ZEPHYR

FR CONCEICAO RODRIGUES INSTITUTE OFTECHNOLOGY

BY THE DEPARTMENT OF COMPUTER ENGINEERING

FROM THE HEAD OF THE DEPARTMENT

Dr. Lata Ragha
Head of the Department,
Computer Engineering

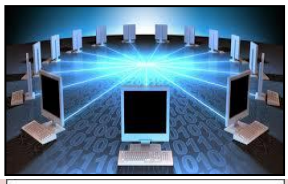
The essence of knowledge lies in a spirit of creative thinking, expression and experimentation. In this regard the Department magazine is a perfect platform for students to think, reflect, create and innovate in a multitude of languages. Writing articles for the magazine also improves the communication skills. The magazine is an excellent platform for the budding engineers to bring out their hidden talents and indeed a precious document that preserves the words of talented students. It is a significant milestone in their creative journeys and inspires them to aspire higher.

The department magazine, **"ZEPHYR"** for the year 2018-2019, helps to showcase the activities that are happening in the department. It provides a platform for exposing the merits and academic achievements of the students. In addition to the numerous achievements of the department this is yet another milestone in the co-curricular activities.

I hope this magazine aims to inspire and nurture upcoming engineers to bring a revolution in this ever-evolving world of technology. It captures the current technological advancements and provide the platform to our students for exhibiting their true talent and creativity through various genres of writings. It also helps in building up teamwork which is very much needed today in the world of competition

I congratulate and thank all the students and staff coordinators who have made untiring efforts to bring out this magazine. Reading this magazine would definitely be an inspiration and motivation for all students and staff to contribute even more to the forthcoming issues. I hope that everyone would continue to give their full efforts to keep the momentum and continue to enhance the standards of the magazine.

INDEX



Department & Curriculum Details

DEPARTMENT DETAILS

The four year Computer Engineering Degree Course was started in the year 1994 and it was accredited for three years from 2006 and reaccredited for two years w.e.f 2012. B.E Computer engineering course offered introduces the student to the world of programming starting with the basics and slowly leading towards the high end programming technologies along with basic, core and specialized (electives) subjects during the duration of four years.

The Computer Engineering Department has domain specific, well equipped labs with Desktops having latest specifications and software.

Besides this, Computer Department Association – ACESS (Agnel Computer Engineering Students Symposium) plays a major role in conducting various workshops and Short term Training courses on Machine Learning, Storage Area Network (SAN), Web Designing, Open Source Technologies, Python, Robotics, Advanced Mobile Technology, Data Science etc. to keep the students at par with the requirements of the industry and to make them successful professionals. The collaboration of the department with industries like EC-Council, Myra Technologies has helped in conducting training programs in the field of Security, Machine Learning which also gives exposure to students about latest technologies and tools used in the industry. Apart from this, students are also encouraged to become members of professional societies like CSI, IEEE etc., to enroll for various internship programs and to develop their programming skills thru Programmer's Club.

Department has well qualified faculty members who are specialized in various areas. Students implement real time projects which are mostly research oriented guided by faculty in the final year as part of their curriculum which trains them to be highly competent computer software professionals needed by industry. As part of final year projects, various groups have undertaken projects from reputed industries and research centres like Persistent, Reliance, BARC and TIFR. TIFR projects taken up by the department have been successfully completed and deployed at the Research Institute. These projects have also received good appreciation. During the curriculum, the department provides a platform for students to present/publish technical papers in National and International Conferences and Journals.

For further details Visit us@ https://fcrit.ac.in/academics/under-graduate/computer

DEPARTMENT VISION & MISSION

Vision:

To contribute significantly towards industry and research oriented technical education leading to self-sustainable professionals and responsible citizens.

Mission:

1. To provide quality and application oriented education to meet the industry requirements.
2. To prepare technically competent, ethically and socially committed professionals with good leadership qualities.
3. To facilitate an opportunity to interact with prominent institutes, alumni and industries to understand the emerging trends in computer technology.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates will be able to:

1. Excel in professional career and higher education in the thrust area of Computer Engineering.
2. Develop software products by adapting the trends in technology to solve real life problems.
3. Exhibit ethical practices, professional conduct and leadership qualities.

PROGRAM SPECIFIC OUTCOMES (PSOs)

At the end of Bachelor of Computer Engineering program, graduates will be able:

PSO1 - To comprehend, analyze and develop solutions in the areas of Web Technologies, Data Science, Networking and System Security.

PSO2 - To inculcate self-learning and research attitude for excelling in Software Development.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Faculty Details

FACULTY DETAILS

	Dr. Lata Ragha	B.E., M.Tech., Ph.D.	Professor & HOD
	Mrs. M.Kiruthika	B.E., M.E., Ph.D.(Pursuing)	Associate Professor
	Mr. Amroz Siddiqui	B.Sc.(Tech.), M.Tech.	Assistant Professor
	Mrs. Smita Dange	B.Tech., M.Tech., Ph.D.(Pursuing)	Assistant Professor
	Mrs. Shweta Tripathi	B.E., M.Tech.	Assistant Professor
	Mrs. Rakhi Kalantri	B.E., M.E.	Assistant Professor
	Mrs. Sandhya Pati	B.Tech., M.E.	Assistant Professor
	Mrs. Shagufta Rajguru	B.E., M.E.	Assistant Professor
	Mrs. Dakshayani G	B.E., M.E.	Assistant Professor

	Mrs. Kavita Shelke	B.E., M.E.	Assistant Professor
	Mr. Mritunjay Ojha	B.E., M.E.	Assistant Professor
	Mr. Rahul Jadhav	B.E., M.E.	Assistant Professor
	Mrs. Aparna Naik	B.E., M.Tech.	Assistant Professor

R & D PROJECTS

Sr. No	Fields of Research and Development
1.	Data Science
2.	Data Mining
3.	Image Processing
4.	Mobile and Web Applications
5.	Cyber Security and Digital Forensics
6.	Artificial Intelligence and Machine Learning

STTP / WORKSHOPS / CONFERENCES ORGANIZED BY COMPUTER ENGINEERING DEPARTMENT

Sr. No.	Name of the Seminar / Conference / Competition / Short Term Training Programme	Convener
1.	One week ISTE approved STTP on **"IoT and Data Science"** at Fr.C.R.I.T, Vashi from 24th June to 28th June- 2019	**Convener :** Dr. Lata Ragha **Co-Conveners :** Mrs. Shagufta R Mrs. Dakshayani G

FACULTY PUBLICATIONS*

Sr.No.	Name of the Faculty	National Conference	International Conference	International Journal
1.	Dr. Lata Ragha	13	53	41
2.	Mrs. M.Kiruthika	10	15	18
3.	Mr. Amroz S	02	----	07
4.	Mrs. Smita Dange	09	07	08
5.	Mrs. Shweta Tripathi	06	03	09
6.	Mrs. Rakhi Kalantri	07	05	09
7.	Mrs. Sandhya P	04	03	14
8.	Mrs. Shagufta R	03	03	08
9.	Mrs. Dakshayani G	01	05	09
10.	Mrs. Kavita S	----	03	09
11.	Mr. Mritunjay Ojha	01	04	09
12.	Mr. Rahul Jadhav	02	05	07

***- Till date**

Students Activities

EVENTS ORGANIZED FOR STUDENTS

Sr. No.	Name of the Seminar / Conference / Competition / Short Term Training Programme	Speaker	Convener
1.	**Project Poster Presentation** Competition for Final Year Projects		Mrs. Rakhi Kalantri
2.	**ACESS'2018** Seminar on "**Knowing Cyber Breaches and the Laws against Them**" Seminar on "**Block Chain and Virtual Reality**" Seminar on "**Designing for an Eco-Conscious Future**"	Mr.Vicky Shah, Advocate, Cyber Crime Clinic Ms. Shilpa Karkera, Myraa Technologies Mr. Shashwath Bolar, Bajaj Auto Ltd.	Mrs. Shweta T
3.	**CRYPTEX'18** Workshops on : **a) Intro to Data Analysis and Machine Learning** **b) Android Development** **c) Django** Competitions : **a) Decrypto** **b) Technical Treasure Hunt**	Conducted by Students of Semester-V	Mrs. Shagufta R
4.	**ACESS'2019** Seminar on **"Professional Ethics"**	Ms. Radhika Kandhari, Hexaware Technologies	Mrs. Shweta T
5.	Seminar on **""UI/UX Design"**	Ms. Ayesha Patel, Centillion	

COMPETITIVE EXAM DETAILS

Year	Nature of Examination	No. of Students	
		Appeared	Qualified
2018 – 2019	GATE	17	05
	GRE	10	10
	TOEFL	10	10
	IELTS	1	1

CAMPUS PLACEMENT

Sr.No.	Company	Total No. of Offers on Campus	Pay Package
1.	TCS Ninja	34*	3.36 Lacs
2.	LTI	10*	4.18 Lacs
3.	Shell	5	10 Lacs
4.	NSEIT	3*	3 Lacs
5.	Willis Towers Watson (WTW)	3	5 Lacs
6.	Citius Tech.	2	4 Lacs
7.	Nerolac	2*	4.5 Lacs
8.	We Can Education	2	2.6 Lacs
9.	TCS Digital	1	7 Lacs
10.	TIAA	1	7 Lacs
11.	Endurance	1*	4.5 Lacs
12.	Xoriant	1	4.5 Lacs
13.	Ingram	1	4 Lacs
14.	Rave Technologies	1	3.8 Lacs
15.	Vyasaka	1	2.5 Lacs
16.	Tata Communications	1	3.8 Lacs
17.	Zeus Learning	1	5 Lacs
	Total No. of Offers	**70**	**4.63 Lacs(Average)**

*** - Dual Offers : Students opted for Higher Package**

Total Number of Students Placed : 60

TCS NINJA (34)

Ms. Aleena

Mr. Sujit

Mr. Ashley

Mr. Kshitij

Mr. Akshay

Mr. Shivanand

Ms. Hingis

Ms. Krupa

Ms. Nikita

Mr. Jithin

Ms. Sreenidhi

Mr. Sibi

Mr. Piyush

Mr. Shubham

Mr. Vinayak

Ms. Leah

Mr. Tushar

Mr. Akash

Ms. Tanisha

Ms. Sharon

Mr. Abhishek

Mr. Akshay

Mr. Adarsh

Mr. Sebin

Ms. Shanitamol

Mr. Sheldon

Ms. Mrinali

Ms. Sonia

Ms. Devashree

Ms. Ruby

Mr. Shantanu

Ms. Prajakta

Mr. Vikram

Ms. Ruchira

Pay Package : 3.36 Lacs Per Annum

LTI (10)

