

DEPT. OF COMPUTER SCIENCE AND ENGINEERING

GOVT. ENGINEERING COLLEGE, PALAKKAD

# QUANTA



QUANTUM COMPUTING  
EDGE COMPUTING  
AI AND ML



DEPARTMENT MAGAZINE 2K21 - 22



**GOVT. ENGINEERING COLLEGE  
PALAKKAD**

# **Government Engineering College , Palakkad**



Government Engineering College Sreekrishnapuram is a premier educational institute established in 1999. It is situated in Palakkad district of Kerala. The college is fully owned by Govt. of Kerala and is under the Directorate of Technical Education, Kerala. GEC Sreekrishnapuram is approved by the AICTE and is affiliated to the APJ Abdul kalam Technological University (from 2015 onwards)...



## **Mission**

To transform youth to talented engineers with creativity and integrity who can meet the technological challenges for the service of society.



## **Vision**

Excellence through the wings of science and technology.



# **Department Of Computer Science and Engineering**

The department of Computer Science and Engineering offering B.Tech in Computer Science and Engineering, M.Tech in Computational Linguistics and PhD under the University of Calicut from 2012 onwards. Later, the programme has been affiliated to APJ Abdul Kalam Technological University since its inception from 2015 onwards.



## **Mission**

To impart high quality education in Computer science and Engineering that prepares the students for rewarding, enthusiastic and enjoyable careers in the industry, academia and other organizations.



## **Vision**

"To become a Centre of Excellence in Computing and allied disciplines."

# Program Educational Objectives (PEOs)

Within a short span of time after graduation, the graduates shall:

- PEO1. Apply good analytic, design, and implementation skills required to formulate and solve computer science problems.
- PEO2. Be employed as computer professionals beyond entry-level positions.
- PEO3. Be able to route their talents to post graduate research program to promote remarkable advancement in emerging areas.
- PEO4. Demonstrate that they can work in a team, communicate, cooperate and continue to learn ethically as responsibly competent and responsible professionals.

- PSO1: Problem Solving Skills: Ability to design and develop computer programs and computer based systems of moderate complexity in the areas pertaining to system software, multimedia, database, networking, artificial intelligence, web- design and information security.
- PSO2: Professional Skills: Ability to apply standard practices and methods in software project management and software development using suitable programming environments to deliver quality product for the industry..

# Program Specific Outcomes (PSOs)



# FROM THE PRINCIPAL'S DESK

**DR. P.C. REGHU RAJ**

PRINCIPAL  
GOVT. ENGINEERING  
COLLEGE, PALAKKAD

I AM HAPPY TO NOTE THAT OUR STUDENTS OF THE COMPUTER SCIENCE & ENGINEERING DEPARTMENT ARE BRINGING OUT A NEW MAGAZINE NAMED QUANTA, WHICH WILL BE A PLATFORM TO PROJECT THE POSITIVE THINGS HAPPENING IN THE DEPARTMENT WITHIN A BROADER CANVAS OF TECHNICAL EDUCATION. IT TRIES TO HIGHLIGHT THE IMMENSE CONTRIBUTIONS THAT THE FIELD OF COMPUTING HAS MADE TO UPLIFT THE QUALITY OF LIFE OF THE PEOPLE THROUGH GENERATIONS. I HOPE THESE STORIES WILL MOTIVATE THE PRESENT GROUP OF STUDENTS TO DEDICATE THEMSELVES TO LEARNING TECHNOLOGY WITH A VIEW TO BRING IN SOCIAL TRANSFORMATION. IDEALLY, THIS EFFORT SHOULD BE A CONFLUENCE OF TECHNICAL PROWESS AND CREATIVE TALENTS OF THE STUDENTS. THE COMBINATION OF ART AND TECHNOLOGY IS A HEADY MIX THAT HAS THE POTENTIAL TO ENSLAVE YOUNG MINDS!

I WISH ALL SUCCESS TO THE TEAM BEHIND THIS EFFORT AND HOPE THAT THE PUBLICATION OF THE FUTURE VERSIONS WILL CONTINUE UNINTERRUPTED FOR A LONG TIME.



# FROM HEAD OF THE DEPARTMENT

**DR. SABITHA S**

HOD,DEPT.OF CSE  
GOVT. ENGINEERING  
COLLEGE, PALAKKAD

I AM DELIGHTED TO KNOW THAT THE STUDENTS OF THE COMPUTER SCIENCE DEPARTMENT ARE LAUNCHING THE DEPARTMENTAL MAGAZINE BASED ON THE THEME - QUANTUM COMPUTING. THIS WORK INDEED EXCHANGES THE INTELLECTUAL IDEAS AND THOUGHTS OF OUR STUDENTS. I APPRECIATE THE AUTHORS OF THE ARTICLE FOR THEIR IDEAS AND OBSERVATIONS. THE DEPARTMENT IS ALWAYS STRIVING FOR STUDENTS' BRIGHT FUTURE AND MAKING THEM COMPETE WITH THE RAPIDLY GROWING DIGITAL WORLD.

THE DRIVING FORCE BEHIND THE ACHIEVEMENTS OF THE DEPARTMENT IS THE ENTHUSIASTIC STUDENTS AND YOUNG FACULTY MEMBERS. THE DEPARTMENT IS ENSURING QUALITY TEACHING. THE DEDICATED FACULTY MEMBERS ARE INVOLVED IN RESEARCH WORK IN PARALLEL, WHICH GIVES ADDITIONAL BENEFITS TO THE STUDENTS FOR THEIR PROJECT WORK AND MOTIVATES THEM TO DO THE RESEARCH-ORIENTED PROJECT WORK. QUALITY TEACHING HELPS STUDENTS TO PREPARE FOR ENTHUSIASTIC AND ENJOYABLE CAREERS IN INDUSTRY AND ACADEMIA.

OUR COLLEGE FACILITATES CO-CURRICULAR ACTIVITIES SUCH AS NSS AND OTHER CLUBS TO IMPROVE STUDENTS' SOCIAL COMMITMENTS AND PERSONALITIES. IN THE POST-COVID TIMES, THESE ACTIVITIES ARE ESSENTIAL IN HELPING THE STUDENTS TO MANAGE STRESS AND STRAINS OF THE COVID PANDEMIC.

I APPRECIATE AND ACKNOWLEDGE THE HARD WORK AND DEDICATION OF THE MAGAZINE COMMITTEE MEMBERS WHO WERE ACTIVELY INVOLVED IN PREPARING AND EDITING THE ARTICLES TO MAKE THEM INTO A FINAL FORM. I CONGRATULATE THE YOUNG MINDS WHO DRIVE BEHIND THIS TO PUBLISH THE MAGAZINE ON TIME.

I THANK THE FACULTY, SUPPORT STAFF, AND STUDENTS FOR THEIR OUTSTANDING EFFORTS. I WISH YOU THE BEST OF LUCK IN YOUR STUDIES AND FUTURE CAREER. I WOULD LIKE TO THANK OUR PRINCIPAL, DR. P C REGHURAJ FOR HIS ONGOING GUIDANCE AND SUPPORT. I WISH YOU ALL THE BEST AND MAY GOD BLESS YOU ALL.



# FROM STAFF EDITOR

**RAJI R PILLAI**

ASST. PROF,DEPT.OF CSE  
GOVT. ENGINEERING  
COLLEGE, PALAKKAD

I FEEL PRIVILEGED TO BE WITH A GROUP OF VIBRANT YOUNG MINDS IN BRINGING OUT THE DEPARTMENT MAGAZINE "QUANTA" SUCCESSFULLY. THIS MAGAZINE WILL SERVE AS A PLATFORM THAT HELPS STUDENTS TO ACQUAINT THEMSELVES WITH THE LATEST TRENDS AND EMERGING TECHNOLOGIES IN THE FIELD OF COMPUTER SCIENCE AND ENGINEERING. ALSO, IT ALLOWS STUDENTS TO SHOWCASE THEIR ACHIEVEMENTS, ACTIVITIES AND THE PROJECTS CARRIED OUT.

I APPRECIATE THE SINCERE EFFORTS AND HARD WORK PUT FORWARD BY THE ENTIRE EDITORIAL TEAM IN GETTING THE MAGAZINE PUBLISHED.

I TAKE THIS OPPORTUNITY TO THANK OUR PRINCIPAL, DR. P. C REGHURAJ, AND THE HEAD OF THE DEPARTMENT, DR. SABITHA S, FOR THEIR CONSTANT SUPPORT AND ENCOURAGEMENT THROUGHOUT THE MAGAZINE PREPARATION. I ALSO THANK ALL THE FACULTY FOR THEIR SUPPORT, STUDENTS FOR THEIR WORK, AND EVERYONE ELSE WHO, EITHER DIRECTLY OR INDIRECTLY, HAS HAD AN IMPACT ON THE MAKING OF THIS EDITION.

HAVE A GREAT TIME GOING THROUGH THE MAGAZINE!



# FROM STUDENT EDITOR

**ABHIRAM V**

S5 CSE  
GOVT. ENGINEERING  
COLLEGE, PALAKKAD

DEAR ALL,

WELCOME TO THE FIRST EDITION OF THE "QUANTA" MAGAZINE OF GOVERNMENT ENGINEERING COLLEGE, PALAKKAD ON THE BEHALF OF THE COMPUTER SCIENCE DEPARTMENT. WE ARE REALLY PROUD TO ACCLAIM THAT THIS MAGAZINE IS BEING ABLE TO COMPLETE ITS OBJECTIVE IN PROVIDING THE STUDENTS THE NECESSARY INFORMATION AND ENCOURAGEMENT THEY REQUIRE. IT'S BEEN A LONG JOURNEY IN CREATING THIS MAGAZINE AND WE HAVE PUT FORWARD A LOT OF EXPRESSION AND ENTHUSIASM IN ISSUING THIS FIRST EDITION OF "QUANTA" MAGAZINE.

