TECHPULSE

"Every Ending has a New Beginning"

Passing on the torch

fr.CRCE
FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING

2022 ISSUE 4
OFFICIAL INFO. TECH.
AI&DS DEPARTMENT NEWSLETTER

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TECHPULSE

VISION

To mould high-quality, innovative, and ethical AI engineers to become part of the global workforce and contribute to the betterment of society.

PROGRAM SPECIFIC OUTCOMES

The graduates of BE in Artificial Intelligence & Data Science program will have strong foundation and ability to use cutting-edge AI tools and techniques to innovate and develop new solutions

EDITORIAL TEAM

- Faculty In-charge
  Prof. Garima Tripathi
- Student In-charge
  Mareena Fernandes, BE IT

PROGRAM EDUCATIONAL OBJECTIVE

- Innovate, create, analyze, design, implement and test AI-based solutions to solve real-world business problems.
- Adapt to changing AI-DS technology and use it in a multidisciplinary context.
- Develop and demonstrate leadership and interpersonal skills in their chosen field.

MISSION

- Provide students with a skill-based education that will help them master problem-solving and analytical skills, as well as expand their domain expertise
- Promote continuous learning and research in the core and emerging areas of AI and Data science.
- Facilitate an excellent scholastic environment for students and faculty by developing center of excellence in advanced technology

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FOREWORD FROM

H. O. D

DR. JAGRUTI SAVE

Dear all,
Welcome to the fourth edition of our department newsletter, which highlights our teachers' and students' various activities and achievements. As the head of the department, I'd want to offer my gratitude to the BEIT graduating batch and the AI&DS junior batches through this newsletter.

Greetings, B.E. IT students!
I would like to congratulate you, everyone, on completing four years of engineering studies! For a variety of reasons, your batch holds a special place in our hearts. Due to the unavoidable pandemic, your class spent the most time in an online college. Despite all of the obstacles, you all performed admirably. What's more impressive is that, after college started in the offline mode, you were able to form bonds with teachers and fellow students in a rather short period of time. Due to all your dedication towards the department in all spheres, be it academics or extracurricular activities, our department won three major trophies at the Euphoria Annual event. These trophies are especially meaningful to the department because they are the last batch of CRCE IT prizes, and I am grateful for them. Finally, I'd want to state that we had a wonderful time together. Good-byes are always difficult, but I would like to wholeheartedly bid my adieu to the class of CRCE BE IT 2022. I'd want to express my gratitude to each of you for enriching our lives and providing us with unforgettable memories.
All the best for your future endeavor.

Greetings, AI&DS students, I welcome you all to CRCE.
I am sure you came into this branch with specific aims and desires in mind. I would advise all of you to keep focusing on your aspirations and never give up. I hope that the college and our department will act as the wind beneath your wings. I also appreciate your enthusiasm in participating in all the events at the college level. Your dance performance at Euphoria was just outstanding. As the inaugural class of AI&DS, I have high hopes for you, and I am confident that you will exceed my expectations by excelling in all verticals. I wish you all the best of luck.

CONDOLENCE MESSAGE

MIRANSH PARIKH
S.E. AI&DS

It is with great sadness that we share the sad news of the death of our student, Miransh Parikh.

We at Fr. CRCE and the Department of I.T and AI&DS would like to convey our deepest condolences to the family and friends. May God Bless peace to the departed soul and courage to the bereaved family to bear the irreplaceable loss.

Our thoughts and prayers will always be with the family.
Rest in Peace.

ATHARVARAUT

BATCH OF 2019

When I was asked to write about my experience at FRCRCE, it sent me on a trip down the boulevard of bitter-sweet memories. Right from taking bus #211 to the college on the first day to biding our goodbyes at the convocation, it was a delightful journey.

Even though 3 long years have passed since I have left the institution, its memories are still fresh. I still clearly remember my first day at the college, amongst a pool of super-enthusiastic kids (only one year shy from being adults :D) starting their 4 years long journey, curious to uncover what lies ahead. Where each student dreamt of having a meal at the majestic Taj overlooking the college one day. CRCE from down the hill always looked to me like how Hogwarts used to look from Hogsmeade. I would never have imagined that a view of a blackboard with a direct view of the waterfront would be such a great combination.

Being a tech enthusiast, I did not ever fall short of challenges at CRCE. Be it our final year projects where we were asked to stretch our imagination long and wide. Or be it events like Hackathons and tech-fests which were wholeheartedly supported by all the teaching and non-teaching staff. And in case we wanted a momentary escape from the academics, the councils had our back. Ranging from technology and innovation to giving back to society, there were councils serving all interests.

In any endeavor, some factors are in our control and some are not. And our success in such endeavors largely depends on how we handle the outcomes of factors not in our control. As Louis Pasteur rightly said, “Fortune favors the prepared mind”, CRCE taught us to handle the outcomes of such factors with the right attitude. Whether it be the very first university exam or the very last project evaluation, the ethics, the discipline, the perseverance and the righteousness that CRCE instilled within us is a gift of a lifetime.

I am grateful to CRCE to give me an opportunity to try out different things and help me find what my real interest lies in and later kickstart my career in the pursuit of the same. It is due to this institution, that a meal at Taj doesn’t seem far-fetched anymore.

PUJASHARMA

BATCH OF 2020

I remember when I was entering my first day, I was extremely excited but at the same time extremely nervous. Being a direct second year student, things were obviously not usual for me, like others. It took time for me to get that acceptance but IT being the coolest and the youngest department of CRCE never failed to encourage and support me. “Batch of 2020”, yes that’s how we are addressed now. Not to forget the first ever batch to bag all the Euphoria trophy and bring it “Home- IT”. We gave our final exams online, had a virtual farewell without that #oneLastTime. Maybe, because our batch was one of its kind who made history in the chapter of IT by winning hearts.

I owe a lot to this department, a s it helped me in my journey from being a young and a naïve girl to an aspiring and an inspiring woman. If you are in CRCE, you are already a lucky one but if you are in IT it’s nothing less than a cherry on a cake. It’s an ocean of opportunities and supportive professors who will always help you to grab that opportunity, you should better make most of it.

To all the “Women in tech”, never let anyone assume that you are not enough for this technological world because trust me you are. Take a leap of faith because it’s always bigger and stronger than your fear of coding. I am one of those who went through it, so speaking straight out of my experience.

Reflecting on the whole experience now, I would encourage incoming students to recognize that like anything in life, you'll face both ups and downs throughout your Engineering experience. The important thing to remember is to always try your best and not let the instances where you may have fallen short hold you back from continuing to work hard and reach your full potential.

If y’all made it till here reading this, on that note,
“From viva to Industrial visits, from break up to new relationships, from java to python, each moment you are creating memories. Engineering days are not going to come back, live it to the fullest. Take that experience which you can share for the rest of your life”

HALL OF FAME

MS. MAREENA FERNANDES

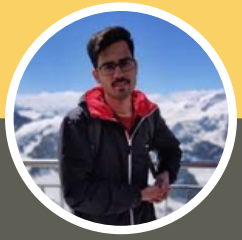
B.E. All Rounder 2022
(Female Category)

MR. DHANANJAY SHETTIGAR

Job offer-JP Morgan with CTC 12LPA

MS. SALONI KHANNA

Sports' Person 2022
(Female Category)



MR. KARAN SHAH

Job offer-HackerRank with CTC 22LPA

MR. HRITIK KOTHARI

Job offer-HackerRank with CTC 22LPA

MR. VARAD PATIL

Job offer-HackerRank with CTC 22LPA

MR. VARAD PATIL

PPO offer-Amazon Berlin with CTC €40.8KPA

MR. DHANANJAY SHETTIGAR

PPO offer-Amazon Berlin with CTC €40.8KPA

MR. HRITIK KOTHARI

PPO offer-Amazon Berlin with CTC €40.8KPA

MR. GANESHPRASAD KENI

MR. HERON VAS

Secured AIR 2 - eYantra Innovation Challenge by IIT Bombay

MR. GAURAV SHETTY
MR. PARVA JUTHANI
MR. VRAJ SHAH

Applied for Patent, which is under Scrutiny

MR. PRATHAM KAMBLI

Fr. CRCE Idea competition Qualified Semi-Finals

MR. YASH GURAV

2nd Place- 33rd senior Kyorugi and 9th Poomsae Taekwondo championship 21-22

fr.CRCE
FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING

B.E. IT

S.E. AI&DS

DEPARTMENT

EVENTS

CONVOCATION OF BATCH 2021

ConGRADulations Batch of 2021!!!
We couldn't be more proud of you.