Mr. Felix

Ms. Ankita

Mr. Robin

Mr. Mohil

Ms. Shruti

Ms. Pheba

Ms. Rasika

Mr. Rahul

Ms. Deepshika

Mr. Nikhil

Pay Package : 4.18 Lacs Per Annum

SHELL (05)

Ms. Gloria

Mr. Shivanand

Mr. Adil

Mr. Snehit

Ms. Madhura

Pay Package : 10 Lacs Per Annum

NSEIT (03)

Ms. Rashmi

Mr. Ronnie

Ms. Rasika

Pay Package : 3 Lacs Per Annum

CITIUS TECH (02)

Ms. Frezy

Ms. Vaishnavi

Pay Package : 4 Lacs Per Annum

WTW (03)

Mr. Sujit

Mr. Adarsh

Ms. Prajakta

Pay Package : 5 Lacs Per Annum

NEROLAC (02)

Ms. Rashmi

Ms. Sreenidhi

Pay Package : 4.5 Lacs Per Annum

TCS DIGITAL

Mr. Gyandip

Pay Package : 7 Lacs Per Annum

TIAA

Mr. Ashley

ENDURANCE

Mr. Ronnie

Pay Package : 3.5 Lacs Per Annum

XORIANT

Mr. Akshay

INGRAM

Mr. Dylan

Pay Package : 4 Lacs Per Annum

RAVE GEARS (01)

Mr. Reji

Pay Package : 2.8 Lacs Per Annum

TATA COMMUNICATIONS (01)

Mr. Akhil

VYASAKA (01)

Mr. Nithin

Pay Package : 2.5 Lacs Per Annum

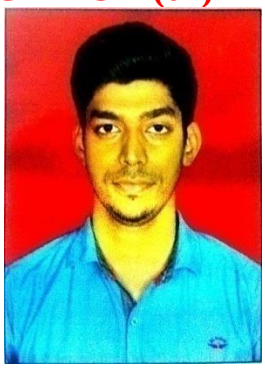
ZEUS (01)

Mr. Dheeraj

Pay Package : 5 Lacs Per Annum

WE CAN EDUCATION (02)

Mr. Rohan



Mr. Lija

Pay Package : 2.6 Lacs Per Annum

PAPER PRESENTATIONS IN NATIONAL , INTERNATIONAL CONFERENCES AND INTERNATIONAL JOURNALS

Students Publication Record (2018-2019)			
Sr.No.	**Student Name**	**Paper Title**	**Details**
1.	Sujit Amin Nikita Jayakar Pheba Babu Sonia Sunny	Web Application for Screening Resume	**3rd Biennial International Conference** on Nascent Technologies in Engineering (ICNTE) January 4-5, 2019
2.	Robin Jaison Adil Khot Gloria Benny Akshay Bhosale	Indoor Navigation System using BLE Beacons	**3rd Biennial International Conference** on Nascent Technologies in Engineering (ICNTE) January 4-5, 2019
3.	Sebin John Akash Maurya Rasika Shinde Rahul Wable	Chronic Kidney disease Predication & Recommendation of suitable Diet Plan by using Machine Learning	**3rd Biennial International Conference** on Nascent Technologies in Engineering (ICNTE) January 4-5, 2019
4.	Ronnie Thomas Adarsh Saroj Shantanu Wagh Annapurna Pandita	Image Morphing and detection using CNN	**Digital Forensics** 4n6 Journal, May 2019 issue
5.	Joel Miranda Jariel Gojar Sheldon Karkada Dylan D'Souza	Integrating the Sam Sensor with the Mars Rover Simulator	**2nd Biennial International Conference**on Emerging Trends on Engineering Science, Technology and Management-19 10th& 11th May 2019 Trivandrum , Kerala
6.	Shivanand Babu Gollagi Krupa Deepak Jariwala Tushar Anil Masane Aleena George	Image Compression Using Generative Adversarial Network	**IEEE Sponsored Global Conference** for Advancement in Technology (GCAT)2019
7.	Shanitamol Sojan Frezy Roy Lijo Varghese	An Android Application for School Information System	**International Journal** of Innovations in Engineering &Technology (IJIET) Volume 13 Issue 1 April 2019

STUDENT ACHIEVEMENTS

2018 – 2019			
Sr. No.	**Student Name**	**Title**	**Details with Positions held**
1	Gyandip Mallahi Akshay Bhosale Joel Miranda D.	Smart city hackathon: CodeJam and Ideathon ENROOT	**First Prize: Cash prize of ₹8000/-** **Event:** Innovate for Mumbai CodeJam and Ideathon on 20th-21stOctober - 2018.
2	Snehit Paunikar, Madhura Dumbre, Mohil Palav, Dylan D'souza, Jariel Gojar Joel Mirinda	Change India Challenge (CIC)-Hackathon **Topic:** "Differentiating two documents"	**2nd Position:Cash Prize of ₹12000/-** **Event:** CIC-Hackathon, Etamax, 28th Feb and 1st March, 2019, FCRIT, Vashi
3	Akshay Bhosale Gyandip Mallahi Nikita Jayakar K.V. Shreenidhi Robin Kurissery Gloria Benny	Smart India Hakathon-2019 **Topic:** Chromatography	**1st Position: Cash Prize of ₹1,00,000/-** **Event:** Smart India Hakathon-2019 during 2nd and 3rd March 2019 at NIT Warangal.
4	Freddy Poly Mendes Edelquinn Nimmy Augustine Shruti Kanatt Neem Patel Shantanu Shinde	Smart India Hakathon-2019 **Topic:** Operational maintenance of critical vehicles using AR/VR	**1st Position: Cash Prize of ₹100000/-** **Event:** Smart India Hakathon-2019 during 2nd and 3rd March 2019 at NIT Jamshedpur.
5	Suresh Kumar Jha Jefin Francis Nixon Paulson	CRECENDO Hakathon-2019 **Topic:** Remote Server management System	**2nd Position:Cash Prize of ₹4500/-** **Event:** CRECENDO Hakathon-2019 during 15th and 16thMarch 2019 at FCRCE Bandra.
6	Dheeraj Kallakuri Sharon Laurance Vinayak Kurup Nikhil Londhe	CSI Project and Poster Competition **Topic:** IoT based Deep learning device(M-LENS)	**1stPosition:Cash Prize of ₹2000/-** **Event:** CSI Project and Poster Competition at Theems College of Engineering Boisar on 11th April 2019
7	Raveena Dandona	Internship	**Unpaid** Internship at CERN Summer Student Switzerland, Zeneva 17th June to 20th July 2019
8	Nirmal Babu	Boxing	**Boxing: Gold medal** Event: Wilson college competition held on 24-25 January, 2019
9	Sahaya Cyril	MEGALEIO 2019	**Second runner up** St John COE on 22nd- 23rd February 2019

10	Tejas Jadhav Dylan D	InCTF (team nullsec)	**7th in Competition** **Event:** InCTF qualification round national level jeopardy style with more than 100 teams participating from all over the India
11	Raveena Dandona	TEDxCOEP	**Speaker at TEDx,** COEP, Pune 03/03/2019
12	Joel Shaju Elson Pinto Parth Shinde Neha Ann J. Rajani Pawar	Texas Instrumentwith Department of Science and Technology (DST) **Title:**The Scouting Pyrocopter - An Automated Fire Extinguishing Drone	**Qualified for Quarter Finals** India Innovation Challenge Design Contest-2018
13	Shreyas L. Soumya H. Riyali P. Ratuja D. Piyush K.	Texas Instrumentwith Department of Science and Technology (DST) **Title:**Robotic Drone Cracks and Fissure DetectorSystem	**Qualified for Quarter Finals** India Innovation Challenge Design Contest-2018
14	Salome Palani	Game of Codes	**Top 30:** Don Bosco Institute of Technology**,** 3rd October 2018
15	Leah Abraham Srividya Inampudi	SKREAM-KJCOE (Sports event)	**2nd runner up** SKREAM-KJCOE, 07-11, January-19
16	Tanisha Mittal	Kathak	**Completed "Kattak"** exam with first class from **"**Akhil Bharatiya Gandharv Mahavidyalaya"
17	Felix Bijju Nair	RANGEELA	**1st position** in RANGEELA Held at SIES Nerul on 19th January 2019
18	Felix Bijju Nair	Symphony 2019	**Runner up** in battle of bands at KJCOE

PROJECT POSTER PRESENTATION WINNERS (P-CUBE)

SEMESTER- VIII (2018-2019)

PROJECT		
	PROJECT TITLE	**TEAM MEMBERS**
I PRIZE	Real –Time fake News Detection	Snehit Paunikar
		Nithin Stephen
		Madhura Dumbre
		Mohil Palav
II PRIZE	Precision time measurement upto resolution of sub nano seconds in between successive collisions	Tanisha Mittal
		Gyandip
		Devashree Tike
		Anoop Panicker
III PRIZE	Disaster Management using Swarm Robotics	Felix Biju
		Jithin Jose
		Sibi Biju
		Leah Abraham

POSTER		
	PROJECT TITLE	**TEAM MEMBERS**
I PRIZE	School Information System	Shanita Sojan
		Frezy Roy
		Lijo Varghese
	Coordinated motion of Swarm Bots for Navigation and Object Retrieval	Ruby Veppineth
		Deepti Paul
		Shruti Paramane
		Akhil Maniprasad
II PRIZE	Dynamic Navigation System using BLE Beacons	Robin Jaison
		Adil Khot
		Gloria Benny
		Akshay Bhosale
III PRIZE	IOT based deep learning device	Dheeraj Kallakuri
		Nikhil Londhe
		Vinayak Kurup
		Sharon Laurance
	Image Forensics	Ronnie Thomas
		Adarsh Saroj
		Shantanu Wagh
		Annapurna Pandita
	InterAR - Interior Decor App using Augmented Reality	Vaishnavi Jadhav
		Reji Jacob
		Rohan Moraes
		Rushikesh Bagul

MODEL		
	PROJECT TITLE	**TEAM MEMBERS**
I PRIZE	Image Compression using GANs	Shivanand Babu Gollagi Krupa Deepak Jariwala Tushar Anil Masane Aleena George
II PRIZE	Disease Detection using Blood Smear Analysis by Quantification of WBC/RBCs	Mrinali Sonawne Ashley Antony Prajakta Wani Deepshikha Zutshi
	Data Science Application to suggest Chronic diseases w.r.t. the Symptom and effective treatment	Bisht Rashmi Kottur Ankita Pophare Navin Raina Yogesh
III PRIZE	AI for Resume Screening	Sujit Amin Nikita Jayakar Pheba Babu Sonia Sunny
	Heart Abnormality Detection using Deep Learning	K.V Sreenidhi Hingis Martin Akshay Pillai Rohan Dominic Gaddam Moses Peter