WE ARE SURE THAT THE POSITIVE ATTITUDE, HARD WORK, SUSTAINED EFFORTS AND INNOVATIVE IDEAS EXHIBITED BY THE STUDENTS WHO WORKED BEHIND THE SUCCESS OF THIS MAGAZINE WILL BE SURELY STIR THE MINDS OF THE READERS. WE HAVE PUT IN RELENTLESS EFFORT TO BRING THIS DREAM TO A SUCCESSFUL MAGAZINE.

I SINCERELY WISH THAT ALL THE READERS COULD SEE THE BEST IN THIS MAGAZINE AND HOPE THAT THIS MAGAZINE COULD BE APPRECIATED WHOLE HEARTEDLY BY ALL.



# CONTENT

EDGE COMPUTING .19  
FUTURE OF AI AND .28  
MACHINE LEARNING |

PRODUCTS .44  
THORAK .45  
DIALOG MUSIC PLAYER .46 |

BLOGS .52  
GETTING STARTED WITH .53  
SOFTWARE ENGINEERING |

GALLERY .64  
TEAM .68

01

1. QUANTUM COMPUTING  
2. DAVID DUESTCH  
3. QUANTUM COMPUTING  
7. APPLICATION  
12. QUANTUM COMPLEXITY  
15. TIMELINE  
17. QUANTUM CROSS

02

40. PROJECTS  
41. HARITHAKARMA

04

47. ACHIEVEMENTS &  
ACTIVITIES  
48. STUDENT ACHIEVEMENTS  
49. FACULTY PUBLICATION  
50. ACTIVITIES

06

61. PLACEMENTS REPORT  
62. PLACEMENTS

07

08

# QUANTUM COMPUTING





# DAVID ELIESER DEUTSCH

David Elieser Deutsch, known as the father of Quantum Computing , born 18 May 1953. He is a British physicist at the University of Oxford. He is a Visiting Professor in the Department of Atomic and Laser Physics at the Centre for Quantum Computation(CQC) in the Clarendon Laboratory of the University of Oxford. He pioneered the field of quantum computation by formulating a description for a quantum Turing machine, as well as specifying an algorithm designed to run on a quantum computer. He has also proposed the use of entangled states and Bell's theorem for quantum key distribution and is a proponent of the many - worlds interpretation of quantum mechanics. His work on quantum algorithms began with a 1985 paper, later expanded in 1992 along with Richard Jozsa to produce the Deutsch – Jozsa algorithm, one of the first examples of a quantum algorithm that is exponentially faster than any possible deterministic classical algorithm. In his 1985 paper, he also suggests the use of entangled states and Bell's theorem for quantum key distribution.

# What is the difference between a regular computer and a quantum computer?

Classical computers encode information in bits whereas quantum computers use qubits.

## What are qubits?

A qubit is the physical carrier of quantum information and can take values of zero, one, or both at once.

An each qubit can represent both a 1 and a 0 at the same time.

## How it works?

Quantum computers has the potential to solve world complex problems which is beyond the reach even with today's super computers. Classical computers stores information in bits which represent 0 or 1.These 0's and 1's act as a ON/OFF switches which translate into a compute function ,to perform a calculation classical computes test each route one at a time using 0's and 1's.

# What Quantum computers can achieve?

1. It can lead to the discovery of new medicine and materials by unwinding the complexities of molecular and chemical interactions.



2. They can help financial industries to make better investments by finding new ways to model financial data and isolate key global risk factors.



3. Quantum computers can be able to make accurate prediction for complex systems like stock markets.



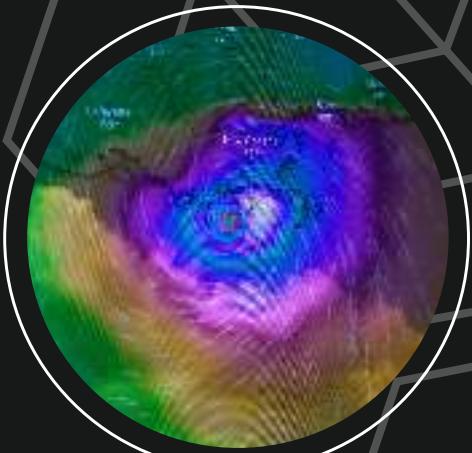
# ADVANTAGES

- The main advantage of quantum computing is that it can even perform classical algorithm calculations. They are also performed easily which is similar to the classical computer.
- If we adding the qubits to the register we increase its storage capacity exponentially.
- In this computing qubit is the conventional superposition state. So there are advantages of exponential speedup to the resulted by handle the number of calculations and method.
- Quantum computing requires less power.
- The other advantage of quantum computing is it can execute any task very faster and very accurately compared to a classical computer. Generally, the atom changes very faster in the case of traditional computing whereas in quantum computing it changes even faster.
- Calculations with quantum computers are particularly promising wherever incredibly complex processes with huge amounts of data are to be analyzed or simulated.
- The application of quantum computing in the future could lead to advancements in artificial intelligence.

# DISADVANTAGES

1. The research for this problem is still continuing the effort applied to identify a solution for this problem that has no positive progress.
2. Qubits are not digital bits of the day thus they cannot use as conventional error correction.
3. The main disadvantage of Quantum computing is the technology required to implement a quantum computer is not available at present days.
4. The minimum energy requirement for quantum logical operations is five times that of classical computers.
5. Quantum CPU will have efficiency and heating problems of its own
6. The computers will be very expensive and therefore only a few organizations and countries will be able to afford them.
7. When a measurement of any type is made to a quantum system, decoherence is totally broken down and the wave function collapses into a single state.
8. It is not known how long it will take before quantum computers achieve the computational power of classical computers. Therefore it is difficult to predict what problems they can solve and for how long this advantage will last.

# APPLICATIONS OF QUANTUM COMPUTING



## 1. Cryptography

One notable application of quantum computing is in attacks against cryptographic systems currently in use. Integer factorization, which underlies the security of public-key cryptosystems, is considered computationally infeasible for a conventional computer for large integers if they are products of several primes (e.g. the product of two 300-digit primes). For comparison, a quantum computer can effectively solve this problem by using the Shor algorithm to find its factors. This capability would allow a quantum computer to break many of the cryptographic systems in use today, in the sense that there would be a polynomial time algorithm (in the number of digits of the integer) to solve the problem. In particular, most popular public key ciphers are based on the difficulty of integer calculus or discrete logarithm problems, both of which can be solved using the Shor algorithm. In particular, the RSA, Diffie-Hellman, and Elliptic Curve Diffie-Hellman algorithms can be broken. These are used to protect secure Web pages, encrypted email, and many other types of data. Breaking these would have significant ramifications for electronic privacy and security.

## 2. Cancer treatment

Medical files of cancer patients often contain up to 100 terabytes of personal data,

typically highly disparate data. This includes blood and tumor values, personal identification numbers, sequencing and treatment data, etc. Efficient use of this wealth

of information was previously nearly impossible due to the lack of suitable processing

mechanisms. As a result, the possibility of applying promising individualized therapeutic

approaches remains theoretical for many types of cancer, in which patients are still receiving standard care.

Now the German Cancer Research Center (DKFZ) in Heidelberg wants to use quantum

computing to advance research in this area.

A more targeted option for patients who do

not respond well to immunotherapy.

Ultimately, it asks which patients can benefit from

which treatment and how. Niels Halama, Senior Physician at the Center, said: There are several applied research questions related to this.

#### 4. Discovery of Materials

Quantum computing has the potential to disrupt almost all industries, with exponential increases in performance compared to classical computing. The interest in quantum computing comes

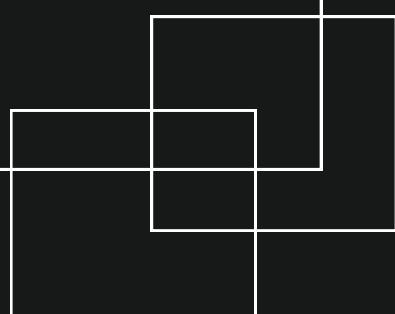
from the considerable amount of computing potential in quantum bits (qubits), which are exceedingly difficult to manage, both in terms of quantity and quality

#### 5. Financial Modelling

Financial modelling is an essential aspect of business accounting and management. It allows businesses to view their current revenue, predict future expenses and make financial decisions based on the financial information it collects. For a finance industry to find the right mix for fruitful investments based on expected returns, the risk associated, and other factors are important to survive in the market. To achieve that, the technique of 'Monte Carlo' simulations are continually being run on conventional computers, which, in turn, consume an enormous amount of computer time.

## 6. Logistics Optimisation

A logistics optimisation process will enable you to increase your supply-chain efficiency. The process can also reduce waste and ensure proper management of sensitive and fragile products such as glass objects or meat. The operating models need to continuously calculate and recalculate optimal routes of traffic management, fleet operations, air traffic control, freight and distribution, and that could have a severe impact on applications. Usually, to do these tasks, conventional computing is used; however, some of them could turn into more complex for an ideal computing solution, whereas a quantum approach may be able to do it.



# QUANTUM COMPLEXITY

Quantum complexity theory is the subfield of computational complexity theory that deals with complexity classes defined using quantum computers ,a computational model based on quantum mechanics. It studies the hardness of computational problems in relation to these complexity classes,as well as the relationship between quantum complexity classes and classical (i.e.,non-quantum) complexity classes.Two Important Quantum complexity classes are BQP and QMA.