The Convocation of the Information Technology Engineering batch of 2021 was held on 17th March 2022. It was a wonderful day with the content faces of graduates as well as their family and friends.

A total strength of 69 graduates from I.T. were present for the convocation.

DEPARTMENT

EVENTS

CHATBOT DESIGNING WORKSHOP

Date: 27-28th August, 2021 | Platform: Zoom

Student Development Program (SDP) Fr. CRCE. organized a workshop on "Chat-bot Designing" on 27-28th August 2021. The objective of the event was to help the students understand the basics of chat-bot designing and clear their doubts regarding the same hence encouraging them to build their own chat-bot.

A total of 160+ students of SE from the Computer and AI&DS branches attended the session. The mode of session delivery was Zoom.

DAY:1

The session started with Mr. Deepak Bhoir faculty of Fr. CRCE explaining to the students the importance to adapt the upcoming advancements in the field of computers. Later the session was continued by our speaker for the day Mr. Yameen Ajani.

The first half session for day-1 was covered by the speaker for the day, Mr. Yameen Ajani who was Technical Secretary of STUCO for the year 2020-21. He has helped conduct various technical events for the students of CRCE. Major events conducted by him were Crescendo and Synergy. Currently, he is helping by working as a chat-box developer for CRCE.

He initiated the workshop by taking into consideration what prior knowledge the students possessed regarding the chat-bot designing. According he proceeded with the session starting with covering the basics. The importance of chat bots' in our upcoming future along with it's use and accessibility was emphasized. The speaker used various fun illustrations to make the session more easier to understand.

DEPARTMENT

EVENTS

Google Dialogflow platform was used for the making of the chatbot. Dialogflow makes it easy to design and integrate conversational user interfaces hence students found it easy to grasp.

The speaker taught us how to add basic training phrases, and commands depending on the purpose of our bot thus making us familiar with how to train the bot.

The second half session for day-1 was covered by Ms. Sachi Verma, who is the current Technical Secretary of STUCO for the year 2021-22. Ms. Sachi continued the workshop by covering the topics on how to add reference links to our bot and a few more.

Day-1 ended on a happy note with students having satisfactory responses along with basic knowledge of bot building.

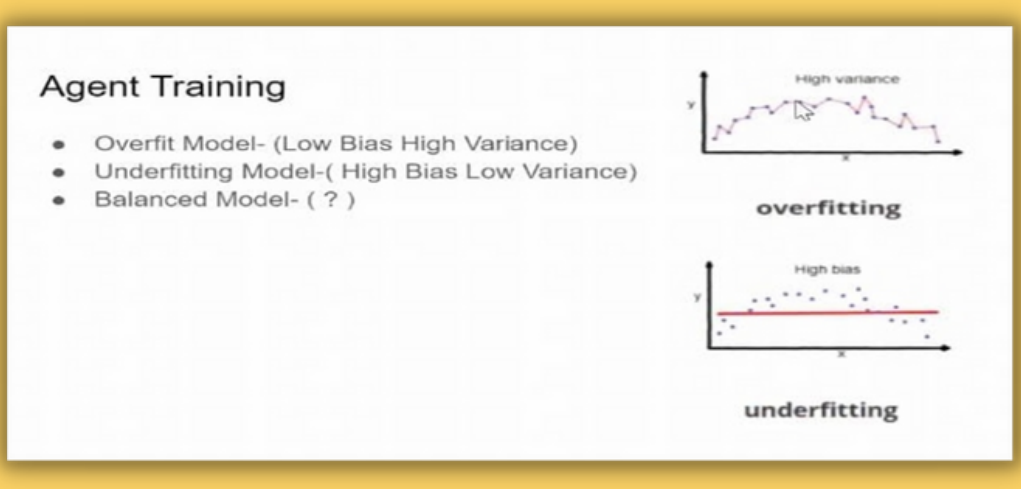
DEPARTMENT

EVENTS

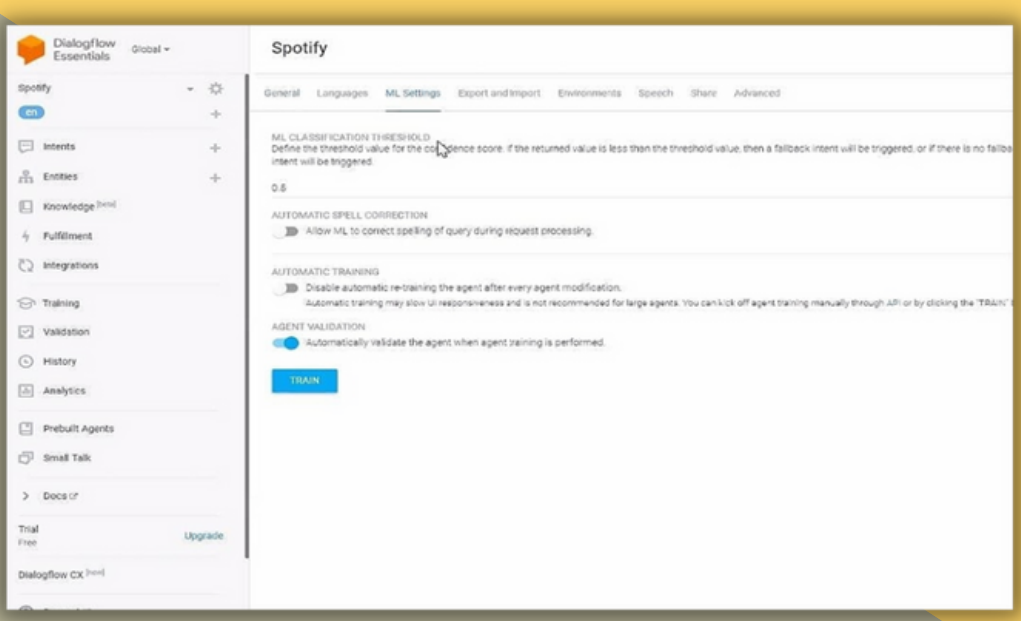
DAY: 2

The second day of the workshop started with having speaker, Mr. Noel Jaymon. He has developed various chatbots which are currently used on platforms such as Google Assistant, Telegram, and many more. Mr. Noel is currently working as a Conventional Bot Engineer at Quantiphi.

He initiated the session by taking a recap of what was done in the previous day's session. Later he explained the theory behind chat-bot making in detail. The speaker had prepared various charts, graphs, etc which made it simpler to learn and understand the concepts covered.



The session was continued by covering the steps required to link a particular bot to any apps. Backend programming to form a chat bot was taught with the help of VS code and Node JS.



DEPARTMENT

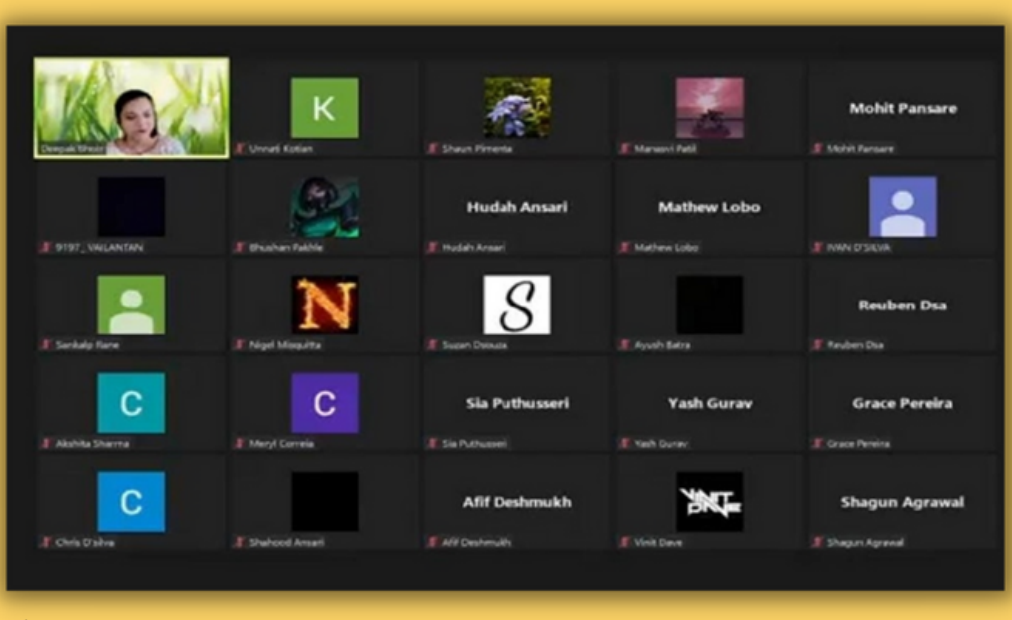
EVENTS

The overall environment created in the workshop encouraged students to freely ask their doubts without any hesitation. Therefore the audience actively participated and interacted during the session and cleared all the queries they had in mind.