SUMMER PROJECT PRESENTATION WINNERS

SEMESTER- V (2018-2019)

	PROJECT TITLE	TEAM MEMBERS
I PRIZE	Facial Emotion Detector	Kochara Abishai Aswini K.
		Palani Salome Nelson
		Patel Naeem Niyazahmed
		Pushkarna Himanshu A.
II PRIZE	Face Recognition & Object Detection	Magdum Kaustubh Ashok
		Patel Srujan
		Patil Anuja Dilip
		Shinde Ankita Vijay
	Student Portal	Borhade Vipul Gulabrao
		Gavin Henry Lewis
		Kankariya Akash Sunil
		Waghmare Ashriel Samson
III PRIZE	Business Card Reader	Bothraa Siddhi Raajjhesh
		Dandona Raveena Rajeev
		Jadhav Tejesh Prakash
		Telang Shruti Vikas
	Blind Walk	Mathias Jovin Vincent
		Mathias Sandesh Sunny
		Tiwari Dipak Kamlesh
		Varghese Jacob
	Online Store For Electronics	Agwekar Atharva Ajit
		Makasare Gaurav Rajesh
		Noronha Ryan Sunil
		Philip Prasun Alexander

LIST OF TOPPERS (2018 -2019)

FINAL YEAR TOPPERS

I

Ms. Tanisha Mittal
(9.35 CGPI)

II

Ms. Shanitamol Sojan
(9.32 CGPI)

II

Mr. Shivanand Gollagi
(9.32 CGPI)

III

Ms. Krupa Jariwala
(9.30 CGPI)

III

Ms. Gloria Benny
(9.30 CGPI)

THIRD YEAR TOPPERS

SEMESTER - V

I

Mr.Rajshankar Khattar
(10 SGPI)

II

Mr. Atharva Agwekar
(9.78 SGPI)

II

Ms. Ankita Shinde
(9.78 SGPI)

III

Ms. Shruthi Nair
(9.70 SGPI)

SEMESTER – VI

I

Ms. Anuja Patil
(9.69 SGPI)

II

Mr. Atharva Agwekar
(9.54 SGPI)

II

Mr.Rajshankar Khattar
(9.54 SGPI)

II

Ms. Ankita Shinde
(9.54 SGPI)

III

Mr.Gavin Lewis
(9.38 SGPI)

SECOND YEAR TOPPERS

SEMESTER - III

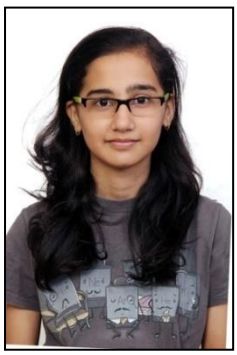
I

Mr. Anthony Thomas
(10 SGPI)

I

Mr. Shreyas Labhsetwar
(10 SGPI)

I



Ms. Sanjana Pradhan
(10 SGPI)

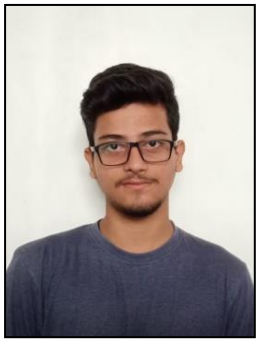
I

Ms. Soumya Haridas
(10 SGPI)

II

Ms. Lieta Lobo
(9.96 SGPI)

III



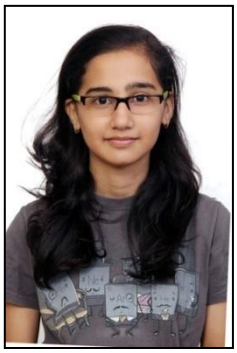
Mr. Sureshkumar Jha
(9.88 SGPI)

SEMESTER – IV

I

Ms. I Srividya
(10 SGPI)

I



Ms. Sanjana Pradhan
(10 SGPI)

I

Ms. Soumya Haridas
(10 SGPI)

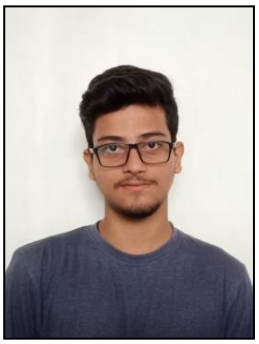
II

Mr. Omkar Jadhav
(9.85 SGPI)

II

Mr. Shreyas Labhsetwar
(9.85 SGPI)

III



Mr. Sureshkumar Jha
(9.81 SGPI)

FINAL YEAR (2015-2019 BATCH)

THIRD YEAR (2016-2020 BATCH)

SECOND YEAR (2017-2021 BATCH)

CSI – ACESS 2018

INDUSTRIAL VISITS

Final Year Students Industrial Visit to Info Tech. Corporation of Goa Ltd.(Itg) , Goa

Third Year Students Industrial Visit to CETTM – Mumbai

Second Year Students Industrial Visit to Xoriant Solutions Pvt. Ltd.– Mumbai

PROJECT POSTER PRESENTATION
(2018-2019)


















Articles Section

1. CYBER SECURITY GAMIFIED

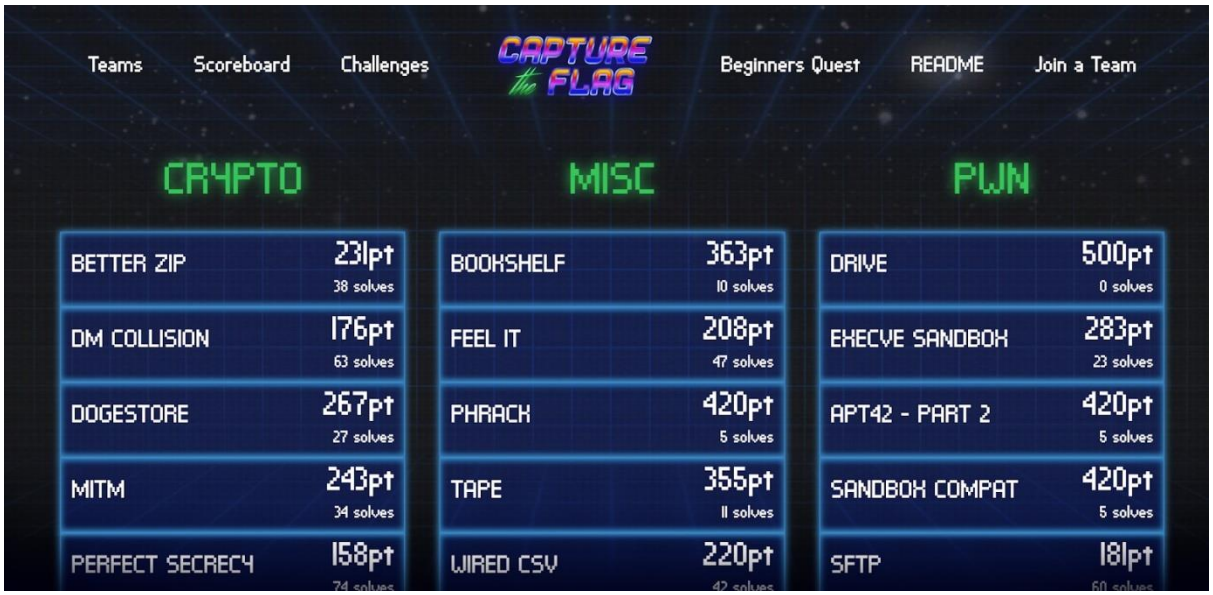
Initialize

Learning cybersecurity theoretically is not as fun as learning it practically, of course you do need to know theory, before getting practical. Because theory is key to exploiting vulnerabilities in software or hardware. Being practical will help you put that theory to use. The fun thing about cyber security is that it's like puzzle solving on steroids basically. One such way to learn cyber security(whilst having fun) is by playing Capture The Flag competitions or CTF for short. This word kind of stems out from the gaming industry, where you have players competing to capture the maximum number of flags.

Ctfs

So what are CTF's in terms of cyber security? Like I said before it's just like the game in which you compete for capturing the maximum number of flags. The CTFs are mainly 2 types(3 actually if you take "king of the hill" into consideration). You have "Jeopardy" style and "Attack-Defense" style.

Jeopardy based CTFs



Jeopardy CTFs have a game style similar to the actual jeopardy game, which is a quiz show. There's a leaderboard with teams of course. There are a set of tasks which need to be completed. Successful completion of these tasks will yield a so called "flag" which can be submitted to the game in order to get points. The tasks range from all the domains of security like web, cryptography, pwn(binary exploitation), reverse engineering, forensics, programming and so on. The top tier one's even have tasks based on 1-Day exploits in which you can try your hand at exploiting real applications like Firefox, Chrome, etc. The scoring is mainly of two types, static and dynamic. In static each task has the same points throughout the game. Where as in dynamic, the

points go on decreasing for a task as more number of teams solve it(which is a better scoring mechanism imo).

Attack-Defense based CTFs

Now let me speak about this type. Last year I had the privilege to attend one such competition which our college team "Nullsec" had qualified for. It was the first time we had ever played something like it, although I knew what it was, but playing it in person was fun. Attack Defense based CTFs are usually onsite CTFs as in you have to actually travel to a physical location(which is kinda cool since you get to see places).Back to the point, in attack defense ctfs, each team has a server assigned to them. These servers have various services running on them, which need to be exploited(attack side) and patched(defense side). Then comes the main flag server. This server is responsible for planting flags on all the teams boxes after regular intervals. The flag server plants a different flag for each of the running services. The job of the attacker is to steal these so called "flags" from the other teams by gaining access to their boxes. How do they do that? They exploit vulnerabilities in the running services. Each of those services have intentional vulnerabilities. It is the job of defense to patch these vulnerabilities. Everything goes in this game, except attacking the infrastructure itself. Now the flags do expire after certain interval, so you gotta keep stealing, here is where automation plays a key role(and where our team screwed up).

Learning a lot…

There's a lot to learn especially if you're new to the scene. I'd suggest creating a team, or play for any open team. The reason I say play with a team, is because each and every member has a unique perspective about a problem, that helps a lot(playing alone is no fun, and it won't take you very far). Learn Python or any scripting language(I cannot stress how important this is). Get used to reading documentation(the devil is in the details). Play often and learn from other teams. If you get stuck on a problem, once the game is over you can like read "writeups" which are solutions to the

problems which were solved by other teams. Even if the team didn't do a writeup, but still solved it, shoot them an email or contact them on irc, chances are they're more than willing to help you out. Learn your basics well, then build upon that. Staying up to date is key. Recently they've even started adding tasks based on blockchain(yes that can be exploited to). Some techniques get outdated and new ones come into play, and CTFs stress a lot on new techniques. You should be convinced by now of how important it is to keep learning by the amount of times I've used "Learn" in the last few sentences. Usually you need to shutdown your service, for patching, the more time the service is down the more penalties you get, in this case you can use the flag servers interval (or so called tick) time to your advantage, basically patch in between ticks.