# Bounded Error Quantum Polynomial Time

The class of problems that can be efficiently solved by a quantum computer with bounded error is called BQP ("bounded error quantum polynomial time"). In short, BQP is the class problems that can be solved by polynomial-time quantum Turing machine with error probability of at most  $1/3$ . As a Class Probabilistic Problems, BQP is the quantum counterpart of BPP ("bounded error ,probabilistic ,polynomial time"), the class of problems that can be efficiently solved by probabilistic Turing machines with bounded error. There is no proof that BQP is not a subset of BPP which means Quantum computers are more powerful than classical computers in terms of time complexity .BQP is a subset of PP .

## Quantum Query Complexity

It refers to how complex or how many queries to the graph associated with the solution of a particular problem ,are required to solve the problem .Adjacency array model and adjacency matrix model can be used to determine the query complexity of particulary types of graphing problems,including the connectivity,strong connectivity(a directed graph version of the connectivity model), minimum spanning tree, and single source shortest path models graphs



# Quantum

**1980**

Paul Benioff of the Argonne National Laboratory publishes a paper describing a quantum mechanical model of a Turing machine or a classical computer, the first to demonstrate the possibility of quantum computing.



**1981**

Richard Feynman of the California Institute of Technology argues that a quantum computer had the potential to simulate physical phenomena that a classical computer could not simulate



**1985**

British physicist David Deutsch publishes the idea of a "universal quantum computer" that would operate beyond the limits of any classical machine.

**1992**

The Deutsch-Jozsa algorithm is one of the first examples of a quantum algorithm that is exponentially faster than any possible deterministic classical algorithm

**1994**

Peter Shor discovered a quantum algorithm, which allows a quantum computer to factor large integers exponentially much faster than the best known classical algorithm. Shor's can theoretically break many of the Public-key cryptography systems in use today



**1998**

Jonathan Jones, Michele Mosca and Rasmus Hansen of Oxford University publish the first implementation of a quantum algorithm. They use a 2-qubit quantum computer to run Grover's algorithm.



**1996**

Lov Grover, a mathematician at Bell Labs, presents an algorithm that would offer significant quantum advantage in searching unstructured databases.

# Timeline

## 2011

The first commercially available quantum computer is offered by D-Wave Systems

## 1999

Yasunobu Nakamura of the University of Tokyo and Jaw-Shen Tsai of Tokyo University of Science demonstrate that a superconducting circuit can be used as a qubit

## 2012

1QB Information Technologies (1QBit), the first dedicated quantum computing software company, is founded

## 2019

Google announced it had achieved quantum supremacy - marking a huge milestone in the advancement of practical quantum computing

## 2002

The first version of the Quantum Computation Roadmap, a living document involving key quantum computing researchers, is published

## 2017

IBM Research scientists successfully "broke the 49-qubit simulation barrier"

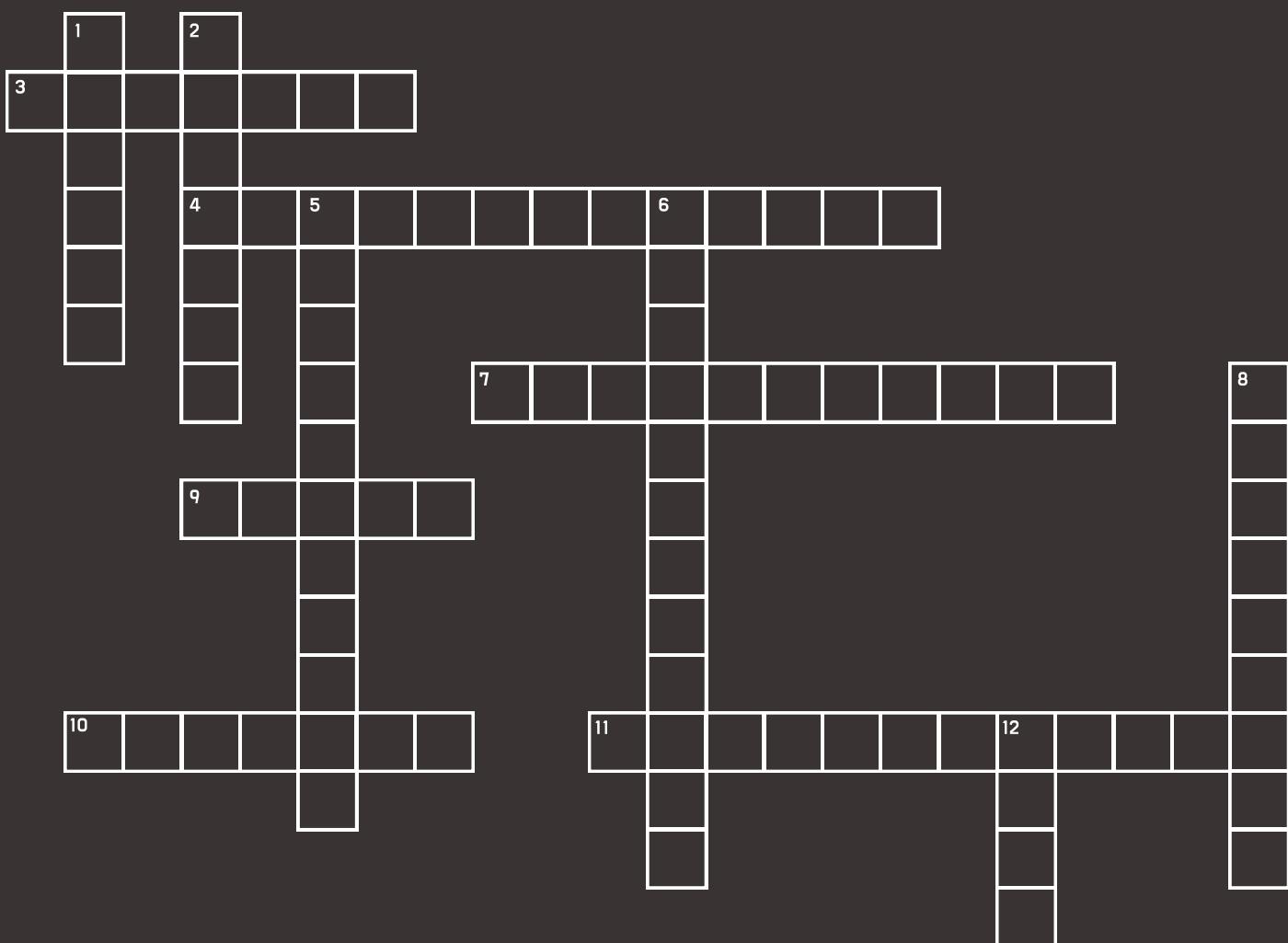
## 2016

IBM Research announced that for the first time ever it is making quantum computing available to members of the public via the cloud

## 2018

IBM, Intel, and Google each reported testing quantum processors containing 50, 49, and 72 qubits

# QUANTUM CROSS

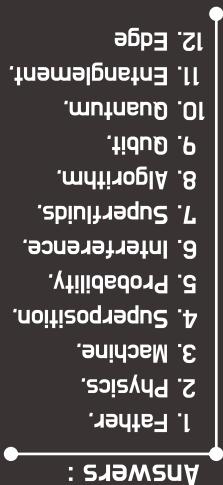


# ACROSS

3. \_\_\_\_\_ Learning is the field of study that gives computers the capability to learn without being explicitly programmed.
4. The theory that states a quantum particle can exists in 2 distinct locations at the same time.
7. The concept states that elementary particles can not only be in more than one place at any given time but that an individual particle can cross its own trajectory and interfere with the direction of its path.
9. Quantum mechanical analogue of a classical bit.
10. The law of physics that apply at the level of individual atoms, electrons and elementary particles.
11. A phenomenon that creates a correlation between two qubits.

# DOWN

1. David Elieser Deutsch, known as the \_\_\_\_\_ of Quantum Computing.
2. \_\_\_\_\_ forms the foundation of quantum computing.
5. Quantum computers perform calculations based on \_\_\_\_\_.
6. The concept states that elementary particles can not only be in more than one place at any given time but that an individual particle can cross its own trajectory and interfere with the direction of its path.
8. An\_\_\_\_\_ is a step-by-step procedure to perform a calculation, or a sequence of instructions to solve a problem, where each step can be performed on a computer.
12. \_\_\_\_\_ computing is an emerging computing paradigm which refers to a range of networks and devices at or near the user.

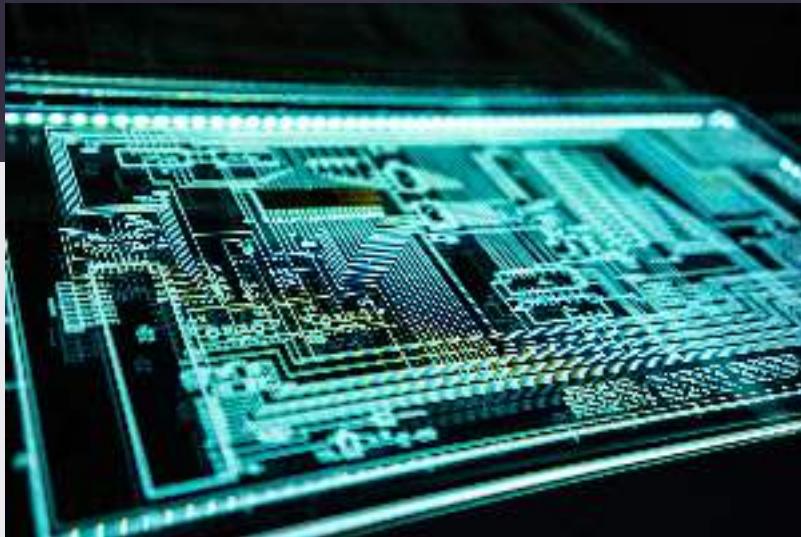




# EDGE COMPUTING

# EDGE COMPUTING

Edge computing is a distributed computing paradigm that brings computation and data storage closer to the sources of data. This is expected to improve response times and save bandwidth. It is an architecture rather than a specific technology. It is a topology- and location-sensitive form of distributed computing.



