMENTS

<b>Company</b>	<b>Student Name</b>	<b>Package</b>
Sprinklr	Rahul Raj Dev Sahoo	5LPA
	Neeraj Kumar	
	Saiprasad Revankar	
Deltax	Neeraj Kumar	5LPA
Logituit	Neha Shivakumar	5LPA
	Rishu Anand	
FIS Global	Nithin Kumar M	5LPA
	S Raghav Tejas	
Meltronics	Sampada .	4LPA
MyCaptain	Vishnu R Kumar	3.5 LPA
ITOrizon	Surbhi Choudhary	3LPA
Infosys	Vismaya R	3.6 LPA
	Dyamanagouda Patil	
Codilar Technologies	Chaitra Ankesh	2.52LPA
Entune	Vamshika A S	2.5LPA

## FACULTY SERVED AS RESOURCE

<b>NAME</b>	<b>Served As</b>	<b>Event name / Venue</b>
Dr. Rijo Jackson Tom	Journal Reviewer	Complex & Intelligent Systems, Springer Journal
Dr. Jagadishwari	Journal Reviewer	2nd International conference on Data Mining and Software Engineering
Dr. Paras Nath Singh	Journal Reviewer	<ul style="list-style-type: none"> <li>• Springer Nature (Computer Science)</li> <li>• IEEE International Conference- MysuruCon-2021</li> <li>• IIEEE CONECCT 2021, Bangalore chapter</li> <li>• IEEE ICMNWC 2021</li> <li>• IEEE ICEECCOT 2021</li> </ul>
	Resource Person,	Python Programming Training for Placement, CMRU, Bangalore
	Resource Person	29th NCSC workshop
	Resource Person	Webinar on "Emerging Trends of Software Engineering", IIBM, Patna, and CSI
	RAC member	CMRU
	Question setter/BOS	SREC, Warangal (Autonomous)
	External DCS	VTU Examination
Dr. Manoj Challa	SPOC	March for secure code program
Dr.Kavitha.P	Resource Person	Online webinar, Vemana Institute of Technology
	Question setter/BOS	SREC, Warrangal Telangana
	Resource Person	Hackathon -2021,CMRIT
Kartheek GCR, Shivaraj VB, Anjali Gupta	Resource Person	Mobile Application Development FDP, CMRIT
Sherly Noel	Resource Person	Full stack development FDP, CMRIT
Dr. Jhansi Rani	External DCS	VTU Examination
Kartheek G C R	Resource Person	Guest Lecture, C Byregowda Institute of Technology

## ARTICLES / PAPERS

### **Data Science in Strange and Hilarious Ways**

Yes, I'm talking about embracing (rather than embarrassing) the strange and entertaining aspects of data science. When you combine the world's most advanced face-generating AI (Artificial Intelligence) with a user-friendly website, you get faces of individuals that don't exist at all.

What is the computer vision notion that this model is based on? It's called Generative Adversarial Networks (GANs). I never expected to see something like this — a machine learning algorithm creating clothing that is far superior to that of designers. When asked to compare an AI-designed dress to a human-designed one, people's reactions were epic.

In August of last year, a Game of Thrones enthusiast used Recurrent Neural Networks (RNN) to write five AI-generated chapters. What is the computer vision notion that this model is based on? It's called Generative Adversarial Networks (GANs). The GANs training phase is divided into two sections that function in tandem:

Stage 1: Train discriminator and freeze generator (freezing implies setting preparing as bogus. The organization does just advance pass and no back-engendering is applied.

Stage 2: Train generator and freeze discriminator: An information science model will guess what I might be thinking as I awaken and prepare my garments as indicated by my disposition.

Commonly, Computer Vision methods that apply on pattern recognition are utilized to discover outwardly comparable garments yet their methodology was somewhat unique.

The Hollywood Reporter and Microsoft collaborated to foresee who might bring home an Oscar at the 2019 Academy Awards through an online forecast survey called Awards Predictor (fueled by Microsoft AI). You may believe it's odd however indeed AI had a great 94 percent score in anticipating last year's Oscars, for the third year straight.

You will be excited to realize that AI with Machine Learning & data Science (including big data) beat industry specialists in strange and hilarious ways.



Dr. Paras Nath Singh  
Professor(CSE), CMRIT, Bangalore  
President, ICT-CS, Indian Science  
Congress 2021



## ARTICLES / PAPERS

### **Data Science Use Cases in Health Care**

Medicine and healthcare is a revolutionary and promising industry for implementing the data science solutions. Data analytics is moving the medical science to a whole new level, from computerizing medical records to drug discovery and genetic disease exploration.

Healthcare and data science are often linked through finances as the industry attempts to reduce its expenses with the help of large amounts of data. Data science and medicine are rapidly developing, and it is important that they advance together. There are different use cases of data science with the highest impact and the most significant potential for future development in medicine and healthcare.

The healthcare sector receives great benefits from the data science application in medical imaging. There is a lot of research in this area, and one of the major studies is Big Data Analytics in Healthcare, published in BioMed Research International. According to the study, popular imaging techniques include magnetic resonance imaging (MRI), X-ray, computed tomography, mammography, and so on. Numerous methods are used to tackle the difference in modality, resolution, and dimension of these images. Many more are being developed to improve the image quality, extract data from images more efficiently, and provide the most accurate interpretation. The deep-learning based algorithms increase the diagnostic accuracy by learning from the previous examples and then suggest better treatment solutions. The most popular image-processing techniques focus on enhancement, segmentation, and denoising that allows deep analysis of organ anatomy, and detection of diverse disease conditions. The most promising applications aim to detect tumors, artery stenosis, organ delineation, etc. Different methods and frameworks contribute to medical imaging in various aspects. Hadoop, a popular analytical framework, employs MapReduce to find the optimal parameters for tasks like lung texture classification. It applies machine learning methods, support vector machines (SVM), content-based medical image indexing, and wavelet analysis for solid texture classification. The data science solutions reshape the medicine industry, uncover new insights, and turn brave ideas into reality. The possibilities for integrating data science and healthcare are expanding as the amount of data is growing faster each day, and the technologies are constantly improving.

