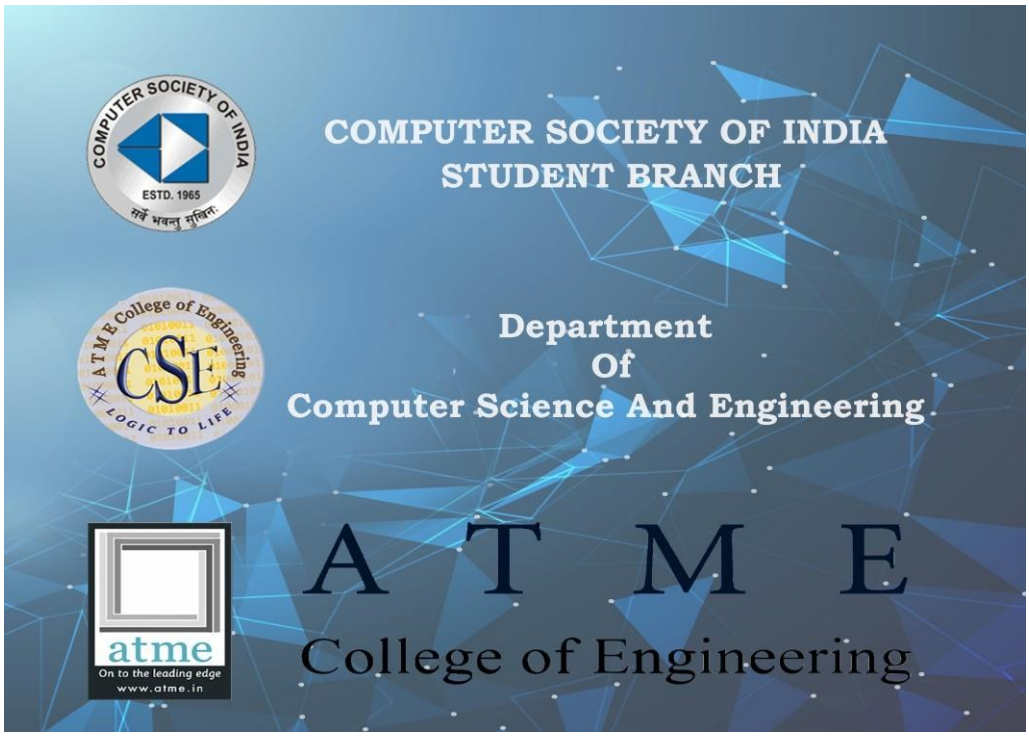

Tech Bits

CSI Newsletter

Volume 6
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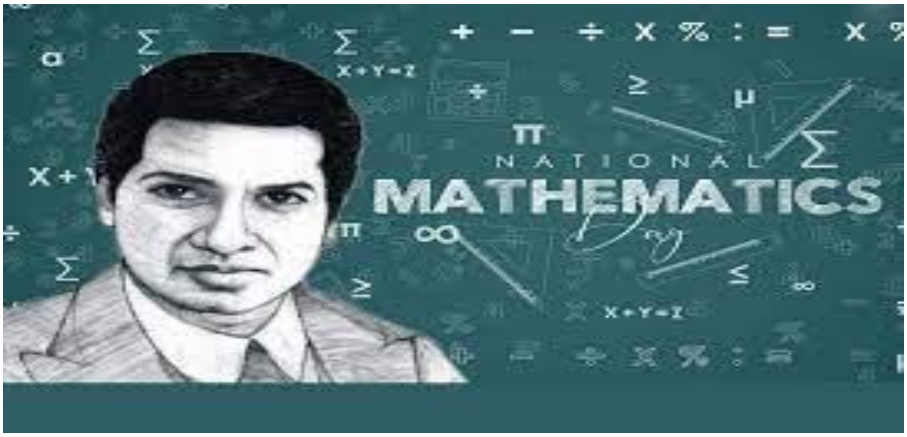
5th JULY 2022

In This Issue

A tribute to

Srinivasa Ramanujam

(22nd Dec 1887 - 26th April 1920)



"AN EQUATION MEANS NOTHING TO ME UNLESS IT EXPRESSES A THOUGHT OF GOD"

Srinivasa Ramanujan, (born December 22, 1887, Erode, India—died April 26, 1920, Kumbakonam), Indian mathematician whose contributions to the theory of numbers include pioneering discoveries of the properties of the partition function. When he was 15 years old, he obtained a copy of George Shoobridge Carr's *Synopsis of Elementary Results in Pure and Applied Mathematics*, 2 vol. (1880–86). This collection of thousands of theorems, many presented with only the briefest of proofs and with no material newer than 1860, aroused his genius. Having verified the results in Carr's book, Ramanujan went beyond it, developing his own theorems and ideas.