One definition of edge computing is any type of computer program that delivers low latency

to the requests. Karim Arabi, in an IEEE DAC 2014 Keynote and subsequently in an invited talk at MIT's MTL Seminar in 2015, defined edge computing broadly as all computing outside the cloud happening at the edge of the network, and more specifically in applications where real-time processing of data is required. In his definition, cloud computing nearer to the requests.

Karim Arabi, in an IEEE DAC 2014 Keynote and subsequently in an invited talk at MIT's MTL Seminar in 2015, defined edge computing broadly as all computing outside the cloud happening at the edge of the network, and more specifically in applications where real-time processing of data is required. In his definition, cloud computing

The term is often used synonymously with fog computing. According to The State of the Edge report, edge computing concentrates on servers "in proximity to the last mile network. Alex Reznik, Chair of the ETSI MEC ISG standards committee loosely defines the term: "anything that's not a traditional data center could be the 'edge' to somebody.



Edge nodes used for game streaming are known as gamelets, which are usually one or two hops

away from the client. Per Anand and Edwin say "the edge node is mostly one or two hops away from the mobile client to meet the response time constraints for real-time games' in the cloud gaming context. Edge computing may employ virtualization technology to make it easier to deploy and run a wide range of applications on edge servers

The world's data is expected to grow 61% to 175 zettabytes by 2025. According to research firm. Gartner, around 10% of enterprise-generated data is created and processed outside a traditional centralized data center or cloud. By 2025, the firm predicts that this figure will reach 75%.The increase of IoT devices at the edge of the network is producing a massive amount of data - storing and using all that data in cloud data centers pushes network bandwidth requirements to the limit. Despite the improvements of network technology, data centers cannot guarantee acceptable transfer rates and response times, which, however, often is a critical requirement for many applications. Furthermore, devices at the edge constantly consume data coming from the cloud, forcing companies to decentralize data storage and service provisioning, leveraging physical proximity to the end user.

In a similar way, the aim of edge computing is to move the computation away from data centers towards the edge of the network, exploiting smart objects, mobile phones, or network gateways to perform tasks and provide services on behalf of the cloud. By moving services to the edge,



it is possible to provide content caching, service delivery, persistent data storage, and IoT management resulting in better response times and transfer rates. At the same time, distributing the logic to different network nodes introduces new issues and challenges.

The distributed nature of this paradigm introduces a shift in security schemes used in cloud computing. In edge computing, data may travel between different distributed nodes connected through the Internet and thus requires special encryption mechanisms independent of the cloud. Edge nodes may also be resource-constrained devices, limiting the choice in terms of security methods. Moreover, a shift from centralized top-down infrastructure to a decentralized trust model is required. On the other hand, by keeping and processing data at the edge, it is possible to increase privacy by minimizing the transmission of sensitive information to the cloud. Furthermore, the ownership of collected data shifts from service providers to end-users.

# PRIVACY AND SECURITY



# SCALABILITY

Scalability in a distributed network must face different issues. First, it must take into account the heterogeneity of the devices, having different performance and energy constraints, the highly dynamic condition, and the reliability of the connections compared to more robust infrastructure of cloud data centers. Moreover, security requirements may introduce further latency in the communication between nodes, which may slow down the scaling process. The state-of-the-art scheduling technique can increase the efficiency of utilizing edge resources and scales the edge server by minimum edge resources to each offloaded tasks.

# RELIABILITY

Management of failovers is crucial in order to keep a service alive. If a single node goes down and is unreachable, users should still be able to access a service without interruptions. Moreover, edge computing systems must provide actions to recover from a failure and alerting the user about the incident. To this aim, each device must maintain the network topology of the entire distributed system, so that detection of errors and recovery become easily applicable. Other factors that may

influence this aspect are the connection technologies in use, which may provide different levels of reliability, and the accuracy of the data produced at the edge that could be unreliable due to particular environment conditions. As an example an edge computing device, such as a voice assistant may continue to provide service to local users even during cloud service or internet outages.

## SPEED

Edge computing brings analytical computational resources close to the end users and therefore can increase the responsiveness and throughput of applications. A well-designed edge platform would significantly outperform a traditional cloud-based system. Some applications rely on short response times, making edge computing a significantly more feasible option than cloud computing. Examples range from IoT to autonomous driving, anything health or human / public safety relevant, or involving human perception such as facial recognition, which typically takes a human between 370-620 ms to perform. Edge computing is more likely to be able to mimic the same perception speed as humans, which is useful in applications such as augmented reality where the headset should preferably recognize who a person is at the same time as the wearer does.

# EFFICIENCY



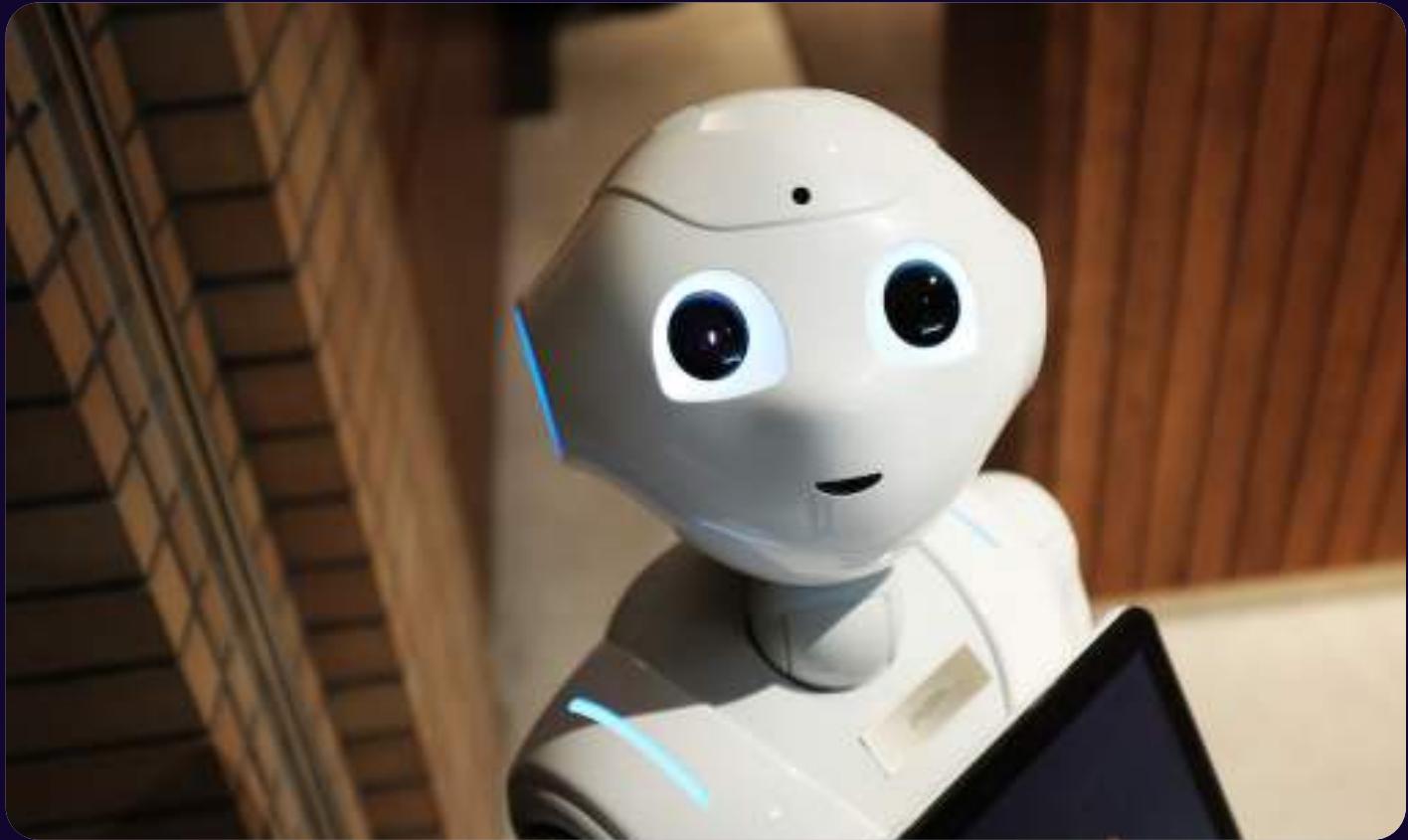
Due to the nearness of the analytical resources to the end users, sophisticated analytical tools and Artificial Intelligence tools can run on the edge of the system. This placement at the edge helps to increase operational efficiency and is responsible for many advantages to the system. Additionally, the usage of edge computing as an intermediate stage between client devices and the wider internet results in efficiency savings that can be demonstrated in the following example: A client device requires computationally intensive processing on video files to be performed on external servers. By using servers located on a local edge network to perform those computations, the video files only need to be transmitted in the local network. Avoiding transmission over the internet results in significant bandwidth savings and therefore increases efficiency. Another example is voice recognition. If the recognition is performed locally, it is possible to send the recognized text to the cloud rather than audio recordings, significantly reducing the amount of required bandwidth.

# APPLICATIONS

Edge application services reduce the volumes of data that must be moved, the consequent traffic, and the distance that data must travel. That provides lower latency and reduces transmission costs. Computation offloading for real-time applications, such as facial recognition algorithms, showed considerable improvements in response times, as demonstrated in early research. Further research showed that using resource-rich machines called cloudlets or micro data centers near mobile users, which offer services typically found in the cloud, provided improvements in execution time when some of the tasks are offloaded to the edge node. On the other hand, offloading every task may result in a slowdown due to transfer times between device and nodes, so depending on the workload, an optimal configuration can be defined.