The questions asked by the audience included such as::

- ·How to make pre-defined slots
- ·How to get the value of parameters in training phases
- ·What steps do we need to take to create a caller id
- ·How to add different intents' contexts to one intent
- ·What is the procedure to attach links to our bot

·How to create more options to choose from in our bot



The outcome of the workshop was that all the students learned and cleared their doubts regarding chat-bot designing and the speaker also motivated them to form their own bots and to take on various projects involving bot designing by stating his experience and guidance. The session also helped the students realize how important bots are with the help of examples. It enlightened the students about what they should do in the future and it's never late to begin.

Good feedback was received from all the participants. All the students were thrilled to get guidance from mentors Mr. Yameen Ajani and Mr. Noel Jaymon. Participation certificates were also provided to the participants by the Department of Computer and AI-DS. Active participation by the speaker, faculty members, and the participants made the "CHATBOT DESIGNING" workshop a grand success!

DEPARTMENT

EVENTS

ADVANCED CLOUD COMPUTING DOCKER AND KUBERNETES

Date: 28-29th January, 2022 | Platform: Google Meet

Dr. Bhushan Jadhav,
Assistant Professor, Artificial Intelligence & Data

Mr. Thompson Naidu,
Senior Software developer @Quantiphi.

Mr. Pranay Lobo,
Software Engineer (R&D @Protegrity

Speakers for the event

The Department of Computer Engineering and Department of AI & DATA Science of Fr. Conceicao Rodrigues College of Engineering, Mumbai organized a Two-day Faculty Development Program (Online) on "ADVANCE CLOUD COMPUTING -DOCKER AND KUBERNETES" on the 28th and 29th January 2022. This program was a combination of Expert Speeches & Practical Demonstrations by eminent personalities from Industry and Academia. This FDP was aimed at teachers who are teaching various disciplines of science and engineering subjects in colleges or Universities and was also open to research scholars and Industry Personnel. The FDP received a good response with 38 participants registered for this program from different Colleges. Owing to the COVID19 situation the entire FDP was managed and hosted on an online platform via video conferencing.

FDP THEME AND OUTLINE

Around the world Digital transformation has reformed the 'traditional' industries into smart industries by exponentially growing technologies. In essence, Industry 4.0 concerns the transformation of IT industry processes through the integration of modern technologies such as sensors, communication, and computational processing. Technologies such as Cyber-Physical Systems (CPS), the Internet of Things (IoT), Cloud Computing, Machine Learning, Blockchain, and Data Analytics are considered to be the different drivers necessary for the transformation. Cloud computing is one of the key enablers of modern Industry 4.0 automation solutions. So, Cloud computing is considered as the third Revolution of the IT industry.

DEPARTMENT

EVENTS

This FDP was aimed to offer learners an introduction to technological advances in Cloud Computing, its applications in the business world. Learners gained deep insights into how smartness is being harnessed from data and appreciate what needs to be done in order to overcome some of the challenges. Participants understood the opportunities, challenges brought about by advanced Cloud Computing.

OUTLINE:

- Advanced Cloud Computing: A critical enabler boosting the IT Industrial Revolution.
- Docker: A valuable cloud technology that enables developers to package applications into containers.
- Kubernetes: A valuable cloud technology for container orchestration system for automating software deployment, scaling, and management.

PLANNING:

Planning for the Faculty Development Programme began at the start of January 2022. FDP title was confirmed after brainstorming over multiple topics and with due permission of HOD and Principal madam. Meticulous planning was done to design Brochures along with a registration form which was circulated over social media and messaging platforms. Invitations were sent out to different Industry personnel using personnel to join as resource persons for the FDP WhatsApp groups were created to communicate with the registered participants. Online Feedback was collected to validate the learning from the two days of FDP. Attendance was analyzed from the online platform and a list was prepared of eligible candidates and certificates were distributed to them via Email. Course materials and recordings of the sessions were shared with participants for their future reference.

EVENT TIMELINE:

DAY 1 (29TH JANUARY 2022):

The FDP started with a welcome speech by Prof. Supriya Kamoji, she welcomed the participants to the online program and introduced them to Fr. CRCE. She went on to introduce the session1 speaker for the FDP, Mr. Thompson Naidu, Senior Software developer @Quantiphi. Mr. Thompson Naidu later addressed the audience on Introduction to containers, the Difference between VM and containers, Docker containers, Docker terminology (docker container, image, .dockerFile), and 5. Hands-on (Introduction to docker CLI, Docker architecture, Docker command, Some experiments)and Hosting an application inside a docker container

Our next speaker for the day, Dr. Bhushan Jadhav, Assistant Professor, Artificial Intelligence & Data, shared his knowledge through hands-on Implementation of Containerization using Docker.

DEPARTMENT

EVENTS

DAY 2 (29TH JANUARY 2022):

Mr. Pranay Lobo, Software Engineer (R&D) @Protegrity introduced the audience to the concept of advanced cloud computing and Kubernetes. How these cutting-edge technologies are being used in IT industries to gain better technological and business advantages to deliver reliable services to the customers.

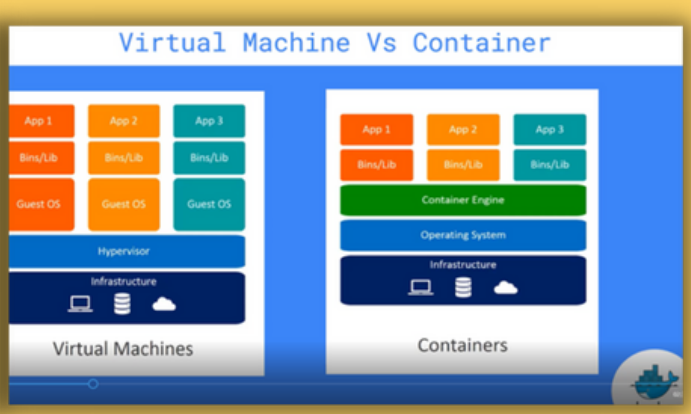
Session2 was continued by Dr. Bhushan Jadhav on implementing container orchestration using Kubernetes and hands experiments on Kubernetes.

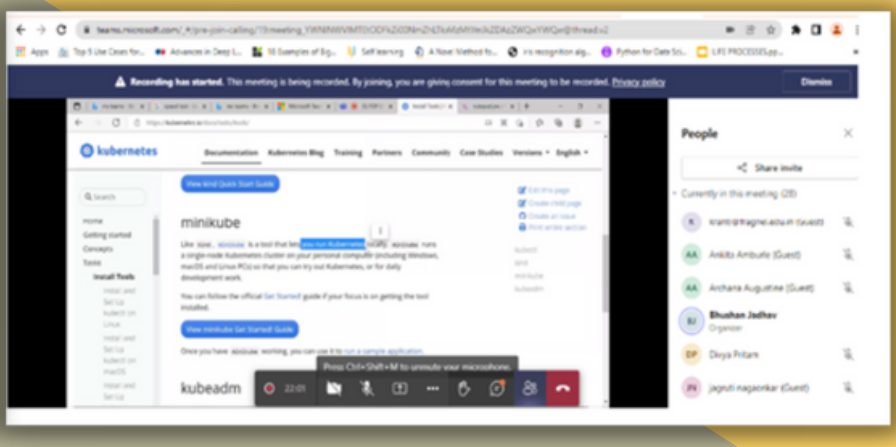
VALEDICTORY:

The program was concluded by Prof. Kranti Wagle with a vote of thanks to Rev. Fr. Valerian Dsouza, Director for his constant motivation, Principal Madam, Dr. Mrs. Srija Unnikrishnan, and HOD of the Computer Department, Dr.B. S. Daga and HOD of AI&DS Department Dr. Jagruti Save for their best wishes and continuous support.