It changes your perspective

Over the past three years, learning to do binary exploitation, watching other people do it, playing around with reverse engineering has really changed my prespective. Trust me, you will not even look at malware the same way after you play CTFs. What is malicious code? It's just code to me now, which will get me from point A to point B in the unintended way. Always remember, there's always a way, always.

Meet amazing people

The onsite thing, has the perks of socializing. You get to learn a lot from meeting other people and speaking to them. They may (always) do things differently than you, which may be quite interesting. Not everyone solves problems the same way. Speaking of people, there are a lot of youtubers out there who belong to really amazing CTF teams whose channel you should subscribe to, like Gynvael Coldwind from DragonSector and LiveOverflow from ALLES!.

The perks

Seeing those points get added on a problem you solved is an indescribable feeling, especially when the problem is hard. You get to learn technology in depth I feel through CTFs, the details really matter in these games. You learn weird tricks, no one in their right mind would have thought of, and kind of blow your own mind in the process. Having in depth knowledge is extremely useful in the cyber security field, it helps you overlook fewer things. I'm gonna be honest with you, it is challenging. Everything is at the beginning, but once you do it(this is the hardest part-getting yourself to do something), you'll find it easier. Some may argue that these challenges are unrealistic, but I'd say that it does help you become a better programmer at the end of the day. All this knowledge you learnt will also help you be in a better position for cyber security as a career. Cheers!

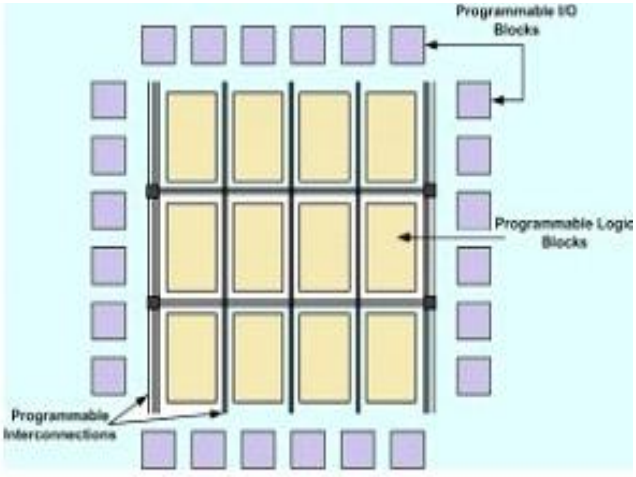
- Dylan Dsouza
(B.E. COMP)

2. FIELD PROGRAMMABLE GATE ARRAYS (FPGA) –A POWER HOUSE OF THE PARALLEL WORLD

As a final year student, I had the opportunity to work with these extremely parallelisable devices during a project with the Tata Institute of Fundamental Research. Our main aim was to make use of these devices to build a time to digital converter (TDC) which is somewhat like a digital watch that could measure time up to a resolution of sub nanoseconds. This was very essential in the application of detecting the exact time at which two high energy beams collided in the Large Hadron Collider located in CERN, Geneva for accurate collision reconstruction. The TDC was built on an FPGA board because of its ability to perform complex operations efficiently and in less time due to its powerful parallel processing capabilities.

A field-programmable gate array (FPGA) is an integrated circuit (IC) that can be programmed “in the field” (by the developers or consumers) after manufacture. FPGAs are similar in principle to, programmable read-only memory (PROM) chips. This means that whatever is programmed onto an FPGA is lost the second it is switched off. The FPGAs are usually configured using a Hardware Description Language (HDL) like VHDL or Verilog using IDEs like Vivado or Xilinx ISE.

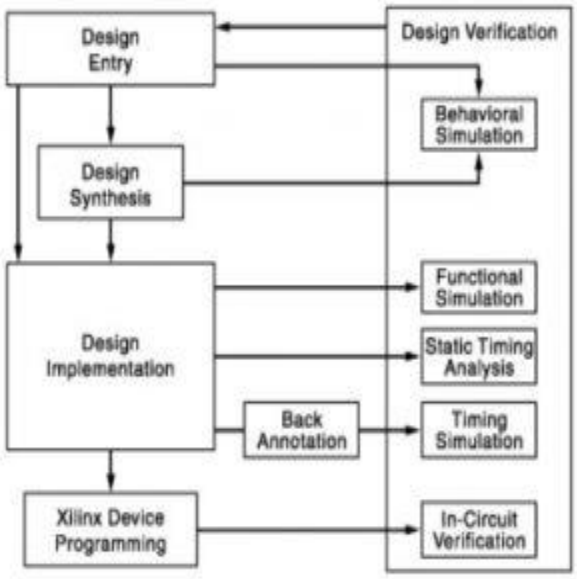
FPGAs contain an array of programmable logic blocks (PLB) - which consist of a multitude of gates, latches, flip-flops etc. and a hierarchy of "reconfigurable interconnects" that allow the blocks to be "wired together". Basically, it is up to the programmer to decide which blocks shall be used for the program and how the blocks will be connected together. This is specified using a constraints file. Logic blocks can be configured to perform complex combinational functions, or merely simple logic gates like AND and XOR. Many FPGAs can be reprogrammed to implement different logic functions allowing flexible reconfigurable computing as performed in computer software.



An FPGA can be used to solve any problem which is computable. Their advantage lies in that they are significantly faster for some applications because of their parallel nature and optimality in terms of the number of gates used for certain processes. Another trend in the use of FPGAs is hardware acceleration, where one can use the FPGA to accelerate certain parts of an algorithm and share part of the computation between the FPGA and a generic processor. The search engine Bing is noted for adopting FPGA acceleration for its search algorithm in 2014. As of 2018, FPGAs are seeing increased use as AI accelerators including Microsoft's so-termed "Project Catapult" and for accelerating artificial neural networks for machine learning applications.

FPGA Architecture Design Flow

These are basically steps of how a program is written and burned on to an FPGA board. FPGA Architecture design comprises of design entry, design synthesis, design implementation, device programming and design verification. Design verification includes functional verification and timing verification that takes place at the time of design flow. The following flow shows the design process of the FPGA.



FPGA Architecture Design Flow

Design Entry

The design entry is done in different techniques like schematic based, hardware description language (HDL) and a combination of both etc. If the designer wants to deal with hardware, then the schematic entry is a good choice. If the designer thinks the design in an algorithmic way, then the HDL is the better choice. The schematic based entry gives the designer a greater visibility and control over the hardware.

Design Synthesis

This process translates VHDL/ Verilog code into a device netlist format, i.e. a complete circuit with logical elements. The design synthesis process will check the code syntax and analyse the hierarchy of the design architecture. This ensures the design optimized for the design architecture. The netlist is saved as Native Generic Circuit (NGC) file.

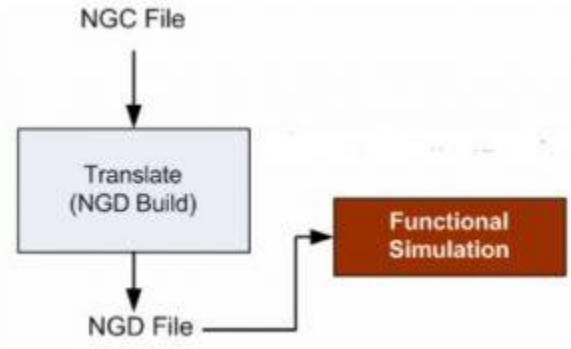
Design Implementation

The implementation process consists of

- Translate
- Map
- Place and Route

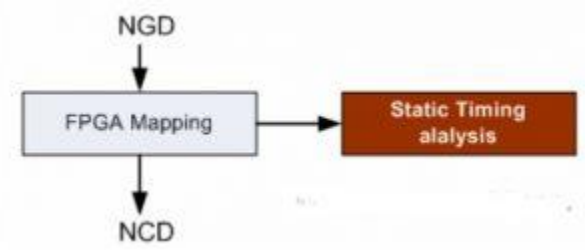
Translate

This process combines all the input netlists to the logic design file which is saved as NGD (Native Generic Database) file. Here the ports are assigned to the physical elements like pins, switches in the design. This is stored in a file called User Constraints File (UCF).



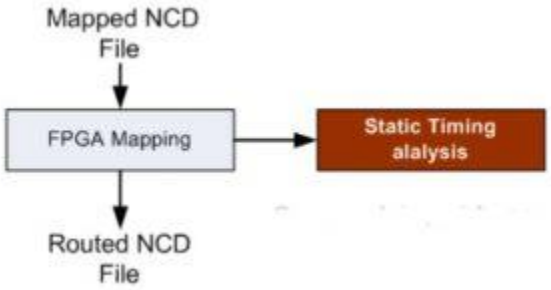
Map

Mapping divides the circuit into sub-blocks such that they can be fit into the FPGA logic blocks. Thus this process fits the logic defined by NGD into the combinational Logic Blocks, Input-Output Blocks and then generates an NCD file, which represents the design mapped to the components of FPGA.



Routing

The routing process places the sub-blocks from the mapping process into the logic block according to the constraints and then connects the logic blocks.



Device Programming

The routed design must be loaded into the FPGA. This design must be converted into a format supported by the FPGA. The routed NCD file is given to the BITGEN program, which generates the BIT file. This BIT file is configured to the FPGA.

Design Verification

Verification can be done at various stages of the process.

1. Behavioural Simulation (RTL Simulation)

Behavioural simulation is the first of all the steps that occur in the hierarchy of the design. In this process, the signals and variables are observed and further, the procedures and functions are traced and breakpoints are set.

2. Functional Simulation

Functional simulation is performed post-translation simulation. It gives the information about the logical operation of the circuit.

3. Static Timing Simulation

This is done post mapping. Post map timing report gives the signal path delays. After place and route, timing report takes the timing delay information. This provides a complete timing summary of the design.

Due to the powerful and flexible capabilities of the FPGA device it is an upcoming player in a lot of applications that need to be optimised.

-Tanisha Mittal
(B.E. COMP)

3. ROBOTS TAKE OVER FARMS FASTER THAN EXPECTED THROUGH AI POWERED EQUIPMENT START-UPS

Robots are taking over farms faster than anyone saw coming, as the first fully autonomous farm equipment is becoming commercially available. Artificially Intelligent machines capable of 'learning through experience' will be able to completely take over a multitude of tasks.

Tractors will drive with no farmer in the cab and specialized equipment will be able to spray, plant, plow and weed cropland. It is all happening well before many analysts had predicted, thanks to small scale as well as large scale start-ups all over the world.