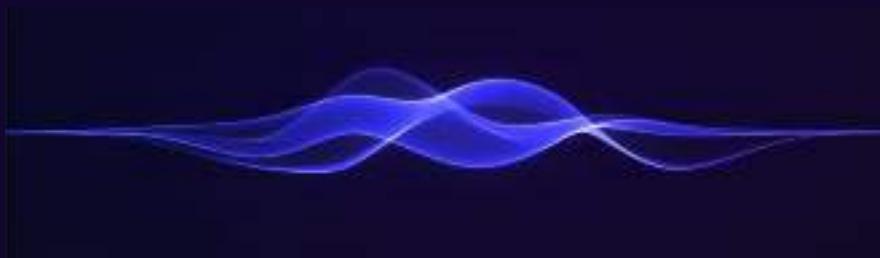
Another use of the architecture is cloud gaming, where some aspects of a game could run in the cloud, while the rendered video is transferred to lightweight clients running on devices such as mobile phones, VR glasses, etc. This type of streaming is also known as pixel streaming.

Other notable applications include connected cars, autonomous cars, smart cities, Industry 4.0 (smart industry), and home automation systems



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# FUTURE OF AI AND MACHINE LEARNING



**Artificial Intelligence** is the simulation of human intelligence by machines. In the field of technology, Artificial Intelligence is evolving rapidly day by day and it is believed that in the near future, artificial intelligence is going to change human life very drastically and will help in ending a lot of major problems faced by humankind and world.

Our life in this modern age depends largely on mobiles and computers. It is almost impossible to think about life without mobiles. So it becomes very important to make computers and softwares intelligent so as to makes our lives easier. Artificial Intelligence is the theory and development of computers, which imitates the human intelligence and senses, such as visual perception, speech recognition, decision-making, logical thinking, translation between human languages etc



**How AI is going to shape our future? ...**



As computers and technology have evolved, this has been one of the most asked questions.

As with many technological developments throughout history, the advancement of artificial intelligence has created fears that one day it will harm us humans who designed it. Just like how labours could lose job because they could be replaced by AI based robots. The reality is probably a lot less dire, but even more complicated.

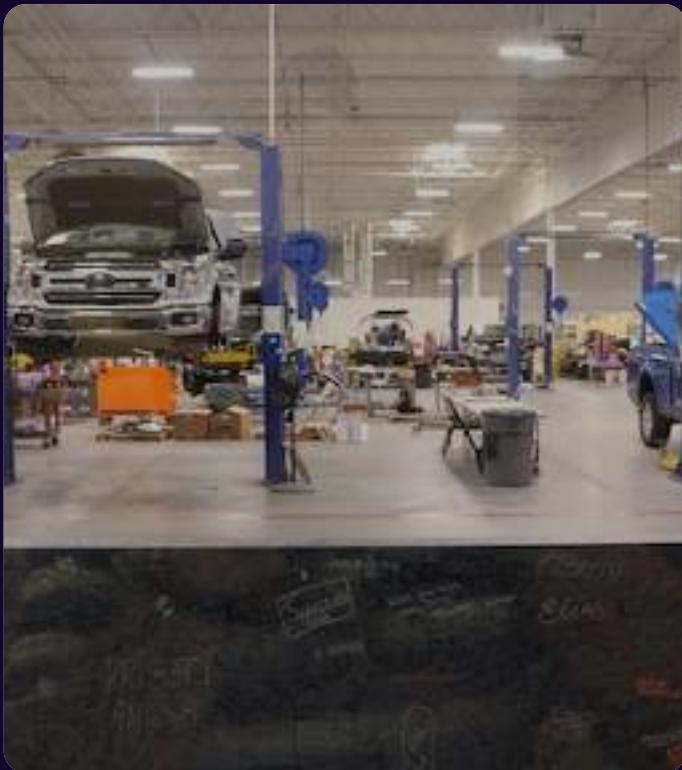
A study by Oxford University and Yale University indicates that AI will outperform humans in many ways and will automate almost all human jobs in the next

120 years. By 2024, AI will be better than humans at translation, will write bestselling books by 2049, and will perform surgeries by 2053.

Here is how ML and AI support various fields:

- **Transportation:**

Although it could take some time to perfect them, autonomous flights and cars will one day ferry us from place to place. For example Tesla is already made their cars fully automated and they're leveraging technologies like big data and AI helped to make that happen.



- **Manufacturing:**

AI powered robots work alongside humans to perform a limited range of tasks like assembly and stacking, and predictive analysis sensors keep equipment running smoothly.

Healthcare & education →



- **Healthcare:**

In the comparatively AI-nascent field of healthcare, diseases are more quickly and accurately diagnosed, drug discovery is sped up and streamlined, virtual nursing assistants monitor patients and big data analysis helps to create a more personalized patient experience.

- **Education:**

Textbooks are digitalized with the help of AI, early-stage virtual tutors assist human instructors and facial analysis gauges the emotions of students to help determine who's struggling or bored and better tailor the experience to their individual needs.



Media & customer service →

- **Media:**

Journalism is harnessing AI too, and will continue to benefit from it. Bloomberg uses Cyborg technology to help make quick sense of complex financial reports. The Associated Press employs the natural language abilities of Automated Insights to produce 3,700 earning reports stories per year — nearly four times more than in the recent past.



- **Customer service:**

Last but hardly least, Google is working on an AI assistant that can place human-like calls to make appointments at, say, your neighborhood hair salon. In addition to words, the system understands context and nuance. Furthermore, Machine learning algorithms help in better serving customers. Chatbots provide immediate response and service to customers.

Here are few of the latest machine learning and AI developments:

## DALL·E 2

DALL·E 2 can create original, realistic images and art from a text description. It can combine concepts, attributes, and styles. It makes realistic edits to existing images from a natural language caption. It can add and remove elements while taking shadows, reflections, and textures into account.

It can also take an image and create different variations of it inspired by the original.



DALL·E 2 has learned the relationship between images and the text used to describe them. It uses a process called "diffusion," which starts with a pattern of random dots and gradually alters that pattern towards an image when it recognizes specific aspects of that image.

In January 2021, OpenAI introduced DALL·E.1, a year later, their newest system, DALL·E 2, generated more realistic and accurate images with 4x greater resolution. DALL·E 2 is preferred over DALL·E 1 for its caption matching and photorealism when evaluators were asked to compare 1,000 image generations from each model.

## AlphaFold

AlphaFold is an AI system developed by DeepMind that predicts a protein's 3D structure from its amino acid sequence. It regularly achieves accuracy competitive with experiment. In CASP14, AlphaFold was the top-ranked protein structure prediction method by a large margin, producing predictions with high accuracy. While the system still has some limitations, the CASP results suggest AlphaFold has immediate potential to help us understand the structure of proteins and advance biological research.



## Bloom

The World's Largest Open Multilingual Language Model:BLOOM is able to generate text in 46 natural languages and 13 programming languages. For almost all of them, such as Spanish, French and Arabic, BLOOM will be the first language model with over 100B parameters ever created.



**176B params · 59 languages · Open-access**

Artificial intelligence is every where,from self-driving cars to automated industrial system to smart home appliances.It is expanding at a rapid speed and scale.That said,this technology is not immune to occasional gaffes.Let us look at some of the goof-ups by AI models!

Microsoft's Tay(bot) turns fascist.

Tay was an artificial intelligence chatter bot that was originally released by Microsoft Corporation via Twitter on March 23, 2016; it caused subsequent controversy when the bot began to post inflammatory and offensive tweets through its Twitter account, causing Microsoft to shut down the service only 16 hours after its launch.



According to Microsoft, this was caused by trolls who "attacked" the service as the bot made replies based on its interactions with people on Twitter. It was replaced with Zo. "Tay" went from "humans are super cool" to full nazi in less than 24 hours.

Satya Nadella, the CEO of Microsoft, summarised the Tay incident as a teaching moment and stated that Tay had changed the mindset of Microsoft's approach towards AI.

In 2017, Facebook (Meta) was forced to shut down one of its AI systems after it had started communicating in a secret language. Similarly, On May 31, 2022, Giannis Daras, research intern at Google, claimed OpenAI DALL-E-2 had a secret language.