I covered only a small part of the possible use cases, Many general use cases, like fraud detection and robotization, apply to healthcare, while some specific cases are inherent only to the industry. To conclude, the potential for data science to revolutionize the modern medicine is enormous, and the future looks bright and promising.



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## Stable Matching: Marriage Problems (Gale-Shapley Algorithm, 1962) - Relevance in Current Job Perspectives

Today's organizations are increasingly reconfiguring their behavior toward employees, and are providing ample opportunities to assist their individual growth by addressing skill gaps and helping them develop skillsets that promote company growth. However, the major barrier to uplifting organizational growth centers around improper employee positioning. Ad-hoc task assignment severely underutilizes employees' potential, and can result in reduced efficiency due to absenteeism, job dissatisfaction, and destruction of corporate relations. Therefore, correct positioning of employees in the appropriate domain is crucial to the overall growth of an organization.

The theory of matching plays a significant role in fair and stable job assignment. Research shows Employment by Lotto (Aldershof et al.) and Random Order Mechanism (Jinpeng et al.) models refuted the matching instability hypothesis for random ordering proposed by Knuth. The Marriage model was coined by David Gale and Lloyd Shapley, who published their path breaking article "College Admissions and the Stability of Marriage" in American Mathematical Monthly, 1962. It features a two-sided, one-to-one bipartite graph matching that can be categorically exploited to solve task positioning problem. The outcome of the marriage problem in this context will be the stable matched pair between the employee and the task.

A marriage problem is a triple  $\langle E, T, \succeq \rangle$ , where  $E, T$  are the two finite and disjoint sets "Employee":  $E = \{e_1, \dots, e_n\}$  and "Task":  $T = \{t_1, \dots, t_n\}$  of  $|E| = |T| = n$ , respectively, and  $\succeq = (\succeq_e)_{e \in E}$  describes preference relationship between employee  $e$  and task  $T$ . The matching function ( $\mu$ ) will follow the following algorithm 1.

As an example, consider five employees  $E = \{Oliver, Emma, William, James, Eva\}$  working in an organization having five tasks  $T = \{Accountant(Ac), Programmer(Pr), Analyst(An), Scientist(Sc), Manager(Mg)\}$ . The iterations to produce stable positioning (i.e., Emp-Task pair) are presented in the below tables.

Recent surveys reveal that the current functioning of job market is entirely based on Gale-Shapley algorithm. Ideally, this algorithm provides optimal solution for stable positioning between employees and tasks with runtime complexity of  $O(n^2)$ .

### Algorithm 1 Stable Emp-Task Matching

```

Input:  $(e, t) \in E \times T, \succeq = (\succeq_e)_{e \in E}$ 
Output:  $\mu : E \cup T \rightarrow T \cup E$ 
Initialize  $\forall e \in E, t \in T$  to free to make the matching pair ;
while  $\mu\{e\} \notin T \wedge \mu\{t\} \notin E$  do
    if  $\exists (\succeq_e)_{e \in E}$  then
         $\mu\{e, t\} \in E \times T$  ;
    if matching pair:  $\mu(e', t) \in E \times T$  already exists then
        if  $e \succeq_e e'$  then
             $\mu\{(e', t) \rightarrow (e, t)\} \in E \times T$  (Blocked by Individual);
        else
            remain matching pair:  $\mu(e', t) \in E \times T$ ;

```

Table 1: Employee Preference List

Employees	Tasks				
	Sc	Pr	An	Ac	Mg
Oliver	Sc	Pr	An	Ac	Mg
Emma	Mg	An	Pr	Ac	Sc
William	Pr	Mg	Ac	Sc	An
James	Mg	Pr	Sc	An	Ac
Eva	Sc	Ac	Pr	An	Mg

Table 2: Task Preference List

Tasks	Employees				
	Ac	James	Emma	Eva	William
Ac	James	Emma	Eva	William	Oliver
Pr	Emma	Oliver	James	William	Eva
An	Oliver	William	Eva	James	Emma
Sc	James	Oliver	William	Emma	Eva
Mg	Emma	Eva	Oliver	William	James

Table 3: Iteration - 1 (Preference List Based Matching)

Employees	Tasks				
	Sc	Pr	An	Ac	Mg
Oliver	Sc	Pr	An	Ac	Mg
Emma	Mg	An	Pr	Ac	Sc
William	Pr	Mg	Ac	Sc	An
James	Mg	Pr	Sc	An	Ac
Eva	Sc	Ac	Pr	An	Mg

Table 4: Iteration - 2 (Blocked by Individual)

Employees	Tasks				
	Sc	Pr	An	Ac	Mg
Oliver	Sc	Pr	An	Ac	Mg
Emma	Mg	An	Pr	Ac	Sc
William	Pr	Mg	Ac	Sc	An
James	Mg	Pr	Sc	An	Ac
Eva	Sc	Ac	Pr	An	Mg

Table 5: Iteration - 3 (Final Stable Matched Pair)

Employees	Tasks				
	Sc	Pr	An	Ac	Mg
Oliver	Sc	Pr	An	Ac	Mg
Emma	Mg	An	Pr	Ac	Sc
William	Pr	Mg	Ac	Sc	An
James	Mg	Pr	Sc	An	Ac
Eva	Sc	Ac	Pr	An	Mg



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