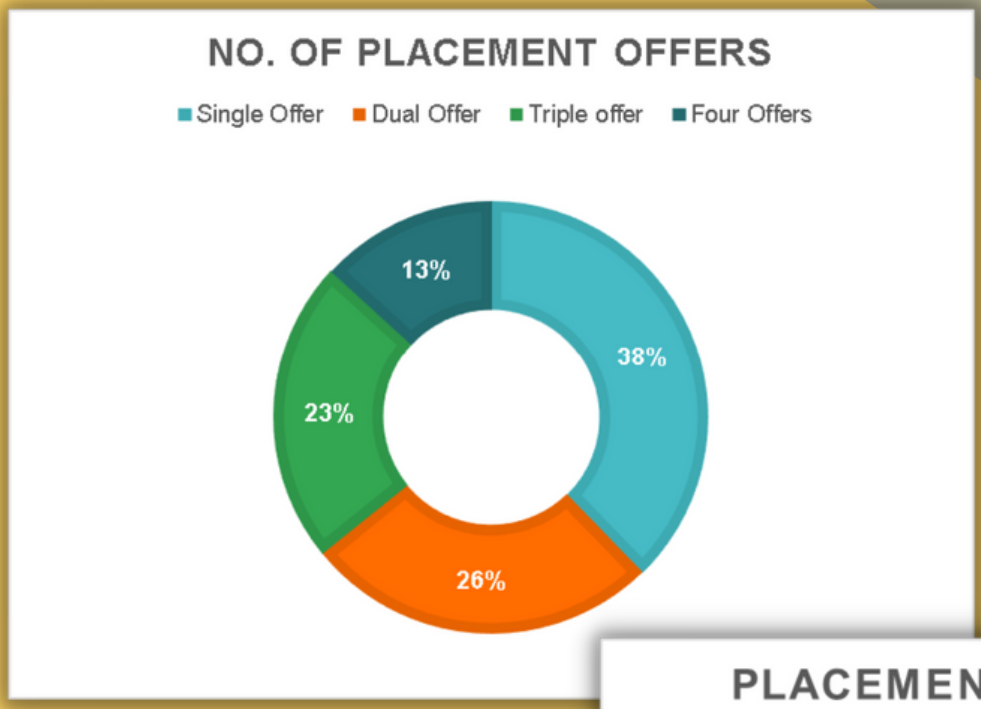
FEEDBACK

Feedback was collected from the participants after the program concluded using Google form. The response received was amazing. Participants' average rating for the FDP was 4.5 out of 5. Most of them praised the structure and contents of the program and the way things were coordinated and communicated. Many of them gave positive comments on the knowledge of the speakers. Also suggested to conducting five days program on the same topic to get detailed insight.

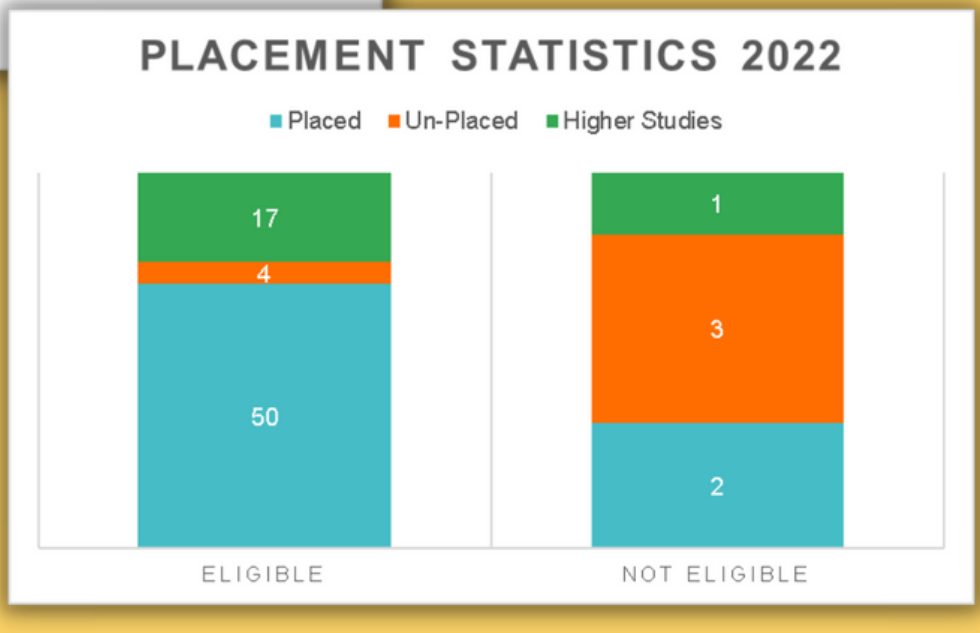




PLACEMENTSTATISTICS



Single Offer: 20
Dual Offer: 14
Triple offer: 12
Four Offers: 7



Total Eligible Students: 71
Total Not-Eligible Students: 6
Students for Higher Studies: 18

HIGHER STUDIES

Name	Admitted to which University
Anu Thomas	Kelley School of Business
Ashish Bandarkar	Arizona State University
Dhrumil Shah	North Carolina State University
Dishant Vora	Carnegie Mellon University

STUDENT

INTERNSHIPS

B.E. IT

Name	Position	Company Name
Aaron D'sa	Business Analyst	Quantiphi
Aksh Mehta	Framework Engineer Intern	Quantiphi
Deepak Tiwari	Program Analyst Trainee	Cognizant
Dhananjay Shettigar	SDE Intern	Juspay
Dhananjay Shettigar	SEP Intern	JP Morgan Chase
Dhrumil Shah	Data Science Intern	Sparks Foundation
Gaurav Shetty	Design and Analysis of Aircraft	Bhramastra
Hritik Kothari	SDE 1	HackerRank
Jerison Fargose	Programmer Analyst	Cognizant
Leandra Monteiro	Business Analyst	Quantiphi
Mahesh Babar	Framework Engineer	Quantiphi
Manuel Fernandes	Framework Engineering	Quantiphi
Mareena Fernandes	Human Resource Executive	Enerzone Life Science
Mareena Fernandes	Member of The Receipt	JUV Consulting
Mareena Fernandes	Business Analyst	Quantiphi
Orvell Ferreira	Web Developer	Ansrone
Orvell Ferreira	Programmer Analyst	Cognizant
Prinkal Dabre	Javascript Developer	Teknopoint
Ridhi Bauskar	MLE Intern	Quantiphi
Ritika Fargose	Programmer Analyst Trainee Intern	Cognizant
Sameeksha Rane	Software Engineer Intern	IDfy

STUDENT

INTERNSHIPS

B.E. IT

Name	Position	Company Name
Sonali Joshi	Framework Engineer	Quantiphi
Umayr Farooqui	Jr Software Engineer	Dquip CRM
Varad Patil	Technical Content Engineer Intern	HackerRank

S.E AI&DS

Name	Position	Company Name
Shreyash Singh	Brand Management	The GreenGen Project
Christina Maria Tomy	Social Media Management	Profitwheel
Andre Isaac Nazareth	Machine Learning Intern	Quantum Learnings
Andre Isaac Nazareth	Data Science & Business Analytics	The Sparks Foundation
Andre Isaac Nazareth	Machine Learning Intern	Feynn Labs
Meet Satra	Marketing Specialist	Younity

STUDENT

COURSES

B.E. IT

Name	Online Course done	Completion
Alec Derose	Web Designing And Development	Jan-22
Gaurav Shetty	Machine Learning	Mar-22
Gaurav Shetty	Google Data Analytics ProfessionalCertificate	Aug-21
Gaurav Shetty	What is Data Science	Jan-22
Gaurav Shetty	Data Science Orientation	Jan-22
Gaurav Shetty	IBM Data Science Professional Certificate	Ongoing
Gaurav Shetty	Build generative adversial networks(GANS)	Ongoing
Mareena Fernandes	Introduction to Business Analysis Using Spreadsheets: Basics	May-21
Mareena Fernandes	Print and Digital Elements of Design: Branding and User Experience	Jun-21
Mareena Fernandes	Jira Fundamentals Badge (Atlassian University)	Jun-22
Mareena Fernandes	Google Data Analytics Professional Certificate	Jun-22
Mareena Fernandes	Agile with Atlassian Jira	Ongoing
Robin Lobo	Python and Machine Learning for Financial Analysis	Nov-21
Robin Lobo	Complete Machine Learning with R Studio	Jun-21
Robin Lobo	Introduction to Packet Tracer	Jul-21
Robin Lobo	Bootstrap 4 Ultimate Course	Jul-21
Swijel Dmello	HTML, JavaScript, & Bootstrap - Certification Course	Jul-21
Swijel Dmello	Java Programming: Complete Beginner to Advanced	Jul-21