Student Articles on latest trends in technology

Find articles on Alexa, Artificial Intelligence and Kotlin submitted by our beloved CSI - SB members.

Message from The HOD

"I am very happy to know that our CSI- Student branch is bringing its 6th edition of the CSI newsletter- "Tech Bits".
I am pleased to introduce the latest edition of our technical newsletter. As the field of technology continues to evolve at a rapid pace, it is essential to stay up-to-date with the latest advancements and trends.
I would like to congratulate and wish the very best to the students, Editorial team, CSI student counselor and faculty members of the department in all their endeavors."

Dr. Puttegowda D
Head of Department
Computer Science and Engineering
ATME College of Engineering

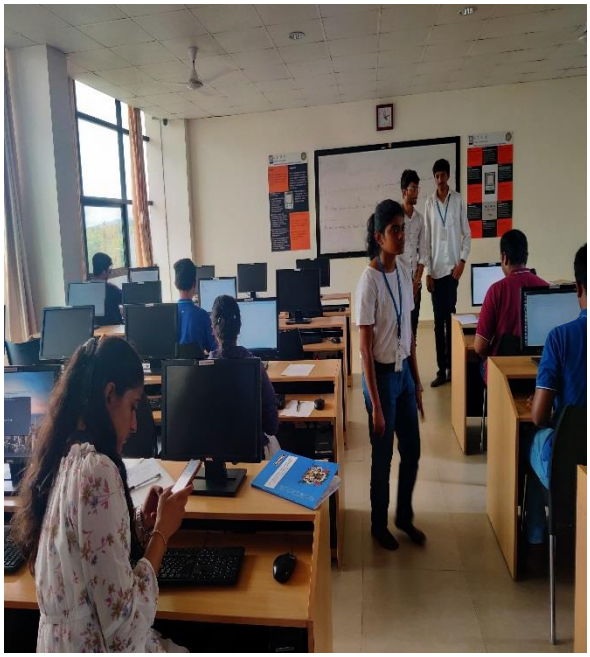
CSI Timeline 2021-22

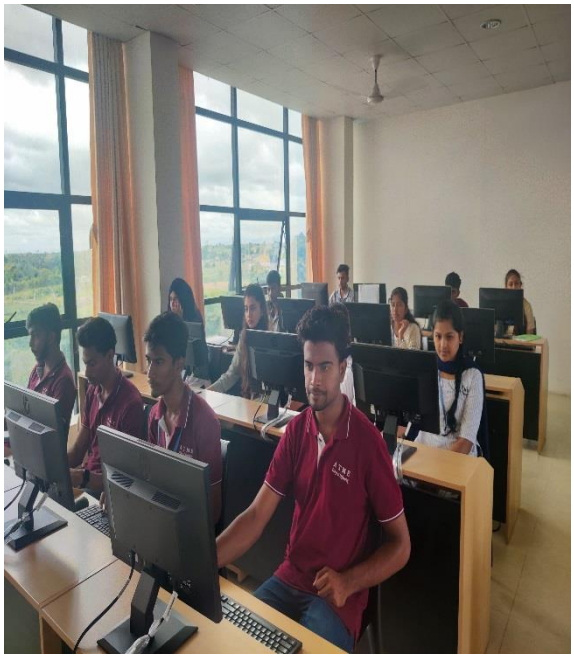
The Department of Computer Science & Engineering had organized 2 days' College Level Technical events CSEISMIC - 2022 on 30th June & 1st July 2022.

Day 1: 30/06/2022

The day started with Dr. Puttegowda, Professor and Head, Department of CSE addressing the students and briefing them about the technical events. Mr. Anil Kumar C J briefed about the rules of the technical events. The following are the events conducted.