While industry leaders have not said when they will launch similar offerings, Saskatchewan's Dot Technology has already sold some so-called power platforms for fully mechanized spring planting.

In India, Green Robot Machinery is leasing weed-killing robots that can also do tasks like mow and spread. The companies have said that their machines are smaller and smarter than the gigantic machinery they aim to replace.

Suraj Bera, a farmer in Assam, was an early adopter as part of a pilot programme for Green Robot Machinery last year. He used four robots, each about the size of a truck, to kill weeds.

In years past, Mr Bera had used a 120-foot wide, 16-ton spraying machine that "looks like a massive praying mantis". It would blanket the field in chemicals, he said.

But the robots were more precise. They distinguished the dull brown colour of the farm's paddock from green foliage and targeted chemicals directly at the weeds. It is a task the farmer does two to three times a year over 20,000 acres. With the robots, Mr Bera said he can save 80 per cent of his chemical costs.

"The savings on chemicals is huge, but there's also savings for the environment from using less chemicals and you're also getting a better result in the end," said Mr Bera, who has run the farm for about 25 years.

Machinery that uses automation for tasks right now is more beneficial to farmers than autonomous equipment. Artificial intelligence, deep learning and advances in computer vision are going to transform agricultural machinery even further.

Automation is a never-ending journey -- there's always something that will get better over time, and there's so much opportunity that scientists are prioritizing automation over autonomy.

A modern tractor does thousands of tasks and to provide a fully autonomous solution, a deep understanding of each of those tasks is needed to automate them.

While CNH Industrial revealed a sleek, aggressive-looking prototype in 2018 to much fanfare, the product is still in testing phase and not yet commercially available. For some tasks, current equipment is oversized, and smaller machines might be able to successfully scout a field, for instance.

Farmers have a demand for productivity, and they'll take it in whatever way they can get it, and technology is the new way.

Further strides in the field of Artificial Intelligence, and its integration with non-conventional forms of energy , are going to be the driving force for automation in agricultural industry all over the world.

- Shreyas Labhsetwar
(S.E. COMP)

4. HEALTHCARE & 3D PRINTING

World's first 3D printed breathing organ could help end the organ shortage.

"We envision bioprinting becoming a major component of medicine and healthcare within the next two decades."

Bioprinting is an additive manufacturing process where biomaterials such as cells and growth factors are combined to create tissue-like structures that imitate natural tissues.

Currently, bioprinting can be used to print tissues and organs to help research drugs and pills. However, emerging innovations span from bioprinting of cells or extracellular matrix deposited into a 3D gel layer by layer to produce the desired tissue or organ.

Getting an organ transplant is a nearly impossible process. As a result, over one in ten people awaiting an organ transplant will die before they get it, and there are thousands of people waiting. Scientists have been hard at work for a long time and today have gotten one step closer with a breakthrough in the development of bioprinted organ's vascular (blood) networks.

For the last several years, researchers have been unable to construct an organ's vascular network with the strength or complexity needed. Previous attempts at a complex system have popped on the first 'breath,' while simpler and stronger systems can't get enough oxygen and nutrients around. A team of researchers from Rice University in Texas have developed a bioprinting method that lets them dial up the complexity while maintaining strength, letting organs breathe, so to speak.

As proof of concept they printed a penny-sized part of a lung that could inject oxygen from the surrounding environment into the de-oxygenated blood that flowed through it. Their method could be scaled up one day to construct an entire lung or further developed into other organs, and it could even be made using some of a patient's own cells to prevent organ rejection.

In a front-page article in Science, they explain how they did it: hydrogel and food dye. Building on an open-source bioprinting technique called stereolithography apparatus for tissue engineering, the scientists 3D printed the vascular network layer by layer out of a new type of light-sensitive hydrogel (a material with similar conditions to the body). The hydrogel is incredibly special because it accepts a wide variety of cells that are embedded into it, and because it hardens in the presence of blue light, allowing each layer to be molded then solidified.

"Our organs actually contain independent vascular networks - like the airways and blood vessels of the lung or the bile ducts and blood vessels in the liver. These interpenetrating networks are physically and biochemically entangled, and the architecture itself is intimately related to tissue function," said Dr. Jordan Miller, the study's leader.

A challenge arose when the light shone on a new layer would affect the layers beneath it – a consequence of the transparency of the hydrogel. When considering potential opaque liquids that were biocompatible, there was an obvious solution: yellow food dye. The dye blocks enough of the light in hardened hydrogel without hindering the process in the liquid hydrogel, letting the researchers increase the fidelity of the printing.

The obvious long-term goal of the research is to bioprint fully functioning organs, but a stop-gap measure to solve the organ shortage might be stop-gap organs. With the average waiting time for an organ being 3.6 years, synthetic organs with shorter lifespans might be given to patients until a real organ or a long-term synthetic organ can be sourced.

It's pretty clear that bioprinting will only continue to develop. It will surely justify its value both from a moral and ethical perspective, which is always a major challenge in technologies associated with nature. Let's see where the technology is in a few more years!

- Anthony Thomas
(S.E. COMP)

5. 5G TECHNOLOGY – A LEAP INTO THE FUTURE OR CONTROVERSY'S CHILD

"5G is nowhere and yet it's everywhere". This was the general mood of the people on the twitter whilst discussing about the on-going diplomatic tussle between USA and China .

It is a part of a mostly made-up race for internet dominance among nations as well as competing mobile providers. It's billed as a cure-all for rural broadband and crumbling national infrastructure. It's considered the backbone of our autonomous future and, by extension, insurance of our future technology supremacy. It's also at the center of a dispute between the US and China over espionage and trade.
So what makes 5 – G Technology so important ?

It is actually fast

Each wireless upgrade has brought faster speeds as well as new ways to use those speeds. The move to 4G from 3G, for example, allowed people to watch high-definition video on their phones and made possible numerous adjacent technologies and inventions like Snap chat, Face Time, and even Uber.

"From an industry and consumer perspective, people are just ready for that next wave of innovation," Adriane Blum, director of communications at Ookla, told Recode. "People will find ways to use new levels of connectivity whether or not we can imagine it now. If the bandwidth is available, industry and consumers will find ways to maximize it."

5G, which is much faster and has lower latency than 4G, will allow people to download entire movies to their phones in seconds rather than minutes. Such speeds could enable the expansion of everything from self-driving cars to telemedicine, as well as stuff we haven't thought of yet.

For people who spend an increasing amount of their time online, fast mobile internet is a very good thing. For an economy that increasingly relies on technology companies to increase its wealth, slow mobile speeds are a nonstarter.

To improve rural broadband connectivity

Urban India has 295 million Internet users and rural 186 million. While rural India saw Internet usage grow at 14.11% year-on-year, compared to urban India which grew at 9.66%, this was mainly due to a low base effect as the total number of Internet users in rural India is still critically low, the TRAI report points out.
Many have pointed to 5G mobile internet as a way to overcome the problem, but it's not a silver bullet. The 5G in rural areas won't have as much capacity as in cities, and people will run up against expensive and limited data plans compared with wired broadband.

Rather, 5G is one of many partial solutions to fixing rural broadband connectivity, including more wire line infrastructure spending, using the spaces between television channels in what's referred to as "super wifi" and increased satellite coverage.

Chinese trade war and surveillance

It's tough to draw the line between the US administrations' son going trade war with China and its more recent battle over Chinese surveillance, but both are threatening a swift rollout of 5G and raising its profile in headlines.

Earlier this month, President Trump banned US tech companies from using telecom equipment that could be a threat to national security — i.e., Huawei, a company that sells 5G telecom equipment. The concern about Huawei is that the Chinese government could intercept information traveling over its networks and then use it for sabotage and espionage. The same day Trump announced his ban, the Commerce Department placed the company on a trade blacklist.

This has an impact on 5G rollout because Huawei makes a lot of relatively affordable networking infrastructure that's needed to build out 5G in the first place. Huawei is also further along in the development of this tech than other companies and already has plenty of infrastructures in place around the world, both in terms of pre-existing 4G networks and in groundwork for 5G.

The Huawei ban seemingly runs counter to Trump's declaration earlier this year that "America must win the race to 5G" to ensure "national competitiveness" and to " improve Americans' lives," though the president did say in the same speech he'd loosen regulations and free up more 5G spectrum to help get the ball rolling.

These promises are politically important since the US has some of the slowest and most expensive internet connectivity among its peers. In April, the US ranked No. 33 in mobile download speeds globally and ninth in fixed broadband speeds, according to Ookla.
In this day and age, faster internet does mean more opportunity for technological development and, by extension, a better economy.

Still, there are legitimate fears about surveillance and security threats from China and Huawei. US companies and federal agencies have long expressed apprehension about Huawei's potential to be used as a spy for the Chinese government — something the Trump administration has accused it of and which Huawei denies.

Huawei is the "emblem" of a variety of fears about China and its technological prowess packed into a single company, Scott Kennedy, deputy director of the Freeman Chair in China Studies at the Center for Strategic and International Studies . And a lot of concerns about it aren't necessarily tied to what it has done, but instead what it might do.

India and 5 G Technology

India's 5G journey could be underway, finally. It is expected that the trials of the 5G networks will start in around 100 days, and the auction of the 5G spectrum for mobile companies should be completed before the end of the year. This will also put India on the map of 5G countries. Just recently, EE rolled out the 5G network in many cities in the UK, and Vodafone UK has also confirmed that it will switch on the 5G network in July. India could soon join the elite list of countries that has 5G networks, if the timelines laid out by the Telecom Minister Ravi Shankar Prasad are followed for the process. But the rollout will be easier said than done in India, since there are some pending issues that need to be addressed.

First is the matter of how much the operators will have to pay for the 5G spectrum.

In August 2018, the Telecom Regulatory Authority of India (TRAI) had recommended that the Department of Telecom (DoT) should auction 20 megahertz (MHz) blocks in the 3,300-3,600 MHz spectrum band, which has been lined up for 5G, at a price of Rs 492 crore per MHz Surely, these auctions will raise a lot of revenue for the government. To put this into perspective, the government revenue was to the tune of Rs 65,789 crore when the latest round of spectrum auctions happened in 2017.

Marketing, marketing, marketing

In many ways, 5G is a tool in a marketing campaign in which mobile providers are "racing" each other to create an inflated sense of urgency around their products.

Whoever has the fastest service — or at least successfully advertises that they do — will have a leg up among customers. It's a matter of optics. "Obviously there's a lot of pride in being able to role out the network officially to their customer base," Ookla's Blum told Recode.