STUDENT

COURSES

S.E. AI&DS

Name	Online Course done	Completion
Aakash Lopes	100 days of code-the complete Python pro Bootcamp for 2021	Aug-21
Andre Isaac Nazareth	Google Data Analytics Professional Certificate	Nov-21
Andre Isaac Nazareth	Machine Learning	Sep-21
Christina Maria Tomy	100 days of python by Angela yu	Ongoing
Ketaki Sarode	Web development Course	Jul-21
Ketaki Sarode	Machine Learning	Ongoing
Meet Satra	Web Development	Ongoing
Mohit Pansare	HTML CSS	Nov-21
Mohit Pansare	Machine Learning	Aug-21
Mohit Pansare	Javascript	Ongoing
Mohit Pansare	Complete python3 cource	Ongoing
Pratham Kambli	Google IT Automation with Python	Oct-21
Shreyash Singh	Cognitive Applications and Machine learning	Nov-21
Shreyash Singh	Chatbot Designing	Nov-21
Shreyash Singh	Canva and Linktree	Oct-21
Shreyash Singh	Machine Learning	Ongoing

TECHNICAL

PUBICATIONS

Author	Paper Title	Journal/Conference
Mareena Fernandes Saloni Khanna Leandra Monteiro Anu Thomas Prof. Garima Tripathi	Bitcoin Price Prediction	IEEE Xplore
Joel Syrus Fernandes Robin Lobo Sonali Joshi Prof. Prajakta Bhangale	Crime Prediction System: A Study on Machine Learning Approach for Crime Analysis and Prediction	Turkish Online Journal of Qualitative Inquiry (TOJQI)
Gaurav Shetty	Designing and Analysis of an Unmanned Aerial Vehicle without Propulsion and Developing an Autonomous Navigation System Using Reinforcement Learning	IEEE Xplore
Gaurav Shetty Parva Juthani Vraj Shah	Autonomous Surveillance Drone	Applied for Patent
Orvell Ferreira Clint Ferreira Sloan Dcunha Prof. Parshvi Shah	College recommendation system: Comparison of different Machine Learning models	International Conference on Smart Technology, Artificial Intelligence and Computer Engineering (ICSTAICE)
Aksh Mehta Ayush Matto Dylan Periera	Covid Cases Prediction using Time Series Models	International Journal of Science and Research (IJSR)

TECHNICAL

PUBICATIONS

Author	Paper Title	Journal/Conference
Rodrigues Sanil Pereira Rincy Tuscano Selvin Prof. Tripathi Garima	Contactless Attendance System	Springer Singapore
Issac Sanctis Nilesh Prasad Kenneth Rebello Prof. Garima Tripathi	Recommendation system for supermarkets	GIS Science Journal
Meera Ghaskadvi Sakshi Khochare Rozebud Gonsalves Prof. Prajakta Dhamanskar	Pneumonia and Diabetic Retinopathy Detection Using Deep Learning Algorithm	Springer Singapore
Meera Ghaskadvi Sakshi Khochare Rozebud Gonsalves Prof. Prajakta Dhamanskar	Diabetes and Liver Detection Using Machine Learning Algorithms	Elsevier
Yashaswini Sunil Chaudhari Vanessa William Dmello Srushti Suraj Shah Prajakta Bhangale	Autonomous Timetable System Using Genetic Algorithm	IEEE Explore
Vaibhav Godbole	Performance improvement in wireless sensor networks using whale optimization algorithm (WOA) and butterfly optimization algorithm (BOA)	STRIDE, Govt. of Malaysia

FACULTY

CONTRIBUTION

FACULTY AS A RESOURCE PERSON

Name of faculty	Nature of work	Date	Organized by	Topic covered
Dr. Jagruti Save	Resource person at ISTE approved STTP on data science using python	15/12/2021	Shah Anchor Kutch Engineering College	Data analysis with statistics
Mrs. Garima Tripathi	Guest Speaker	31/07/2021	Saboo Siddhik Engineering College	Innovation & Entrepreneurship
Mrs. Garima Tripathi	Guest Speaker	22/02/2022	St.Xavier's Institute of Technology	Multicore Architecture

FACULTY INTERACTION WITH THE OUTSIDE WORLD

Name of faculty	Nature of work	Date	Organized by	Topic covered
Dr. Jagruti Save	Syllabus Setting Committee Member	10/01/2022	Pillai College of Engineering	Image processing
Dr. Jagruti Save	Syllabus Setting Committee Member	05/01/2022	Shah Anchor Kutch Engineering College	Data mining and Business Intelligence
Mrs. Garima Tripathi	Syllabus Setting Committee Member	03/07/2021	St. Francis Institute of Technology	Real time Operating system

FACULTY

CONTRIBUTION

FACULTY INTERACTION WITH THE OUTSIDE WORLD

Faculty name	Nature of work	Date	Book/ Journal/ Conference
Dr. Jagruti Save	Reviewer for Chapter "Word Level Devanagari Text Recognition"	10/02/2022	Reviewer for book titled "Practical Data Mining Techniques and Applications
Dr. Jagruti Save	Reviewer for Chapter "Near Human-Level Style Transfer"	10/02/2022	Reviewer for book titled "Practical Data Mining Techniques and Applications
Dr. Jagruti Save	Reviewer for technical paper	--/06/2021	ICAITR2021 (International conference on Advances in IT & Research) organized by VIT
Dr. Jagruti Save	Reviewer for technical paper	--/06/2021	ICCICT (International conference on Communication, Information & Computing Technology) organized by SPIT
Vaibhav Godbole	Reviewer for technical paper	20/01/2022	International Journal of Software Engineering & Comupter Systems
Vaibhav Godbole	Reviewer for technical paper	11/10/2021	Asian Journal of Research in Chemical Science
Vaibhav Godbole	Reviewer for technical paper	26/02/2022	Asian Journal of Research in Computer Science
Vaibhav Godbole	Reviewer for technical paper	07/03/2022	IET Smart Cities
Vaibhav Godbole	Reviewer for technical paper	01/07/2021	IET Sensor Systems
Vaibhav Godbole	Reviewer for technical paper	19/07/2021	IET Communication
Vaibhav Godbole	Reviewer for technical paper	03/11/2021	IET Sensor Systems

FACULTY

CONTRIBUTION

FACULTY DEVELOPMENT PROGRAMS ATTENDED

Type of program	Name of faculty	Title	Organized by
FDP	Dr. Jagruti Save	Deep Learning	NPTEL-AICTE
Seminar	Garima Tripathi	Innovation Ambassador Training	MoE's Innovation Cell & AICTE
ATAL FDP	Garima Tripathi	Emotional Intillegence	AICTE aapproved
Seminar	Prajakta Bhangale	Innovation Ambassador Training	MoE's Innovation Cell & AICTE
STTP	Prajakta Bhangale	Blockchain & It's Applications	VESIT, Mumbai
ATAL FDF	Prajakta Bhangale	ATAL fDP-Recent trends in AI	Laxmi Narain College of Technology
ATAL FDF	Prajakta Bhangale	ATAL FDP-Data science	II-IT, UNA
ATAL-FDP	Prajakta Dhamanskar	ATAL-FDP-Computer Vision: Past, Present and Future	SCTR's Pune Institute of Computer Technology
ATAL-FDP	Prajakta Dhamanskar	ATAL-FDP:Artificial Intelligence & Machine Learning	University Institute of Technology, Rajiv Gandhi Proudyogiki Vishwavidyalaya
Webinar	Prajakta Dhamanskar	Webinar on "Getting Started with Deep Learning"	Government Engineering College, Rajkot.
Seminar	Dr. Nilesh Patil	Innovation Ambassador Training	MoE's Innovation Cell & AICTE
FDP	Dr. Nilesh Patil	AI & Data Science- The Future of Tomorrow	MCT's RGIT

FACULTY

CONTRIBUTION

FACULTY DEVELOPMENT PROGRAMS ATTENDED

Type of program	Name of faculty	Title	Organized by
STTP	Dr. Nilesh Patil	'Advanced Applications in Artificial Intelligence and Machine Learning	MMCOE, Pune
STTP	Dr. Nilesh Patil	Blockchain & It's Applications	VESIT, Mumbai
ATAL FDP	Dr. Nilesh Patil	Advances of AI & ML in Societal Development	Uttarakhand Open University
ATAL FDP	Sarika Davare	"Data Analytics in Smart Healthcare	Knowledge Institute of Technology.
FDP	Sarika Davare	AI & Data Science- The Future of Tomorrow	MCT's RGIT
FDP by NPTEL	Saurabh Kulkarni	Probability for Computer Science	IIT Kanpur
ATAL FDP	Saurabh Kulkarni	Futuristic trends in modern machine learning and data analytics	Lakshmi Narain College of Technology
FDP	Saurabh Kulkarni	Research Methodology and Classroom Management Skills	IIT Guwahati and Nalbari College, Assam
ATAL FDP	Vaibhav Godbole	Futuristic trends in modern machine learning and data analytics	Lakshmi Narain College of Technology
FDP	Vaibhav Godbole	Research Methodology and Classroom Management Skills	IIT Guwahati and Nalbari College, Assam
FDP	Unik Lokhande	Advanced cloud computing docker and kubernates	Fr. CRCE
STTP	Unik Lokhande	Advanced Applications in Artificial Intelligence and Machine Learning	MMCOE and MMIT, Pune