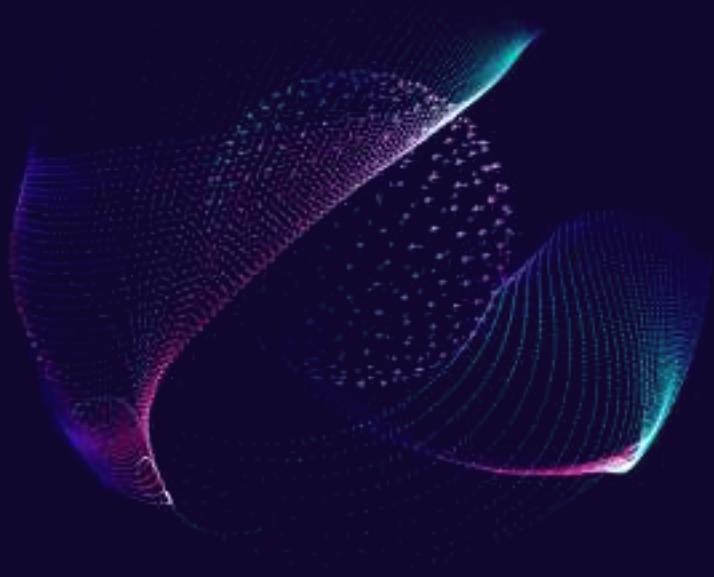


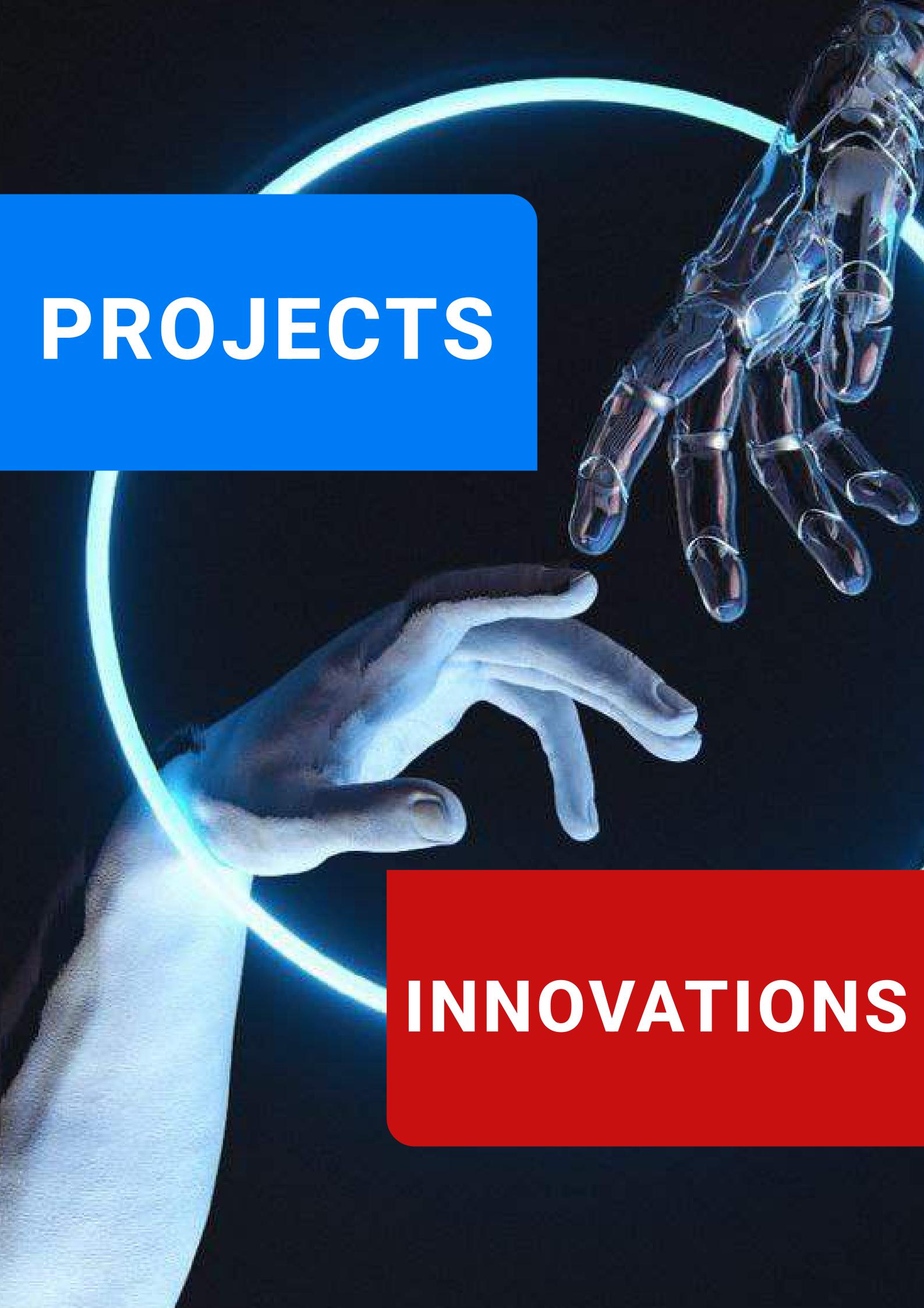
Artificial Intelligence is undoubtedly an futuristic and space-age technology. It is growing day by day, and it is enabling machines to imitate the human brain. Due to its high performance and as it is making human life easier, its demand is increasing in industries every year. But It's no secret that humans dislike and often fear change. This is also coupled with the worry that AI are advancing at a pace that may not be able to be maintained by humankind.

With the advent of AI that reach 'uncanny valley' to those that are able to lie to get what they want, it should be noticed that there is

another side to this coin. While most current applications of AI are used to impact humankind positively, any powerful tool can be wielded for harmful

purposes when it falls into the wrong hands. Let's not forget that while building a better world with AI.





**PROJECTS**

**INNOVATIONS**



AN AID  
AND  
ALTER TO

## GARBAGE COLLECTION

SANKAR VINAYAK

### HARITHAKARMA

Centre for Science and Environment (CSE) surveyed different kinds of cities in the year 2014–15 across the country to understand the status of waste generation in the country. It found that on an average, the generation of waste is 350–600 g per capita per day. As per a 2009 report of the Department of Economic Affairs, per capita waste generation is increasing by about 1.3 per cent annually.

Waste management has become a key milestone and factor in measuring the standard of a city or a state . And garbage collection is the primary and nonexcludable step of waste management.Of course the local governments have already introduced a variety of schemes to solve this problem. The efficient one was the

**the local garbage collection in the panchayat level. This was done on a weekly routine. But this way lays out many disadvantages. The collection may be irregular. There is no way of informing about the routes of collection or time. There may be no one present at the home on the day of collection. There is no existing system to report garbage dumps. So a new software system is proposed to view and manage the current garbage collection in an optimized way.**

**Other than the existing applications our software is built with a mind of applying it in our home state of Kerala. All the users have to do a one time registration to login. They are able to view and edit the profile later. Three different UIs are provided for three categorical users respectively. The first one are the home users who are the benefactors. They can request collection once a minimum size of garbage is ready. They can view when the next collection occurs. They are also able to view their history of actions. Garbage dumps could also be reported with address. Complaints can be registered if they face problems. The second user would be the collection agents. They are the local employees who collect garbage in their designated areas. They will be able to request for a route and the designated wards will be shown. The other user is the administrator who can manage the other two users and control the workflow of the system. One administrator is appointed in every panchayat. They can assign the routes for the collection agents. They can view the reported garbage dumps and complaints and take necessary actions.**

**For security , users are provided with registration and login**

with a unique mobile number and adhar id . Our software can be deployed in web or other operating systems as it was developed using flutter which allows support for cross platforms. An algorithm to automatically give suggestions to the admin user while allocating wards to collection agents is provided. Any problems or limitations or new features can be informed using complaints. New features that could be added are money transactions, announcements, geo-tagging while reporting waste dumps with image uploading etc. The software is tailored to be most personalized to the existing system in our state. It is made to be a secure government controlled system which looks out for almost every problem in the existing systems. The fast developing state and ever-increasing waste generation adds up to the necessity for a systematic step in waste management.



# PRODUCTS

DEVELOPED BY STUDENT

The image shows three smartphones side-by-side, each displaying a different app store page for a product developed by a student.

- Smartphone 1 (Left):** Shows a search result for "music player". The top result is "etlab" with a 3.9-star rating and 71 MB size. Below it are results for Spotify, Music Player, and InShot.
- Smartphone 2 (Middle):** Shows the "etlab" app page on the Google Play Store. The app has a 2.5-star rating from 1K reviews, is 9.9 MB, and is rated for 3+. It is described as an e-campus management system. Similar apps like Inshorts, BYJU'S, and Canva are shown in the "Ads - Related to your search" section.
- Smartphone 3 (Right):** Shows a partially visible app store page for another product, likely related to video editing or media, with sections for "family", "Premium", "Android", "All Format", and "Videos, OTT & Ga...".



# Thorak

By Abhiram V

Thorak is a simple and easy to use android launcher app.

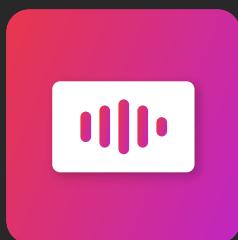
## Developer



Abhiram V  
S5 CSE



Get it on Play Store



# Dialog Music Player

By Vishnu Sanal T

The stock music player on my phone  
needed unnecessary permissions!  
So, I created one on my own :D

Dialog Music Player is the most  
minimalistic music player requiring  
no permissions except to access  
your storage (so that it can play  
your music).



Developer



Vishnu Sanal T  
S5 CSE

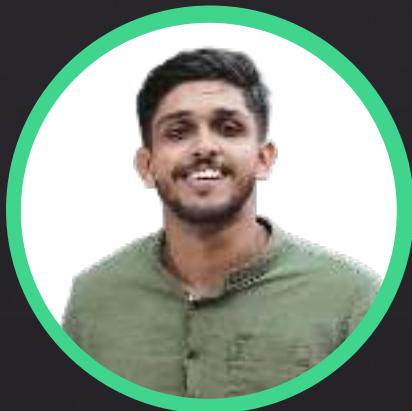
Get it on





# ACHIEVEMENTS

# Student Achievements



**Anshad Ahammed (S5 CSE)**  
selected for Kerala Six-a-side Cricket team and 17th senior national championship on December 2021

## **Vishnu Sanal T (S5 CSE)**

worked as an Android developer as a part of RoboTutor team under Prof. Jack Mostow at the Carnegie Mellon University and is an open source developer and maintainer of Amaze File manager.