1. Blind coding
2. Code debugging
3. Quiz
4. Code relay
5. Hackathon





Day 2: 01/07/2022

The day started with the Hackathon conducted from 9:30 AM to 4:00 PM, and event Code Relay from 11:00 AM to 12:30 PM.

Totally 10 teams participated in the Hackathon. Two rounds of evaluation were conducted and the Juries were DR. J V Gorabal, Professor, Department of CSE and Dr. Deepu R, Professor, Department of CSE.

The Advantages and Challenges of 5G Technology

By Anil Kumar C J,

Associate Professor

5G technology is the latest evolution of cellular networks, offering significant improvements over its predecessor, 4G. With faster download and upload speeds, lower latency, and greater capacity, 5G has the potential to revolutionize industries such as healthcare, transportation, and entertainment.

Advantages of 5G Technology:

1. Faster download and upload speeds: 5G promises to deliver download speeds up to 20 times faster than 4G, with upload speeds up to 10 times faster. This means users can download large files, stream high-definition video, and play online games without any lag.

2. Lower latency: 5G networks have lower latency than 4G, meaning the time it takes for data to travel from one device to another is significantly reduced. This is particularly beneficial for applications that require real-time response, such as self-driving cars, remote surgery, and virtual reality.

3. Greater capacity: 5G networks can support more devices per square kilometer than 4G, making it ideal for densely populated areas. This means that users can enjoy faster speeds and more reliable connections even in crowded places like stadiums and airports.

Challenges of 5G Technology:

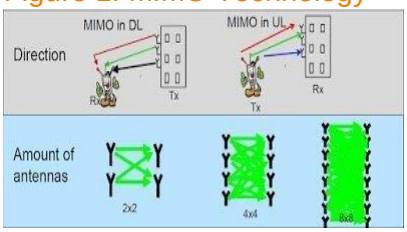
1. Infrastructure cost: Implementing 5G technology requires significant investment in infrastructure, including building new cell towers and upgrading existing ones. This can be a challenge for telecom companies, especially in rural areas with low population density.

2. Frequency Bands: Current LTE system operates with more than 50 frequency bands which are below 3.6 GHz range. One of the frequency candidates for early deployment of 5G is sub-6 GHz range. Unlicensed spectrum below 6 GHz (600 MHz and between 3.5 GHz and 6 GHz) will be used for first generation of 5G networks. 5G NR-New Radio standard for 5G networks are set of frequency bands at sub-6 GHz range and millimeter waves of the RF spectrum. Design of hardware at millimeter waves are much complex than low frequency range.

3. Huge Data Volume: As the technology advances, the data volume of each network also increases every year and the trend is growing. Each network has to support huge volume of data since many applications capable of high resolution video calling, live streaming, downloading etc… The new media trend is towards video standard and there is huge demand for video contents compared to conventional text form. Multimedia gaming, augmented reality (AR) and virtual reality (VR) applications needs high speed network for better user experience.

4. MIMO Technology:

Figure 1: MIMO Technology



Complex MIMO antenna arrays will be used to deliver high speed data to individual users. The idea of MIMO is to increase number of transmitting antenna at the base station and mobile device (UE) to maximize the data transfer by simultaneously sending and receiving. MIMO technology requires complex algorithms and device capability at both base station and user equipment.

5. Limited coverage: While 5G is being rolled out in many countries, it is still not available in all areas. In some cases, the signal strength may be weaker than 4G, particularly indoors.

6. Compatibility issues: Not all devices are compatible with 5G networks, so users may need to upgrade their devices to take advantage of the new technology.

Figure 2: Comparison of 4G and 5G download speeds

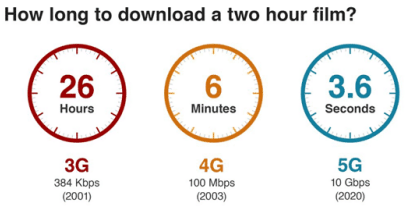


Figure 3: 5G coverage map

Conclusion:

Despite the challenges, 5G technology offers many advantages that could benefit a wide range of industries. As the technology continues to evolve, it is important for telecom companies to work together to ensure widespread coverage and compatibility with devices.

ARTIFICIAL INTELLIGENCE... The Explosion of Intelligence

Artificial intelligence (**AI**, also **machine intelligence**, **MI**) is intelligent behaviour by machines, rather than the *natural intelligence* (*NI*) of humans and other animals. In computer science AI research is defined as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of success at some goal. Colloquially, the term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving".