FACULTY

CONTRIBUTION

FACULTY DEVELOPMENT PROGRAMS ATTENDED

Type of program	Name of faculty	Title	Organized by
FDP	Unik Lokhande	Artificial Intelligence	AICTE Training And Learning (ATAL) Academy and Dr Babasaheb Ambedkar Marathwada University
FDP	Unik Lokhande	Blockchain and its Security Perspectives"	AICTE Training And Learning (ATAL) Academy & IIIT Guwahati

EXTRA & CO-CURRICULAR

ACHIEVERS

B.E. IT SPORTS

THROWBALL (GIRLS) 3

Anu Thomas, Saloni Khanna, Mareena Fernandes, Leandra Monteiro, Melita Japhet, Riddhi Bauskar, Ritika Fargose

RINK FOOTBALL (GIRLS) 3

Anu Thomas, Saloni Khanna, Mareena Fernandes, Leandra Monteiro, Melita Japhet, Riddhi Bauskar

BADMINTON SINGLES (GIRLS) 3

Saloni Khanna

BADMINTON DOUBLES (GIRLS) 2

Saloni Khanna, Leandra Monteiro

TABLE TENNIS SINGLES (GIRLS) 2

Anu Thomas

TABLE TENNIS DOUBLES (GIRLS) 2

Anu Thomas, Riddhi Bauskar

GIRLS RACE (100M) 1

Saloni Khanna

GIRLS RACE (200M) 1

Saloni Khanna

GIRLS RACE (800M) 1

Saloni Khanna

GIRLS RACE (1200M) 2

Saloni Khanna

GIRLS RELAY 1

Saloni Khanna, Mareena Fernandes, Leandra Monteiro, Riddhi Bauskar

GIRLS SHOT PUT (GIRLS)

Saloni Khanna 1

Apoorva Sheth 3

GROUND FOOTBALL (BOYS) 2

Aaron D'Sa, Ayaan Shaikh, Heron Vas, Joash Soans, Gaurav Shetty,Dylan Pereira, Manuel Fernandes,Clafacio Lobo, Steve Thomas, Umayr Farooqui, Parva Juthani

CAROM SINGLES (BOYS) 2

Alec Derose

BOYS RELAY 1

Gaurav Shetty, Ayaan Shaikh, Aaron D'Sa, Reece Tuscano

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BADMINTON DOUBLES (BOYS) — 3

Aldrich Mendes, Dylan Pereira

CARROM DOUBLES (BOYS) — 1

Alec Derose, Ayaan Shaikh

RACE (200M) — 2

Gaurav Shetty

TUG OF WAR (BOYS) — 1

Manuel Fernandes, Smith Lopes, Reece Tuscano, Nash Correia, Ninad Shetty, Alexander Rodrigues, Gaurav Shetty, Meet Bhalgamiya, Ajay Tripathi

RINK FOOTBALL (BOYS) — 1

Aaron D'Sa, Ayaan Shaikh, Heron Vas, Joash Soans, Gaurav Shetty, Dylan Pereira, Manuel Fernandes, Clafacio Lobo, Parva Juthani, Aldrich Mendes

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SERAPHIC — 3

Mareena Fernandes, Ninad Shetty, Ashish Bandarkar, Lance Main, Smith Lopes

LIGHTS, CAMERA, ACTION

Lance Main, Clint Ferreira — 1

Dhananjay Shettigar, Smith Lopes — 2

CRCE'S FITTEST (GIRLS)

Saloni Khanna — 2

Anu Thomas — 3

CRCE ROADIES

Clafacio Lobo — 1

Parva Juthani — 2

RANG DE RANGOLI — 2

Ridhi Bauskar

ART IN MOTION — 3

Lance Main, Sijoy Almeida

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SHAKE IT OFF 3

Ayaan Shaikh, Clafacio Lobo

EMBELLISH 1 3

Clint Ferreira, Pierre Colaco, Smith Lopes, Reece Tuscano

CRICKET SLAM 1

Smith Lopes, Anu Thomas

BEYOND THE VOICE 1

Anu Thomas

B.E. IT TECHNICAL

ELEXATHON 1

Anu Thomas, Ayaan Shaikh, Ninad Shetty

TROPHIES BAGGED BY B.E. IT

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S.E. AI&DS SPORTS

BADMINTON DOUBLE (BOYS) 1
Moeez Sheikh, Jace Tuscano

BADMINTON SINGLES (GIRLS) 2
Bhavika Salvi

CHESS (GIRLS) 2
Grace Pereira

BOYS RACE (200M) 3
Smith Tuscano

TABLE TENNIS DOUBLES (BOYS) 2
Jace Tuscano, Pratham Mahajan

BOYS RACE (1200M) 1
Yash Gurav

BOYS RACE (100M) 3
Smith Tuscano

S.E. AI&DS CULTURAL

LIGHTS, CAMERA, ACTION 3
Christina Maria Tomy, Wellborn Bar

BEYOND THE VOICE 2
Christina Maria Tomy

FUNACTIVITIES

How well do you know your Department?

801 LAB:
N_tw_ _k Se_ _ri_ _ Lab

802 LAB:
Cl_ _d C_m_ _ti_g Lab

803 LAB:
P_ _je_ _ M_n_ge_ _ _t and MIS Lab

804 LAB:
I_t_ _ne_ T_ _h_ol_ _y Lab

808 LAB:
M_b_ _ity Lab

809 LAB:
C_r_ Prog_ _ _m_ _g Lab

810 LAB:
R-TOS E_bed_ _d S_st_ _ Lab

YEAR I.T DEPT. WAS STARTED:
_____

YEAR AI&DS DEPT. WAS STARTED:
_____

PROFESSOR WHO IS AN ALUMNI OF FR.CRCE:
_____

HOD OF I.T AND AI&DS DEPT.:
_____

PROFESSORS WHO SHARE THEIR FIRSTNAME:
_____

WHICH IS OUR FLOOR?
_____

Answers!

2000
2020
Prof. Prachi Patil
Dr. Jagruti Save
Prof. Prajakta
8th Floor

801 - Network Security, 802 - Cloud Computing, 803 - Project Management, 804 - Internet Technology, 808 - Mobility, 809 - Core Programming, 810 - Embedded System

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A QUANTUM CONNECTION

Last year, I wrote a sort of an Intro to Quantum Computing and tried explaining, in layman's terms, a few entry-level topics such as superposition and quantum entanglement with a few analogies here and there. Well between now and then, a lot of progress has been made in this very difficult-to-understand field of computing. A lot is an understatement really. The people and companies at the forefront of quantum computing have made a ridiculous amount of progress in the short span of a few years. Revolutions don't happen overnight but realizing the breakneck speed at which quantum computing is moving ahead, one would think twice about that statement. And the interest is rightly present. In classical computing, there is a sort of an observational law put forth by the co-founder of Intel, whom many consider the pioneer of modern semiconductor applications (me included). It states, "the number of transistors on a microchip doubles about every two years, though the cost of computers is halved". Now, this is a law pertaining to classical computers and it has held up for 40+ years. But experts think that it may be time, that Moore's Law may not hold up in the near future. The reason for this is the scale at which we are manufacturing the core blocks of a classical computer; transistors. Transistors basically reduce or amplify the flow of electrons across a bipolar junction essentially acting as a switch with two different voltage levels corresponding to high or binary '1' and low or binary '0'. So today, the industry-standard in personal computers is a 14nm manufacturing process and even 7nm for the ARM processors in your modern smartphones. Now the 14nm or 7nm process is just a commercial term but to put in simple terms, the smaller the number, the smaller your transistors and the gap between them. This leads to a process that allows billions (yes, with an 's') of transistors to fit into an inch-wide processor chip in your phone. Now that is very impressive, but to adhere to Moore's law is to keep shrinking your process. Here's where the problem comes in. Now to put in perspective, the HIV Virus is about 140nm in size and when your chips are so much smaller, it becomes very difficult to work with any equipment because, at this size, we start entering the quantum realm. And anyone working with quantum physics would probably use one word to describe the quantum realm; weird. There are so many unexplained phenomena in the quantum realm, the theories published about them have the word "uncertainty" in them. Jokes aside, the quantum realm may be weird but the brilliant minds of our time have seen these phenomena for what they can be. And what they can be is a godsend to the technological progress of humanity at a time when Moore's Law was just about to be broken.