# Faculty Publications

- K.Reji Rahmath, P.C.Reghu Rajand, P.C. Rafeeqe, "Pre-trained Word Embeddings for Malayalam Language : A Review, "2021 International Conferenceon Artificial Intelligence and Smart Systems (ICAIS) , 2021, pp.568-572, DOI : 10.1109/ ICAIS50930.2021.9396042
- S.V.Thambi and P.C.ReghuRaj, "Graph Based Document Model and its Application in Key phrase Extraction , "2022 IEEE International Conference on Signal Processing, Informatics, Communication and Energy Systems (SPICES), 2022, pp.92-98, DOI : 10.1109/ SPICES52834.2022.9774141
- S.V.Thambi and P.C.ReghuRaj , "Towards Improving the Performance of Question Answering System using Knowledge Graph - A Survey, " 2022 Second International Conference on Artificial Intelligence and Smart Energy (ICAIS), 2022, pp.672-679, DOI : 10.1109/ ICAIS53314.2022.9742802.
- Reji Rahmath K , P.C.Reghu Raj and Rafeeqe PC (2022) Malayalam and Question Answering System Using Deep Learning Approaches, IETE Journal of Research, DOI : 10.1080/03772063.2022.2077846.
- Panchami, V.U., and Manish, T.I., "Bladder Cancer Prediction Using Genetic Algorithm and Fuzzy Rule-Based System". In 2021 International Conference on Communication, Control and Information Sciences (ICCISc) (Vol.1,pp.1-6). IEEE. <https://doi.org/10.1109/ICCISc52257.2021.9484862>
- Pillai, Raji .R, Chandran, L.S., Das, S.K., Hell, P., Padinhatteeri, S. (2021). Template-Driven Rainbow Coloring of Proper Interval Graphs. In:Mudgal,A.,Subramanian,C.R.(eds) Algorithms and Discrete Applied Mathematics. CALDAM 2021. Lecture Notes in Computer Science(), vol 12601. Springer,Cham. [https://doi.org/10.1007/978-3-030-67899-9\\_36](https://doi.org/10.1007/978-3-030-67899-9_36)
- Pillai,Raji .R,Chakraborty,D.,Chandran, L.S.,Padinhatteri,S(2021).Algorithms andComplexity of s-Club Cluster Vertex Deletion. In: Flocchini, P., Moura, L. (eds) Combinatorial Algorithms. IWOCA 2021. Lecture Notes in Computer Science(), vol 12757. Springer, Cham. [https://doi.org/10.1007/978-3-030-79987-8\\_11](https://doi.org/10.1007/978-3-030-79987-8_11)

# ACTIVITIES

## Faculty Development Program

Department of Computer Science and Engineering conducted 3 days online Faculty Development Program on "Machine Learning and Optimization" sponsored by DTE during 01/12/2021 – 03/12/2021. There were two resource persons – Dr. Chandrashekhar Lakshminarayanan from IIT Madras and Dr. John Paul CI from NIE Mysuru. 46 teachers from various government/aided/self-financing engineering colleges participated in the program.

## An Introduction to Programming in Rust

An expert talk on "An Introduction to Programming in Rust" for B.Tech Computer Science & Engineering students under TEQIP-II FOUR FUNDS ( IIIC ) has conducted on 18th and 19th December 2021 by the CSE department. The resource person was Mr. Pramode C.E, Programmer and Consultant on Free and Open Software based technology, Recursive Labs, Thrissur. A total of 118 students participated in the program.

# BLOGS



November 5, 2022

## Can quantum computers hack?

These machines will enable hackers to decipher public keys, and break through the security of almost any encrypted device or system. When exactly a quantum computing-caused Cyber Doomsday will dawn is unclear, but it could happen in just 10 years' time

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November 6, 2022

**What is Quantum Computing (QC)?,  
Why quantum mechanics?, What is  
the difference between a quantum  
computer and a classical computer?**





# GETTING STARTED WITH SOFTWARE ENGINEERING AS A FRESHMAN

Vishnu Sanal. T , S5 CSE

Hey there! Happy to see that you're interested in CSE. This is the one article that you need to get a kickstart into your software engineering journey. This is not something you would understand in one go. You would need to explore more about the topics mentioned here on your own - through a web search, talking to your seniors or even email software engineers or DM them on Twitter or LinkedIn.

Talking about me, I'm a freshman pursuing CSE in Kerala, India and I have been developing open-source Android apps for quite a while now. I'm trying to walk the same road as you and what I share here are the things that I learned from countless blogs, my seniors and software engineers. These tips helped me get started. Hope they will be as useful to you as they have been to me.

Before getting started, remember that you can achieve your dreams if you persevere and put in the necessary efforts. It's a long game!

I have grouped this article into three sections:

- Beginner
- Once you're no more a beginner
- Intermediate

*"Perseverance is a great element of success. If you knock long enough and loud enough at the gate, you are sure to wake up somebody" – Henry Longfellow*

## **Beginner**

There are a lot of fancy terms you would hear in tech - Full Stack, Machine Learning, Cloud, AI, etc which sound intimidating. A question that comes often is which field are you passionate about and how to get started with it.

One thing to keep in mind is the motivation to code. It is an intrinsic motivation that you should pursue. Do you want to build the next best search engine? Do you wish to build cool consumer-facing apps? Do you wish to work on Mars rovers? If you get started with something that you do not like, you may end up quitting the journey without going far or even before you get started! So, it's important to get started with something you like to keep the motivation levels up & to keep going. This is a simple drill that I suggest to anyone asking how to get started.

*Explore the different domains in tech, see where your interest lies in and dive deep!*

Here are some domains: Web Development, Ethical Hacking / Network Security, iOS Development, Android Development, Desktop Applications, Game Development, Arduino/Microcontrollers/Robots (Embedded Programming), Cross-Platform App Development (Flutter, React Native etc), Systems Programming, Networks, Infra, Operating systems/Kernel development, UI/UX design

*Here's how to dive deep into your domains:*

- Google "How to get started in "
- Look for blogs, tutorials, videos, etc. Since there are

tons of free and great resources available online, there's a high chance that you won't need to pay for resources

- Ask seniors/friends/mentors for suggestions on those domains
- Get familiar with programming languages/tools used
- Explore/think interesting ideas and build mini-programs

## **What You SHOULD NOT Do When You're Starting Out:**

- Just doing online courses
- Building projects from tutorials by copying code without properly understanding the things
- Starting with Machine Learning/Data Science/AI [Andrew: if you're reading this, I'm sorry :D] – those subjects require not only programming skills but also a good grasp of mathematics, statistics, data modelling etc. Go for them only if you're really really interested.
- Doing unpaid internships or in the worst case, doing internships where you pay the company – internships are something for which YOU GET PAID. They aren't something like courses or training where they would teach you; here you do the work and get industry exposure & get paid!

- Cursing/Punishing yourself for your mistakes  
Somewhat relatable. Huh? Mistakes are okay, provided you learn from them, move on & do not repeat the same ones.
- Trying to learn many things simultaneously – it's better to learn the fundamentals, move on to projects and come back to learning often.

## Once You're No More A Beginner

At this point, I hope you're comfortable with at least one programming language. You need not be a GURU! You just need to be comfortable with it. First and foremost, start using a Linux distribution as your primary programming environment if you're not already. Then, if you are not pursuing a CS degree, go through The Missing Semester of Your CS Education since, being good with the fundamentals like databases, operating systems, OOP, networking etc. helps. Next, go and learn Git!

- Think for small good unique ideas or ideas which improve upon already existing products. If you don't get any, feel free to rebuild existing projects and as always, pick something that really excites you.
- Push these projects to GitHub. Write good readmes and blogs or videos too!

- With this, you'll learn to use git, which is a necessary skill to have. And you're slowly building your portfolio too!
- Contribute to open-source
  - You need not be an expert in a language/framework before starting to contribute to open source. You can get started even if you know the basics.
  - You'll get exposure to large codebases, an essence of how to work as a part of a community, learn best practices in coding and get helpful feedback from your mentors.
  - Plus, it's awesome to see your code get merged into a codebase of a project that is used by many people!
  - GitHub Explore is a good place to start!
- Attend Hackathons
  - Here you'll get to brainstorm ideas and build a project in a short period of time in a team
  - You'll most probably work on solving real-world problems
  - Check out MLH hackathons!
- Getting your hands dirty with problem-solving will be awesome from this point
  - You need to be good at Data Structures and Algorithms, especially for coding interviews for internships and jobs

Here are some resources:

- Cracking The Coding Interview by Gayle Laakmann McDowell
- InterviewCake [ [www.interviewcake.com](http://www.interviewcake.com) ]
- Intro to Algos by MIT [ [bit.ly/3DFG1j6](http://bit.ly/3DFG1j6) ]
- A YouTube playlist by CSDojo [ [bit.ly/3U7q3Fp](http://bit.ly/3U7q3Fp) ]
- LeetCode [ [leetcode.com](http://leetcode.com) ]

## Intermediate

You might be knowing in the back of your head that what you should do by now. Still, here is something that you can look into!

- Build better and more complex projects. Move on from beginner-level projects & build something bigger by forming a team or collaborating with friends and build real-world projects
- If you still do not have a LinkedIn Profile, go create one & thank me later
  - LinkedIn is a professional platform & it can enhance or even replace your resume
- Try out competitive programming on CodeForces
  - Competitive programming is like a sport where you tackle a specific problem within a specific time frame
  - Here is a good resource to get you started [ <https://bit.ly/3DwILis> ]

- Internships : Here is a great resource that dives deep into this topic
- Programming contests
  - Kick Start
  - Code Jam
  - Hash Code
- Open Source Programs
  - Google Summer of Code
  - MLH Fellowship
  - Google Season of Docs
  - Outreachy
  - GirlScript Summer of Code

Hey, happy to see you make it till the end of this article! In this article, I shared what helped me in getting started & the path I look forward to moving on from here. I hope they will be as useful to you as they have been to me. Do share it with someone who is enthusiastic about computer science and programming and trying to get started!