The scope of AI is disputed: as machines become increasingly capable, tasks considered as requiring "intelligence" are often removed from the definition, a phenomenon known as the AI effect, leading to the quip "AI is whatever hasn't been done yet." For instance, optical character recognition is frequently excluded from "artificial intelligence", having become a routine technology. Capabilities generally classified as AI as of 2017 include successfully understanding human speech, competing at a high level in strategic game systems (such as chess and Go), autonomous cars, intelligent routing in content delivery networks, military simulations, and interpreting complex data, including images and videos.

In the twenty-first century, AI techniques have experienced a resurgence following concurrent advances in computer power, large amounts of data, and theoretical understanding; and AI techniques have become an essential part of the technology industry, helping to solve many challenging problems in computer science

History

While thought-capable artificial beings appeared as storytelling devices in antiquity, the idea of actually trying to build a machine to perform useful reasoning may have begun with Ramon Llull. With his Calculus ratiocinator, Gottfried Leibniz extended the concept of the calculating machine (Wilhelm Schickard engineered the first one around 1623), intending to perform operations on concepts rather than numbers. Since the 19th century, artificial beings are common in fiction, as in Mary Shelley's Frankenstein or Capek's R.U.R. (Rossum's Universal Robots).

The study of mechanical or "formal" reasoning began with philosophers and mathematicians in antiquity. The study of mathematical logic led directly to Alan Turing's theory of computation, which suggested that a machine, by shuffling symbols as simple as "0" and "1", could simulate any conceivable act of mathematical deduction. This insight, that digital computers can simulate any process of formal reasoning, is known as the Church–Turing thesis. Along with concurrent discoveries in neurology, information theoryand cybernetics, this led researchers to consider the possibility of building an electronic brain. The first work that is now generally recognized as AI was McCullough and Pitts' 1943 formal design for Turing-complete "artificial neurons".

Goals

The overall research goal of artificial intelligence is to create technology that allows computers and machines to function in an intelligent manner. The general problem of simulating (or creating) intelligence has been broken down into sub-problems. These consist of particular traits or capabilities that researchers expect an intelligent system to display. The traits mentioned here have received the most attention. They are, Reasoning, problem solving, Knowledge representation ,Planning, Learning, Natural Language Processing, Perception, Motion and Manipulation, Creativity, Social Intelligence, General Intelligence.

Applications

AI is relevant to any intellectual task. Modern artificial intelligence techniques are pervasive and are too numerous to list here.

- **Healthcare**

Artificial intelligence is breaking into the healthcare industry by assisting doctors. According to Bloomberg Technology, Microsoft has developed AI to help doctors find the right treatments for cancer. There is a great amount of research and drugs developed relating to cancer. In detail, there are more than 800 medicines and vaccines to treat cancer. This negatively affects the doctors, because there are too many options to choose from, making it more difficult to choose the right drugs for the patients. Microsoft is working on a project to develop a machine called "Hanover". Its goal is to memorize all the papers necessary to cancer and help predict which combinations of drugs will be most effective for each patient.

- **Automotive**

Advancements in AI have contributed to the growth of the automotive industry through the creation and evolution of self-driving vehicles. As of 2016, there are over 30 companies utilizing AI into the creation of driverless cars. A few companies involved with AI include Tesla, Google, and Apple.

- **Video Games**

Artificial intelligence is used to generate intelligent behaviors primarily in non-player characters (NPCs), often simulating human-like intelligence.

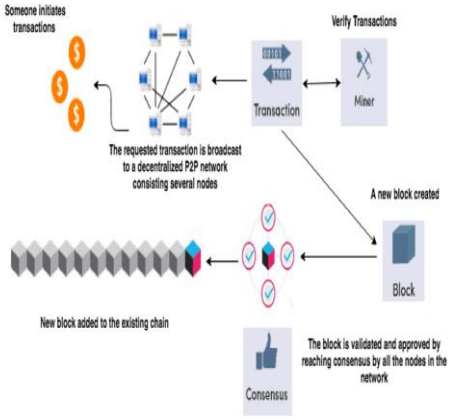
Future of artificial intelligence

In it's short existence, AI has increased understanding of the nature of intelligence and provided an impressive array of application in a wide range of areas. It has sharpened understanding of human reasoning and of the nature of intelligence in general. At the same time, it has revealed the complexity of modeling human reasoning providing new areas and rich challenges for the future.