Let us not forget AT&T's marketing debacle, in which the company began displaying "5G E" branding on customers' phones. Really, 5G E was just 4G with some upgrades, but it was enough to get people interested and testing their phone speeds at higher rates than those without the messaging. When real 5G roles out on consumers' phones, we can expect a whole new round of interest in the technology.

- J Digina Derose
(S.E. COMP)

6. THE FUTURE OF SPACE EXPLORATION-ARTIFICIAL INTELLIGENCE

As automation, AI has also left an indelible imprint on multiple and diverse fields, including image analytics, workflow management, construction, autonomous vehicles, agriculture, communication systems and space exploration. It does seem that very soon these technologies will blast us off to the stratosphere and the metaphor is quite fitting!

AI is already a game-changer that has made scientific research and exploration much more efficient. AI solutions are being increasingly researched and implemented in the space sector for a space age of the future, whose mainstay would be advanced robotics and which might resemble a robotic inter-galactic adventure.

The history of AI and space exploration is older than many probably think. It has already played a significant role in research into our planet, the solar system, and the universe. As computer systems and their software have developed, so have AI's potential use cases. The Earth Observer 1 (EO-1) satellite is a good example. Since its launch in the early 2000s, its onboard AI systems helped optimize analysis and response to natural occurrences, like floods and volcanic eruptions. In some cases, the AI was able to tell EO-1 to start capturing images before the ground crew were even aware that the occurrence had taken place.

ESA(European Space Agency) is supporting and sponsoring many studies into the use of AI for space and spacecraft operations. As of now, spacecraft's need to constantly communicate with Earth-based stations to operate, but the new age space crafts would be able to operate autonomously. This will boost exploration efforts and also significantly reduce the cost of space missions. With complete automation, the need for human intervention would be reduced, saving a lot of time, effort and money.

Since "Journey of a thousand miles begins with a single step", similarly ESA has already started taking a giant leap in AI research. Smart data transmission software aboard the rovers removes the margin of human error which can otherwise lead to fatal consequences. AI has proven to be a powerful tool for sifting and filtering through a virtual ocean of data and its predictive analytics methods would soon be used by many space agencies. Just like ESA, other space agencies are also equally enthusiastic to develop AI capabilities and use it in space programs. The German Aerospace Centre launched an AI assistant that will assist astronauts with their daily tasks on the International Space Station.

NASA is researching to make communication networks more efficient and distortion free by using an AI-based cognitive radio that would increase reliability and minimize noise distortion. NASA also plans to design fully automated launchers and rovers for future missions. It has also joined hands with Google for the exclusive training of AI algorithm that enables sifting data from the Kepler missions and identifying signals from an exoplanet, leading to the discovery of two new exoplanets, which

were previously undetected by scientists. Created under the European Horizons 2020 Framework, ESA and NASA collaborative project called AIDA (Artificial Intelligence Data Analysis), will analyse and process data from space, reduce error margins and expose aberrations.

JAXA, the Japanese Space Agency, has also developed an intelligent system that is aboard the International Space Station clicking and storing pictures of experiments in the Japanese module, KIBO. It was developed to promote the autonomy of extra- and intra-vehicular experiments while seeking to acquire the robotics technology necessary for future exploration missions.

For the past 2,390 days, NASA's Curiosity rover has made its daily trek over the dusty, red Martian landscape, searching for proverbial signs of life.AI is also being used for trajectory and payload optimization, both being the important preliminary steps to NASA's next rover mission to Mars, the Mars 2020 Rover, which is set to land on the red planet in early 2021.

An AI known as AEGIS is already on the red planet onboard NASA's current rovers. The system can handle autonomous targeting of cameras and choose what to investigate. However, the next generation of AIs will be able to control vehicles, autonomously assist with study selection, and dynamically schedule and perform scientific tasks. PIXL's microscope is situated on the rover's arm and needs to be placed 14 millimetres from what we want it to study. That happens thanks to several cameras placed on the rover. It may sound simple, but the handover process and finding out exactly where to place the arm can be as tedious as identifying a building from the picture of a street taken from the roof. This is something that AI is eminently suited for.

AI also helps PIXL operate autonomously throughout the night and continuously adjust as the environment changes—the temperature changes between day and night can be more than 100 degrees Celsius, meaning that the ground beneath the rover, the cameras, the robotic arm, and the rock being studied all keep changing distance. Artificial Intelligence in such rovers help the humans back at mission control to analyse and take pictures of interesting rocks that may contain water.

AI is at the core of all of this work, and helps to double the productivity. So, one of the things that AI does to space exploration is that it opens up a whole range of new possible industries and services that have a more immediate effect on the lives of people on Earth. In a way, space exploration becomes part of people's mindset, and the border between our planet and the solar system thus becomes less important.

So, with the changing pace of technology Artificial intelligence in space exploration is gathering momentum. Over the coming years, new missions look likely to be turbo-charged by AI as we voyage further to comets, moons, and planets and explore the possibilities of mining asteroids.

-Soumya Haridas
(S.E. COMP)

7. LAYMAN'S MACHINE LEARNING

In recent times on numerous occasions, I've come across the dilemma of trying to conceptually explain machine learning without sacrificing a focus on the application that I'm trying to pitch. With competition time constraints and the general need to be concise in delivering pitches, machine learning is a particularly tricky phrase because of the complexity behind its processes. This sort of explanation is becoming more and more important as "machine learning" gains attention as a buzzword. Very rarely will audience members pretend to know how machine learning algorithms will work, and very frequently will they expect an explanation that the average person can understand and relate to. This makes it essential to be able to break down both machine learning as a concept and individual algorithms into digestible pieces. The simplest way to deliver these manageable pieces of information is typically through relatable analogies and anecdotes.

So let's begin with a simple explanation of machine learning with an anecdote that most can relate to: math class. The general framework of teaching math is giving students many practice problems along with the answers. Yes, teachers would likely teach the concept beforehand, but let's assume for the sake of example that the concept is not taught. Each practice problem encodes pieces of information (kind of like input features) that a student (machine learning algorithm) observes alongside the answer (label). We can call this learning process the training of an algorithm.

After tons of practice problems, our hypothetical student is expected to have been able to find some sort of pattern to utilize in order to solve the problem. So we test the student, giving them an exam of questions and comparing the generated answers to the actual answers (similar to the testing of an algorithm). Evaluating the accuracy of the student gives us a measure of the effectiveness of both the student and the set of practice problems they were given. We also know that individual students tend to have different styles of learning. In the same way every machine learning algorithm has a different way of attempting to find patterns within input data. These different styles make different students particularly proficient in particular subjects, just as some ML algorithms are more useful and robust for specific data types.

To summarize the analogy, machine learning algorithms are like math students who are given vast amounts of practice problems and instructed to find methods for solving them by finding patterns between the information within these problems and their associated answers. It's important to be able to find the most effective data (practice problems) to feed to the most effective algorithms (learning styles), because that's where the best performance is generated.

Clearly, this explanation avoids the nuances of both algorithm development and classroom instruction, but it is a handy way of quickly explaining machine learning to someone unfamiliar with the concept. Why is this important? Being able to clearly explain a very complex subject (one that the

average person can recognize as being complex) can make an audience believe in your credibility much more easily. It turns out that the simplification of complex concepts does the opposite of what most would expect. Rather than making the machine learning strategy seem more robust, the simplification communicates to the audience that you aren't just an engineer under the hood, but that you're also someone who can understand more than just the code.

There may exist more fitting analogies to explain machine learning, and that certainly is something that speakers and presenters should take into account. The experiences of your audience will always be the primary factor in determining whether or not they understand your explanations, so it is essential to understand the common theme of the occasion and adjusting the analogy to the commonalities among the audience. In all, keep these considerations in mind and it is not tremendously difficult to craft an explanation to deliver the concept and its applications to an audience in a way that helps them buy into the subject matter. Whether with a math student or corporate executive, machine learning is an idea that is worth sharing, so long as it makes sense to all involved.

- Naeem Patel
(T.E. COMP)

8. NEW AGE PROCESSING UNITS

The Central Processing Unit (CPU) is called the "brain" of the PC. With advancement in technology, this brain is being enhanced by another component – the Graphics Processing Unit (GPU). From an architecture point of view, the CPU consists of multiple cores and cache memory that can handle only a few threads. On the other hand, GPUs consist of hundreds of cores that can simultaneously process thousands of threads. The GPU has a parallel processing architecture. This can accelerate certain software by 100 times over a CPU at improved cost - and power efficiency.

The term GPU has been used from the 1980s. It was popularized by Nvidia in 1999, who marketed the GeForce 256 as "the world's first GPU". The major companies manufacturing GPUs are Nvidia, AMD and Intel. The GPU's capabilities were primarily used for gaming and graphics rendering. However, these capabilities are now used in many other fields that require high computation power. This is called General Purpose Computing on GPUs (GPGPU).

GPUs in Gaming and Graphics

Initially, GPUs were used to speed up rendering and texture mapping which includes defining surface texture, colour information in a graphics model. Later, units for geometric transformations like translation and rotation were added. Graphics tasks are independent from each other. Hence, they are parallelised by using GPUs.

3D objects in a graphics system need to be given textures for the surfaces. The entire scene is then overlaid with lighting schemes. These realistic scenes are obtained using Ray Tracing. Ray Tracing is a concept which determines how a ray of light interacts with its surroundings such that the scene looks realistic. The concept of ray tracing requires a huge amount of processing power to implement. Ray tracing was used for static images or for scenes that can be rendered in advance, for example, in movies. The animation company Pixar made use of ray tracing in the movie 'Cars' for realistic reflections on shiny car surfaces and sharp shadows.

But we are now at a stage where real time ray tracing is now possible. Nvidia's RTX series of cards comes with real time ray tracing features. These new cards split ray tracing into two components – ray casting tracking paths of rays and shading which determines the final appearance. Epic Games, in collaboration with Nvidia and ILMxLAB, gave the first public Star Wars 'Reflections' demonstration of real-time ray tracing in Unreal Engine. This is bound to have a huge impact on the gaming industry.

General Purpose Computing with GPUs (GPGPU)

Due to the large number of cores in GPUs, their processing power is very high. This creates a large speedup. Recent developments have led to addition of shaders in GPUs. Fundamentally, these shaders perform matrix and vector operations. As a result, GPUs are now used for non-graphical applications.

GPUs have accelerated the growth of fields like Artificial Intelligence and Deep Learning. The computationally intensive part of neural networks requires multiple matrix multiplications. These computations can be sped up by using GPUs that can execute concurrently.

An Nvidia GPU accelerated Machine Learning cluster for data science is 1/8th the cost, 1/15th the space and 1/18th the power of a traditional CPU based cluster. Another study shows that Google had built an extremely powerful system for training networks. This system had clusters of CPUs and cost $5 billion dollars. Researchers at Stanford built a similar system in terms of computation power with GPUs. This reduced the cost to $33K with same processing power as compared to Google's system.