Finally, we come to the quantum part of this article. Now the important thing setting apart a quantum computer from a classical computer is the fact that a classical computer depends on bits to store information. Voltage levels are used to provide a binary communication method. With quantum computing, there still is a binary system in place, but unlike classical computing where a single bit can either be a '0' or a '1'; a qubit or a quantum bit exists in

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both those states simultaneously. Now how did that happen? Superposition! Currently, there are 2 kinds of superposition used to create the qubit for a quantum computer. Using electrons, the computer measures the spin state (spin down: 0, spin up: 1) while with photons, they measure polarization (horizontal polarization: 0, vertical polarization: 1).

Quantum systems are said to be in superposition since until a quantum system is measured, the current state of a system cannot be known. And the real kicker with these systems is that when you measure a quantum system, you get that measured data for that particular instance of the system but you tamper with any other data you could hope to obtain (shout out to Heisenberg's Uncertainty Principle). This is because to measure any system, you need to interact with it in a certain way. With macroscopic objects, there are so many data points that interacting with a few doesn't really affect the system as a whole but with quantum systems, measuring is essentially destroying. Well, then how do you really use the power of a quantum computer if barely touching it destroys everything about it. Well, scientists figured, if we are going to tamper in any case, maybe we could minimize the effect that the tampering does. This is why quantum computers are really cold. The D-Wave Quantum Computer is essentially the coldest place in the universe. Yeah, the whole entire universe. Heat is basically energy and any presence of energy is a source of entropy and entropy just creates chaos. So, quantum computers use really cold environments to cool down the system to the point that the only possible disturbance is the measurement itself. No vibrations, no heat, no light, no energy other than lasers trying to measure the state. Well, that's all well and good but a computer's gotta compute right. That's where the difference between a classical and a quantum computer becomes more apparent.

With a classical computer, you feed it input, and if your logic should be correct, you expect an output. Well with quantum computers, it's not that simple. Since a qubit is in a superposition of 0 and 1, the input you feed to a quantum computer goes through every single possible output, not just the one you want. So, a quantum computer doesn't just spin its magic qubits providing a trivial answer. A quantum logic gate unlike a classical logic gate keeps performing operations on its input qubits and generates a lot of outputs. A seemingly random table of outputs. But when the quantum gates are arranged in a certain order forming a kind of digital circuit used to manipulate bits, the outputs start favoring a particular answer. Basically, when quantum gates are correctly arranged, we can find order out of this random mix of answers and the output with the highest probability is usually the output that a user is looking for. The process hasn't been brought down to an exact science but the progress is incredible. To measure this progress, the people in quantum computing use Shor's algorithm which is used for integer factorization. The reason this algorithm is used is that the current encryption standards use prime factors of a really large number for encryption (RSA standard uses 2048-bit keys which is about 617 decimal digits). While classical computing would need millions of years to process this number using Shor's

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algorithm, for a quantum computer, it could just be a matter of days. Well, quantum computers aren't quite at this stage yet with the current world record being 56,153. But only last year, this number was a measly 21. So, we are not far off. While this is great from a computation perspective, this is basically devastating to any and all privacy since encryptions will no longer be a viable security method. Not to worry but quantum computers bring forth the answer to that as well.

This brings me to the final part of this article, the quantum connection. A new interconnected network using only quantum endpoints. The perfect harmony of quantum and classical computing. While our personal computers and smartphones don't see a quantum upgrade anytime soon in their future, our security methods very well could. It goes without saying quantum computing is extremely expensive for the time being, but maybe we could morph Moore's Law to fit quantum computing soon. Anyways, this hasn't stopped a Netherlands group of quantum computer scientists from creating the world's first quantum internet. A quote by the lead of the team: "Quantum Internet will provide virtually unbreakable privacy and a foundation of secure communication, guaranteed by the fundamental laws of physics." They do this by harnessing the quantum phenomenon of entanglement (which is completely unexplained by classical physics but we know exists) over several small quantum computers. And they have used it at an unprecedented scale of over a kilometer (about 1.3km). Qubits, smaller than molecules, are measured on a scale of nanometers, maintaining an entangled state, over a kilometer apart from each other. It really is the stuff science fiction is made of. They have used a process that entangles a lot of these extremely tiny particles and uses them as a single entangled pair providing an error-corrected entangled system where even if a few of those particles lose their entangled state, the system as a whole will provide correct data. This seemingly invisible communication medium setup between 2 Dutch cities today is going to be the basis on which the quantum internet is going to be built. And we have only hardly scratched the surface of this realm of quantum computing. Well, I'm done here for now but I highly recommend you check out the IBM Quantum Experience for a peek at the future of quantum computing and a deeper understanding beyond the scope of this article. Thanks for reading!

- Dhananjay Shettigar, B.E. IT

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AUTONOMOUS SYSTEMS IN UAVS

UAVs are unmanned aerial vehicles such as drones which are traditionally controlled and monitored manually. Since they are controlled by personnels present at the ground station, they may tend to make errors and may face some kind of maneuvering difficulties. Introducing autonomous systems will not only reduce these human errors but also make the system more efficient.

We can automate various systems in an aircraft. For instance to control its stability during the flight or to control its navigation system which makes it a self-guided UAVs. To achieve these autonomous systems we use a combination of numerous sensor data, some decision making algorithms or application of control system design or even Artificial Intelligence (AI) and finally transmit these decisions to the actuators which execute these commands by doing some physical changes in the object to get it into the desired state. In this technical paper, we will look at the traditional methods used currently and how these next-generation autonomous systems help us deliver more reliable and more efficient UAVs.

UAVs are widely used in today's world and have a wide variety of applications ranging from military to domestic operations. All these UAVs are almost entirely controlled by human beings. Since they are sophisticated machines, it is difficult to operate and the user may encounter problems such as

- Navigation of the UAV
- Difficulties in maneuvering
- Taking quick decisions in case of anomaly
- Different terrain training
- Understanding each subsystem

To overcome all of these difficulties we automate things so that software can rapidly take accurate and precise decisions. One way to create these autonomous systems is by using control system design(CSD). There are usually two types of CSD, open-loop systems which are not feedback-based, and closed-loop system which is feedback-based systems.

Proportional integral derivative (PID) is one of the widely used closed-loop systems which is used to automate the stability of the aircraft by controlling the yaw, pitch, and roll of the aircraft. The same algorithm can also be used in navigation. First, we create a vector joining the current position and the destination. Next, we use the PID algorithm so that the heading of the aircraft always has a zero degree difference with the destination vector.

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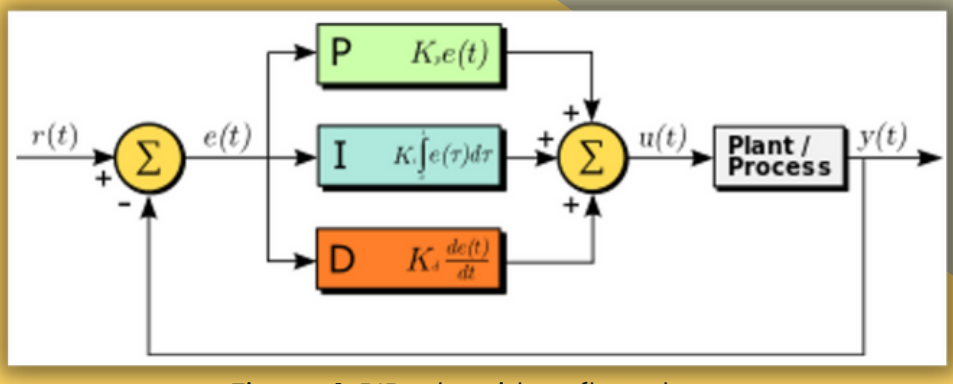

Figure 1: PID algorithm flowchart

Even though the previously discussed methods are effective, they tend to fail when the aircraft encounters a new scenario like a change in terrain or a sudden change in environmental conditions. To tackle this kind of situation we make use of Artificial Intelligence(AI). The software can be programmed or be taught to fly the aircraft in various conditions and configurations. It can be tested on a computer simulation before applying it in a real aircraft. Generally, we use Reinforcement Learning(RL) to solve control problems in place of control system design because of its better response and robustness. But designing the right RL agent is a very tedious task and requires professionals who have mastered this skill.