Blockchain: The Revolutionary Technology Powering Cryptocurrencies and Beyond.

Blockchain is a revolutionary technology that is transforming the way we think about security, transparency, and trust in the digital age. At its core, a blockchain is a decentralized, distributed ledger that records transactions between two parties in a secure and transparent way. The technology was first introduced in 2008 as the backbone of the cryptocurrency Bitcoin, but its potential applications extend far beyond digital currencies.

The blockchain operates using a network of computers, each of which has a copy of the ledger. Whenever a transaction occurs, it is verified and recorded by a consensus of nodes on the network. The transaction data is stored in blocks that are linked together, creating an unalterable chain of information.



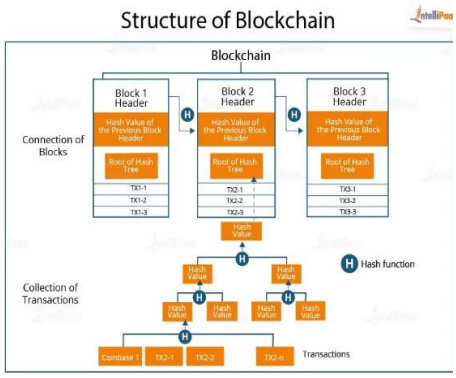
Blockchain is a type of shared database that differs from a typical database in the way that it stores information; blockchains store data in blocks that are then linked together via cryptography..

As new data comes in, it is entered into a fresh block. Once the block is filled with data, it is chained onto the previous block, which makes the data chained together in chronological order.

Different types of information can be stored on a blockchain, but the most common use so far has been as a ledger for transactions.

In Bitcoin's case, blockchain is used in a decentralized way so that no single person or group has control—rather, all users collectively retain control.

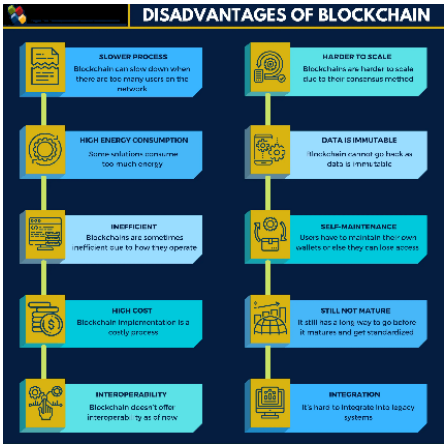
Decentralized blockchains are immutable, which means that the data entered is irreversible. For Bitcoin, this means that transactions are permanently recorded and viewable to anyone.



One of the key benefits of blockchain technology is its ability to provide a high level of security and transparency. Because the ledger is decentralized and distributed across multiple nodes, it is extremely difficult for hackers to tamper with the data. In addition, because each block is linked to the previous block in the chain, any attempt to alter the data would be immediately detected and rejected by the network.

While blockchain technology is most commonly associated with cryptocurrencies, it has the potential to be used in a wide variety of applications. For example, blockchain can be used to create secure digital identities, to verify the authenticity of art and collectibles, and to facilitate secure supply chain management.

In addition, blockchain technology has the potential to disrupt traditional financial systems by enabling faster, cheaper, and more secure cross-border payments. It can also be used to create decentralized marketplaces, where buyers and sellers can transact directly without the need for intermediaries.



Despite its potential benefits, however, blockchain technology is not without its challenges. One of the biggest challenges facing blockchain is scalability. As the number of transactions on a blockchain network grows, it becomes increasingly difficult for the network to process all of the transactions in a timely manner.

Another challenge is the issue of regulation. While blockchain technology has the potential to disrupt traditional industries, it also raises questions about privacy, security, and regulatory compliance. Governments around the world are grappling with how to regulate blockchain technology in a way that promotes innovation while also protecting consumers.

Despite these challenges, blockchain technology is a powerful tool that has the potential to transform the way we think about security, transparency, and trust in the digital age. As more companies and governments begin to explore the potential applications of blockchain, we can expect to see new breakthroughs and innovations in a wide variety of industries.