GPUs are also being used in scientific computing, bioinformatics, autonomous vehicles, computer vision, computer clusters and many more application areas.

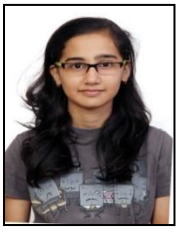
CUDA

CUDA is a parallel computing platform and application programming interface (API) created by Nvidia. It enables software developers to use CUDA-enabled GPUs for GPGPU. CUDA is a software layer that gives access to the GPU's instruction set and parallel computational elements, for executing compute kernels which are routines compiled for high throughput accelerators. While working with CUDA, developers program in popular languages such as C, C++, Fortran, Python and express parallelism through extensions in the form of basic keywords.

Competition to GPUs in AI

Google's Tensor Processing Unit (TPU) is a major competition to conventional GPUs in AI. The TPU is used in neural network computation for Google Photos, Google Translate, Street View. TPU helps to accelerate machine learning workloads using TensorFlow. TPUs enhance performance of linear algebra computations and shorten training time for complex neural networks. Google Brain team lead Jeff Dean tweeted that a Cloud TPU can train a ResNet-50 model to 75% accuracy in 24 hours. Developers can rent on demand Cloud TPU v3 at the rate of US$8.00/TPU hour. The availability of cloud TPU marks the beginning of Google's move into the space of AI accelerators.

All these are examples of how developments in hardware have proven instrumental in accelerating multiple other technologies. While quantum computing matures and comes into mainstream commercial applications, GPUs and TPUs will continue to dominate by providing the necessary computing power.



- Sanjana Pradhan
(S.E. COMP)

9. INTRODUCTION TO OPENGL AND AN OVERVIEW OF ITS FUNCTIONS

Open Graphics Library (OpenGL) is a cross-language, cross-platform application programming interface (API) for rendering 2D and 3D vector graphics. The API is typically used to interact with a graphics processing unit (GPU), to achieve hardware-accelerated rendering. It is extensively in the fields of computer-aided design (CAD), virtual reality, scientific visualization, information visualization, flight simulation, and video games. It is a state-machine, which means it will use the states that have been set or initialized by different function calls, for the output until they are changed and set to different states.

Functions for drawing shapes

To start a shape defined by vertices, we use the glBegin() function. "glBegin()" takes one argument: the type of shape you want to make. Here are some possible arguments:

- **GL_TRIANGLES**
- **GL_QUADS**
- **GL_POLYGON**

A quad is any shape with 4 vertices: a filled quadrilateral. e.g. a rectangle, square, trapezoid, etc. The position of the vertices will define what type of shape it is. Once we are done adding vertices, we use the glEnd() function with no arguments.

Important functions

glutInit() is used to initialize the GLUT library. e.g. glutInit(&argc, argv);

glutInitWindowSize() takes two integer arguments which are non-zero integers, they are "width", and "height" and will be used to set the size of the window in which the output will be displayed. The initial size is 300 by 300.

glutInitWindowPosition() takes two integer arguments that specify the position of the window. The initial position is (-1.0, -1.0).

glutInitDisplayMode() is used to initialize the window states, such as Number Of Buffers, Color Mode, etc. we use Pre-defined Macros separated by "Pipe" or "Bitwise OR" operators to separate these macros while passing them as arguments. e.g.: glutInitDisplayMode(GLUT_DOUBLE | GLUT_RGB | GLUT_DEPTH);

glutCreateWindow("window_name") is used to create a new window with the previously mentioned states set by other functions (e.g. “glutWindowSize()”, “glutInitDisplayMode()“ etc.). It returns the window id for the created window which is an integer value.

glutDisplayFunc(“function_name”) is used to specify the callback for the display function (which is implemented by us) which will be repeatedly called over and over again.

glutMainLoop() is called to begin infinitely calling the user-defined display function specified by “glutDisplayFunc()” method. It usually is called at the end in the main function.

glClearColor() establishes what color the window will be cleared to, and glClear() actually clears the window. Once the clearing color is set, the window is cleared to that color whenever glClear() is called. This clearing color can be changed with another call to glClearColor()

glLoadIdentity() replaces the current matrix with the identity matrix. In simpler terms it resets the current view.

glOrtho() specifies the coordinate system OpenGL assumes as it draws the final image and how the image gets mapped (i.e. projected)onto the screen. It is used for Orthographic Projections.

glFlush() ensures that the drawing commands are actually executed rather than stored in a buffer awaiting additional OpenGL command

- VeeraSai Subramaniam
(S.E. COMP)

10. GOING THE EXTRA MILE!

There is an inherent power of the human spirit to transcend its limits and boundaries. To scale new heights and revel in the wonders of the world. Yet most of us fail to tap into that power. We encounter so many obstacles in this journey of life. The world we live in forces us to conform to its dictates. Our instincts are subjugated. The dark moments of failure trap us. And we are hindered from going the extra mile. But there are a few, who follow their hearts. They are willing to play their hunches and go the extra mile. They are the ones, who have the fire in the belly to subvert the paradigms and as Steve Jobs had said, "put a ding in the universe."

Edison was no stranger to failure. He was labeled a slow learner in school. That did not deter him from nourishing his spirit of enquiry. With his invention, he continues to illumine millions of lives. Beethoven, had been told as a composer he had no future. His music lives on! JK Rowling was a single mother and broke in modern Britain, when she visualized the iconic character of Harry Potter. She had been rejected by several publishers, before launching a series with one of highest readerships of all time. Picasso once etched out a masterpiece for a woman in thirty seconds and demanded a million dollars. She was flabbergasted. But he laughed and said, "My good woman, it took me 30 years to do that masterpiece in 30 seconds."

Back in 1970s, she beheld a vision of providing the best services in Biotechnology. Within the confines of her garage, she started a company which produced enzymes for industrial use. But her path was strewn with hurdles. Nobody knew about enzymes. Banks refused to pay loans to her without a male guarantor. Who would have faith in a company headed by a woman? But, she did not quit. With her dogged perseverance, she battled the insurmountable odds and Kiran Mazumdar Shaw emerged victorious. Biocon, her brainchild, is one of the leading bio-pharmaceutical companies today.

In spite of knowing these stories, why are we afraid to venture on the extra mile?

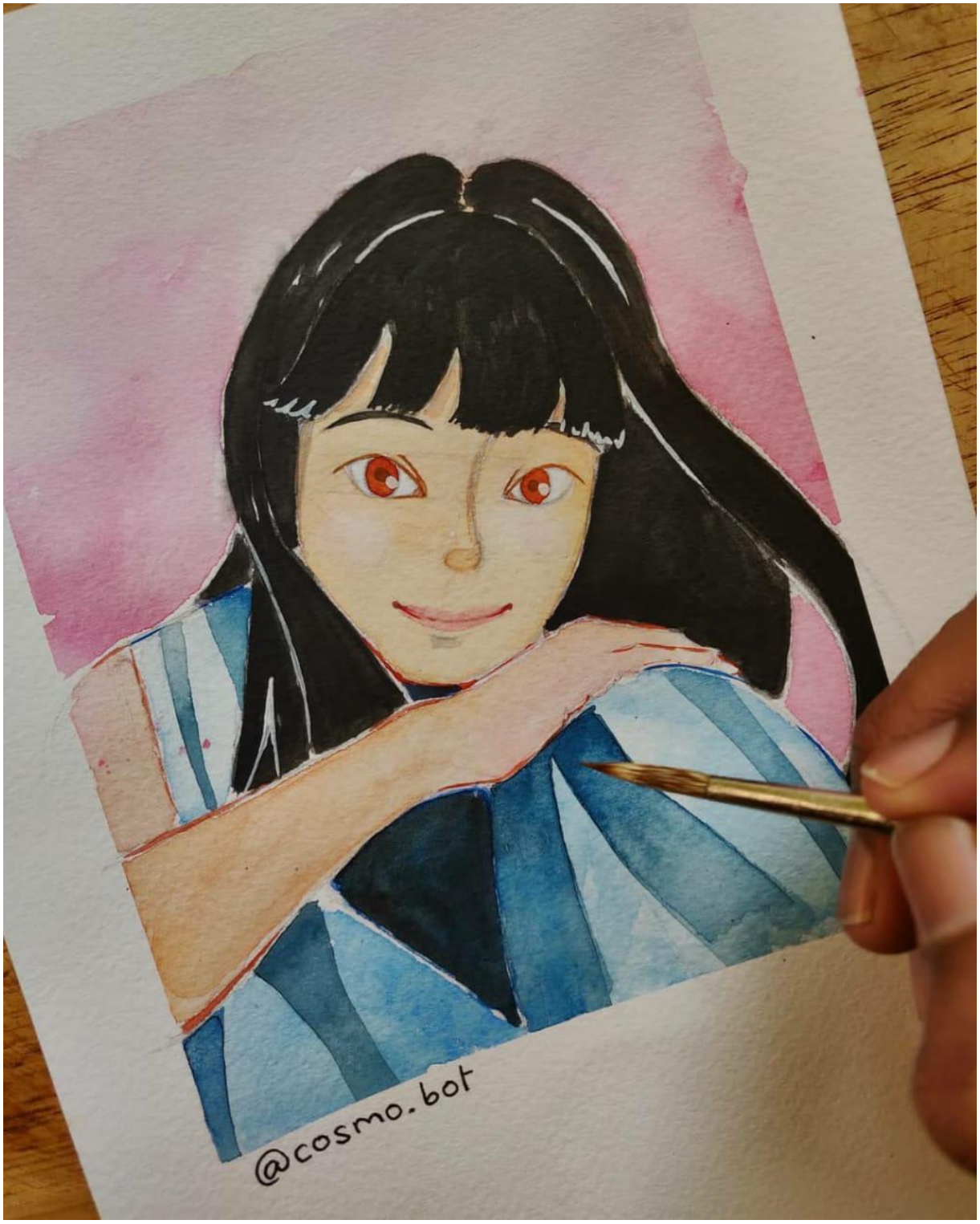
You have got to push the envelope, if you want to leave a mark. Let go of your fears and inhibitions. Immerse yourself into whatever you do. Be committed to your passion. And as Maya Angelou observed,

"If one is lucky, a solitary fantasy can transform a million realities."