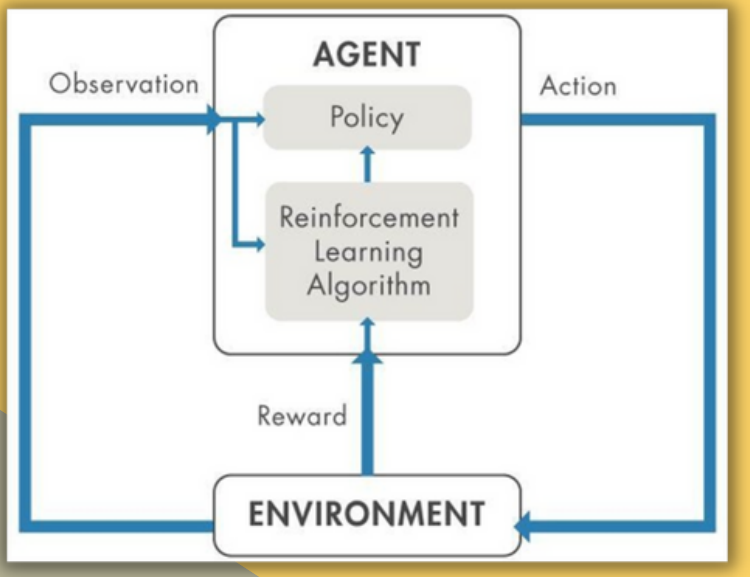

Figure 2: RL working flowchart

Finally, I would like to add that autonomous systems are vital for the more efficient use of UAVs as they reduce human error and can also function continuously without human intervention. They may be difficult to develop and may take a lot of time in the testing phase, as there is a large number of scenarios that the system has to be tested on, and only when its accuracy has reached a certain threshold level they can be applied in the real world. This method is used to create next-generation UAVs that will be robust, easy to use, and more efficient.

- Gaurav Shetty, B.E. IT

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SOARING WEB TECHNOLOGIES

Today, the greatest question an application developer probably faces in the early stages of their programming career is: Native or Web? For long, native applications built specifically to run on a particular Operating System and Web Apps built to run on the browser have had major differences with native apps leading in performance and stability while web apps enjoy multi-platform reach on a single codebase. Although with advancements in network technology and the amazing interest that web technologies have garnered, this line between native and web apps is starting to blur. The Open Source movement has had a massive impact on driving the progress of technology especially web technologies since these technologies are available the easiest and thus attract a bigger audience. Huge Silicon Valley companies use Open Source extensively in their development cycle since it helps produce applications faster, costs are reduced by a lot, developers work together to help each other and this in turn keeps feeding the flame that is Open Source. Open Source Web Technologies have gained massive contributions from the Mozilla Foundation, Google, Microsoft, Facebook and nearly every other big name in this technology space.

But how exactly have web apps been able to catch up to native applications? Generally speaking, native apps shine in providing direct hardware access, offline availability and crazy performance compared to traditional web apps. With modern applications requiring greater processing power and ease of use and accessibility becoming a must-have for any app, it seems discouraging to develop a massive web application that is bound to fail to pertain to these reasons. But all hope is not lost. The Open Source community took it upon itself to make this happen. The vision was simple, to have people write code once, and use it anywhere without having to worry about any of the traditional drawbacks. There are 2 major relatively new technologies introduced to tackle these issues head-on. Firstly, with modern browsers allowing web apps to store a greater amount of data than ever on the client-side and providing easy-to-use APIs for direct hardware access, it was just a matter of providing a standard to create these hybrid apps using the code of a web app while possessing the offline features of a native app. These are PWAs or Progressive Web Apps. Second, and the most difficult hurdle with web apps which is performance has been the biggest turn-off to developers thinking of moving to web app development. To deal with this, the W3C (World Wide Web Consortium) has added a new language to the recommended native browser support languages which previously included only HTML, CSS, and JavaScript.

Let's have a look at PWAs first. Progressive Web Apps are exactly what they sound like. The progress of technology has allowed their existence to come into being. Progressive Web Apps harness the power provided by modern browsers (majorly Chromium project by Google, another open source product) to establish client-side storage for crucial components of an

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app which may take a longer time to be transferred over the network over and over again and also establish core offline functionalities such as push notifications, offline data persistence, and more interactive native-like interfaces. PWAs are not only the subset of web apps that take advantage of client-side storage but they are also built using the best practices in web development. PWAs force HTTPS to be able to utilize HTTP/2 which is a more efficient and secure transport protocol allowing greater speeds without compromising on data integrity using binary framing layers encapsulating HTTP semantics as opposed to HTTP's plain text format. Desktop Browsers allow up to 500MB while mobile browsers are capped at 10MB of client-side storage capacity and so PWAs are made responsive keeping these limitations in mind. But since web apps use languages that were designed to cost less storage and use compressed assets to save network round trip times, PWAs were set up for success even before being introduced back in 2015. PWAs in general use the PRPL Pattern as a guideline for maximum efficiency. PRPL is Push or Preload critical resources for the initial URL Route, Rendering the initial route, Pre-cache remaining routes, Lazy-load, and create remaining routes on demand. Preloading is used to prioritize loading certain files in your app without which your app does not reach its initial view or landing page. This is done by adding the declarative fetch attribute of 'rel = "preload"' to link tags. Rendering the initial route refers to the first bit of processing that your app needs usually written in JavaScript. You can add non-crucial JavaScript operations to a different file which can be deferred using "async" for an asynchronous load pattern. Pre-caching is keeping a cache of assets used in your app on the first load so that the service workers in your browser can act as a proxy fetching the cached assets instead of pulling resources from the server on every request. Finally, Lazy-load is a relatively new technique brought about by web bundlers such as webpack which allow splitting your dependencies into chunks that can be loaded on demand. For example, you would only request pulling axios, a wonderful HTTP client API only when you actually submit the form which needs the library to function. Thus, all of these minor things work toward having a blazing fast first paint or the initial render of your web app by reducing the amount of data sent over the network and the initial processing is done on the client-side allowing to pave the way for the growth of PWAs further.

Next, we come to the performance issue. Let's get into it with a backstory. A few years ago, Mozilla saw this potential on the web, the very thing this article is based on. The developers at Mozilla thought they were limited by their JavaScript engine performance and as such came up with a framework called asm.js which was supposed to be a low-level subset of JavaScript. They had the idea that browsers would see the special string designed for asm.js and switch to a super-fast JavaScript engine and they released it to the public. Google being the big bad browser king, was expected to add asm.js support to their browser Chrome. But the folks at google were like why don't we just make the regular JavaScript engine faster and they did it and essentially succeeded to make the performance boost provided by asm.js a miniscule one.

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(Personally, I just think it's really cool/kickass how Mozilla came up with this new idea and Google was just like "Hold my beer"). Now the problem with this approach was that the end result was still JavaScript and there are only so many optimizations you can make to the core functionalities of a language. Well, that was before WASM was brought into the picture. WASM short for Web Assembly is an Assembly Level language for the browser. If you had to draw comparisons, WASM code is like the bytecode generated by Java compilers which can run on any JVM irrespective of the platform it is running on with relatively the same speed. Here your browser is the JVM equivalent. WASM is a compile target meaning you write your code in a language you feel comfortable in and then you can leave it up to the compiler to provide you with a final product in form of a WASM bytecode. WASM was first developed keeping low-level languages in mind since they provide the most granular access to OS-level features which help performance most. As such, C++ was the first language to be compiled into WASM. Today, WASM supports nearly all languages under the LLVM (Low-Level Virtual Machine) umbrella including Rust, Swift, Clang, and more. Rust has been particularly interesting in the web field. Rust has seen tremendous progress in performant, reliable code and with syntax taking cues from high-level languages while still being a low-level systems language, Rust is now used in compilers creating the WASM binaries. Mozilla has been heavily pushing Rust as a memory-safe language having replaced a lot of C++ code in their browser with Rust but that is outside the scope of this article. All I can say is Rust may just become the next C++ :P

If anything, this web movement is better late than never. Apple had the opportunity to fast-track this in the days of the launch of the first iPhone. When asked about app development for the iPhones, Steve Jobs said he expects developers to create web apps. But there weren't a whole lot of developers coming up with any ideas and in the end, Apple crumbling under pressure, decided to go with the creation of the app store and the entirety of the ugly iOS development environment. Well, all of that to say the future of the Web is bright and we may very well see more web apps being developed using low-level languages harnessing every bit of power provided by the hardware, the permissions provided by the OS, and the optimizations provided by the Browser. You can check out Mozilla's vision for the future of WASM at hacks.mozilla.org in the "Web Assembly Post MVP Future" article. Thanks for reading!

- Dhananjay Shettigar, B.E. IT

A dream is not that which you see while sleeping, it is something that doesn't let you sleep

-APJ Abdul Kalam

Accept your past without regret, handle your present with confidence, and face your future without fear

-APJ Abdul Kalam

Winners are not those who never fail but those who never quit

-APJ Abdul Kalam