2021-2022



# PLACEMENTS REPORT

COMPUTER SCIENCE DEPARTMENT

# PLACEMENTS

<b>ABDULLA SHAHARATH N V</b> placed at : COGNIZANT	<b>ABHIJITH K</b> placed at : TCS, VIRTUSA, TARENTO, CAPEGEMINI	<b>ABHIJITH K K</b> placed at : COGNIZANT, QUEST GLOBAL	<b>ABHINA T P</b> placed at : TCS, HCL, DELOITTE, INFOSYS
<b>ADHIL MOHAMMED P N</b> placed at : COGNIZANT	<b>AJEESHA K A</b> placed at : TCS, WIPRO	<b>ALEN KURIAKOSE</b> placed at : COGNIZANT, TARENTO, CAPEGEMINI	<b>ANJAS K</b> placed at : TRAVANCORE ANALYTICS
<b>ANU A</b> placed at : COGNIZANT	<b>ARJUN RANJITH</b> placed at : INTELLECT DESIGNS, TRAVANCORE ANALYTICS, QUEST GLOBAL, INFOSYS	<b>ASWATHI M</b> placed at : UST GLOBAL	<b>ASWATHY LINCE</b> placed at : TATA ELXSI
<b>AVINASH VISWANATH</b> placed at : COGNIZANT	<b>DEEPNA M</b> placed at : COGNIZANT, TRAVANCORE ANALYTICS	<b>DIVYA P</b> placed at : COGNIZANT, TRAVANCORE ANALYTICS, CAPEGEMINI	<b>FATHIMA AFNAN K</b> placed at : WIPRO, UST GLOBAL
<b>FATHIMA NAZNIN K</b> placed at : INFOSYS	<b>FUAD ABDU RAHIMAN</b> placed at : PUMEX INFOTECH, MARKET SIMPLIFIED	<b>IRFAN MUHAMMED NAZER P</b> placed at : QUALIGY TECH, UST GLOBAL	<b>JAHANA SHIRINE K C</b> placed at : TCS, QUEST GLOBAL
<b>KEERTHANA P P</b> placed at : TCS, WIPRO, HCL	<b>KEERTHI K</b> placed at : TCS, Travancore Analytics	<b>MADHAV RAJ MOHAN</b> placed at : ACCUBITS	<b>MAJIDHA R J</b> placed at : INFOSYS
<b>MOHAMED SHEZIN V C</b> placed at : COGNIZANT, INFOSYS	<b>MUBASHIR K</b> placed at : ACSIA TECHNOLOGIES	<b>NEERAJ V</b> placed at : ACSIA TECHNOLOGIES	<b>RENUKA M</b> placed at : INFOSYS
<b>RIZVA P P</b> placed at : HCL, ATOS SYNTEL, UST GLOBAL	<b>ROOPA PRASAD</b> placed at : CAPGEMINI	<b>SAFA K</b> placed at : TCS	<b>SARATH. S</b> placed at : SOFI, REVATURE
<b>SHAHRABANU K</b> placed at : REVATURE	<b>SHARON A S</b> placed at : TCS, UST GLOBAL	<b>SHIRAS ANAMANGADAN</b> placed at : UST GLOBAL	<b>THASLEEMA N M</b> placed at : WIPRO
<b>THOUSHIYA K</b> placed at : WIPRO	<b>UDHISHA C</b> placed at : TRAVANCORE ANALYTICS	<b>VARSHA V G</b> placed at : HCL	<b>VIDHYASREE V</b> placed at : TRAVANCORE ANALYTICS
<b>VISHNU MOHANAN</b> placed at : 6D TECHNOLOGIES, BIGBINARY	<b>VIVEK V N</b> placed at : TRIASSIC SOLUTIONS	<b>ANJALI P S</b> placed at : TCS, INFOSYS	<b>SRUNGA K S</b> placed at : INFOSYS, UST GLOBAL

# PLACEMENTS

**DEEPTHI K C**

placed at : COGNIZANT

**DEPEN DEB**

placed at : VIRTUSA

**DRISHYA K**

COGNIZANT, HCL,  
CAPEGEMINI, MINDTREE,  
6D TECHNOLOGIES

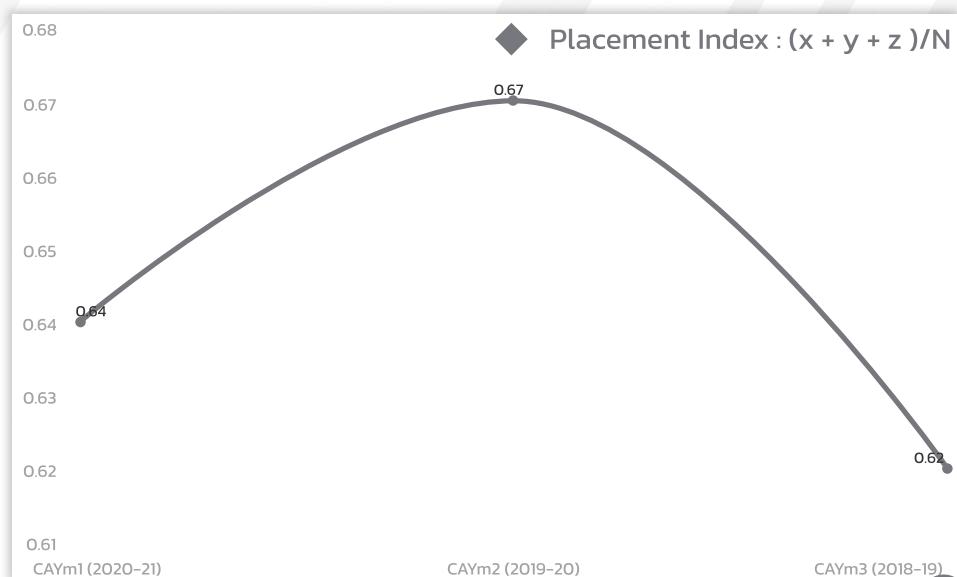
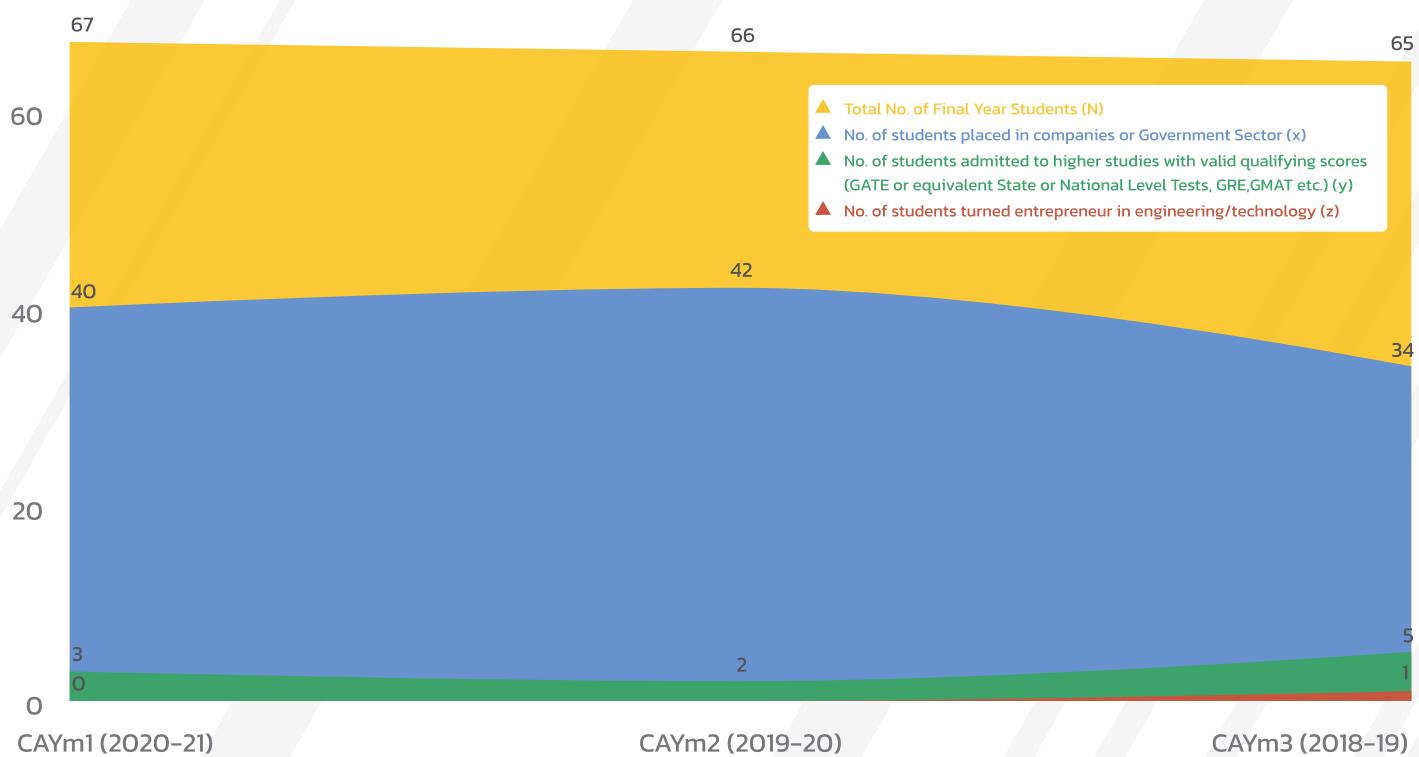
**ARUN JOHN RAFI**

placed at : TATA ELXSI

**RAHUL P UST**

placed at : ELXSI

## PLACEMENT INDEX OF 3 YEAR





Place where  
memories are stored

Gallery





**Spotlights on  
Holi**



**Revisit the  
moment**



**Spotlight on  
Halloween**



**Revisit the  
moment**

### 2019–2023 Batch



### 2020–2024 Batch



### 2021–2025 Batch



# Gallery

Happy times come and go, but the memories stay forever.



## Christmas Days



## Assosiation Day



## Ifthar Night



**Random Memmories**

# TEAM QUANTA