- Annapurna Pandita
(B.E. COMP)

Creative Section

-Anthony Thomas
(S.E.-Comp)

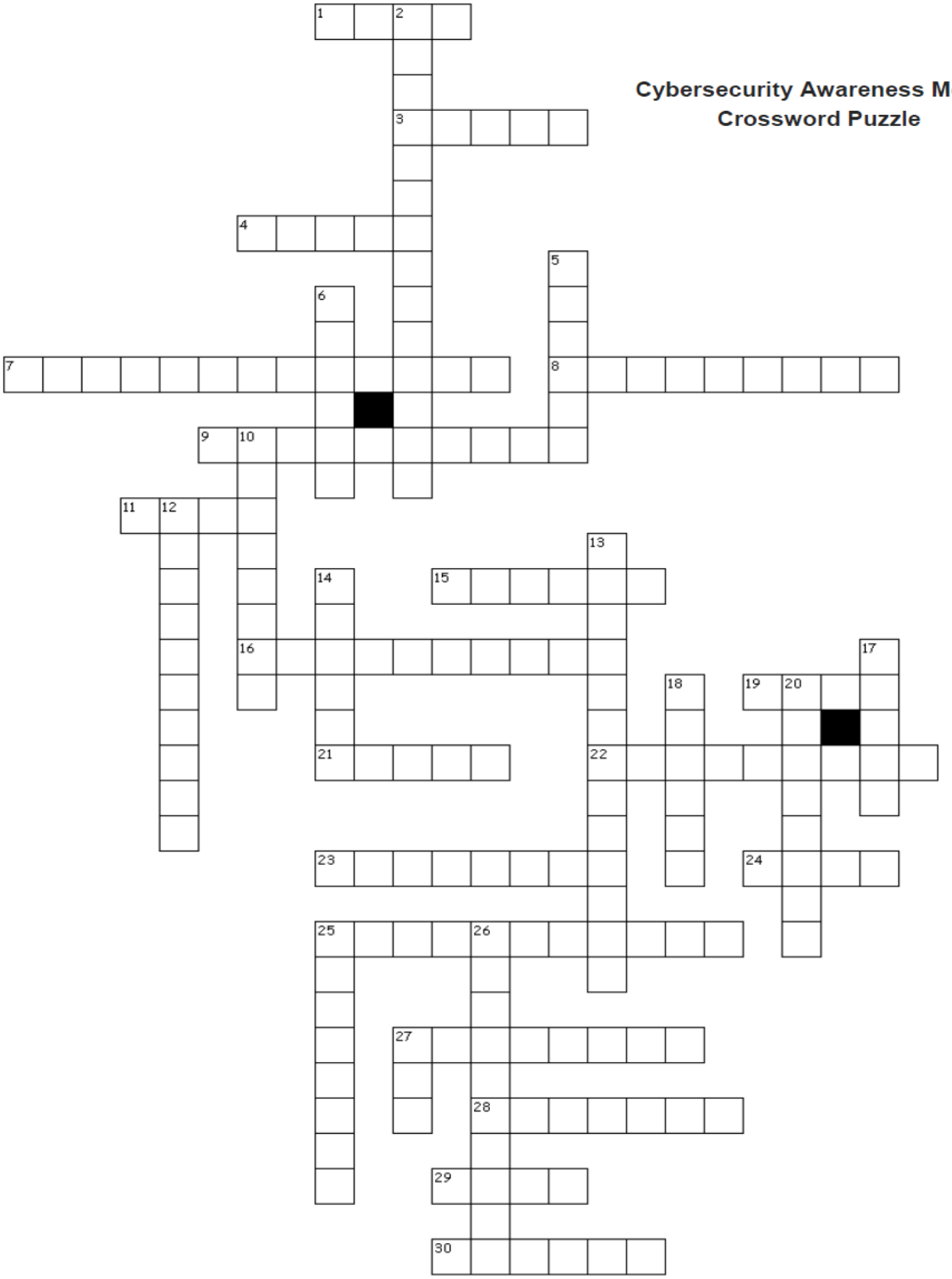


-Anish Patil
(S.E.-Comp)

-Anthony Thomas
(S.E.-Comp)

-Nikita Jayakar
(B.E.-Comp)

Cybersecurity Awareness Month Crossword Puzzle



Cybersecurity Awareness Month
Crossword Puzzle Clues

Across

1. Computer Incident Response Team
3. A software update designed to fix a particular problem or vulnerability
4. The "s" in "_____" stands for "secure" and indicates that communication with a webpage is encrypted
7. Set your computer to _____ check for new software updates
8. A malicious program designed to record which keys are pressed on a computer keyboard
9. The _____ Use of Information Technology (IT) Resources policy (Document# NYS-P14-001) applies to members of the New York State workforce who are provided access to State IT resources
11. Unwanted advertising that comes to your email address
15. A _____ is a copy of an electronic record, maintained to protect the information from loss and often compressed to save space
16. The conversion of digital data into a format unreadable to anyone except those possessing a "key"
19. Any data classified as Personal, Private or Sensitive Information
21. Don't click on _____ within emails from an unknown or untrusted source
22. Software programs that protect your computer from Internet viruses or malicious code
23. Hardware and/or software mechanisms to prevent unauthorized users from accessing a computer network
24. Chief Information Security Officer
25. Never post private and confidential _____ such as your credit card number or password
27. Should contain a minimum of 10 characters using uppercase letters, lowercase letters, numbers and special characters
28. Malicious software that is inserted into a system, usually covertly, with the intent of compromising the victim's data
29. Under Section 208 of the New York State Technology Law, state entities that own or license computerized _____ which includes private information must disclose any breach of the data to New York residents
30. If you receive a suspicious email, the best thing to do is to _____ the message

Down

2. Cybersecurity is our shared _____
5. A piece of digital information generated by a web server and saved in your computer after visiting a website
6. An unauthorized person seeking to maliciously disrupt or damage a computer
10. Lock your _____ and mobile phone when not in use
12. _____ Identifiable Information is any data that could potentially identify a specific individual
13. A weakness of a system or facility holding information which can be exploited to gain access or violate system integrity
14. _____ engineering refers to the methods attackers use to manipulate people into sharing sensitive information
17. A malicious program that spreads by inserting copies of itself into other programs
18. A network of private computers, each of which is called a "bot," infected with malware and controlled as a group without the owners' knowledge
20. An Internet scam that targets unsuspecting users through email
25. A cybersecurity _____ is considered to be any event that threatens the confidentiality, integrity or availability of an entity's information resources
26. A type of malware designed to block access to a computer system or data until a sum of money is paid
27. A Personal Identification Number, commonly assigned to bank customers for use with ATMs and for use with debit cards

**Key at the last page

THAT NIGHT

No wonder why I am sad

Waking up to a dream so bad

Darker than usual was night

As if there would

Never be any twilight

Braver and stronger I stood

Through the petrifying winds not so good

All alone in the night I strolled

Searching for shelter, in the night so cold

Next morning the sun didn't rise

It wrapped a shawl, as a disguise

No wonder why I am sad

Waking up to a dream so bad

-Srividya Inampudi
(S.E.-Comp)

SOCIETY

No matter how you do how you fare

There are people to criticize here and there

For me it's often difficult

The days the sound so critical

All I can do is just give a brittle smile

Realising I have to walk a mile

They put me down in despair

The moment I dream to fly in air

They make me feel tired inside

Like leaves all brown and dried

They think I'm happy cuz I'm smiling

Look into my eyes I'm breaking and crying

-Srividya Inampudi
(S.E.-Comp)

Alumni Section

- Ancy Bejoy

(1998 Batch)

Dear Agnelites

Happy to be part of this magazine today post 21 years of passing out of Fr. Agnels.

I am proud to be part of the first engineering batch that passed out in 1998. I was among the lucky few who got admission in Fr. Agnels Vashi in 1994 in the Computer Engineering batch as the last entry. Roll number "44". Those were the days when India was gearing up to meet the Y2K global challenge and the Internet booming along. Providing lots of opportunity in the Computer world. Let me rewind back to my first year and first day in college. I was glad that my sister too had made it throuh the last entry in Electrical stream. Another interesting story for some other letter. We were a bunch of students spread across Computers, Electronics, Mechanical, Electrical streams. All from various walks of

life.. some aspirational... some lost.. some to enjoy college life.. All were connected as an AGNELITE family.. mostly when it came to assignment submissions

Our late Fr Orlando, the first managing director, ensured strict decorum & discipline. We all cribbed about the gate closing at 8:00am and the assembly all had to attend...However looking back at those aspects has made me value and respect being on time even today. I don't regret that we had a little discipline back in our learning days.

My message to each AGNELITE is – In Fr Agnels you are under the best guidance and mentorship . Utilize these growing years to build your values and knowledge. Promise yourselves to appreciate every job you take..as each brings with it a learning. Remember Oppurtinities mostly come in the form of challenges..so think twice before saying "No".

Wishing you all good luck in your careers and life.

- Ritika Rohatgi

(2005 Batch)

Father Agnel, launch pad of my career provided me with 3 critical components essential for success – discipline, knowledge and network.

Discipline – Being present, being punctual, being prepared to matter what, time management – the ability to complete arduous tasks while still being able to do all the fun stuff – after all college life isn't just about lectures right? Peers have always been surprised by my ability to smile through the toughest situations – I credit it to all the retests and vivas at Agnels ,it's an environment tough enough to make every stone a diamond ..

Knowledge:" The ability to apply knowledge is what separates an engineer from a graduate" Kruthika Mam 2004 .. Words that have stuck with me through the years as I have approached every problem. Life if full of uncertainties and successful corporate careers are built not by what one knows, there will always be grey areas, but how one applies what one knows. I have been fortunate to work

with leadership teams and in Fortune 5 companies and 15 years down the line I may not remember every concept but the systems way of thinking that was ingrained here still exists.

Network: Most important of all, the friends I have made here are still with me, my innermost strength and have guided me through every challenge personal and professional, ensuring I remain level headed in my success and picking me when I am down in the ground.

Thanks Agnels for these!!

- Shimon Johnson

(2017 Batch)

Through the many roles I navigated as a student, a friend, a leader and finally now an alumnus at Fr.CRIT, my myriad emotional experiences make the 4 years I spent in Fr.CRIT very special and dear to me. I've laughed, cried, had happy days and really crappy days as well but above all I learned to be truthful. It's the values I was forced to learn here within the four walls of Fr.CRIT, that I'm now very indebted to and owe my success as an international student. The faculty and staff taught me so many lessons that shaped me into my present role within the student community abroad. I am forever grateful to my alma mater, Fr.CRIT.

- Kane Gonsalves

(2017 Batch)

Today when I look back at my journey so far,Fr Agnels played a crucial role in shaping my personality and making me a confident person. The teachers at Fr Agnels not only gave us theoretical knowledge but helped us get exposure and experience in the real world. I witnessed this in the projects I did in those four years.

Fr Agnel will always be remembered as a stepping stone that helped me reach where I am today.

Cybersecurity Awareness Month
Crossword Puzzle
Answer Key