SMART tcet COMP ENGINEERS

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Simplus

NEW PARADIGMS

THE DECADE AHEAD

ISSUE 9.2

2021

COMPUTER ENGINEERING DEPARTMENT

Vision

"To become the department of national relevance in the field of Computer Engineering"

Mission

To nurture students with sound engineering knowledge in the field of computing through effective use of modern tools with a focus on global employability by imbibing leadership qualities, ethical attitude, lifelong learning and social sensitivity.

Programme Educational Objectives (PEOs)

Students of BE Programme in Computer Engineering will be able to:

PEO 1: Atain Sound Engineering knowledge and use of modern tools effectively to solve real life problems (KNOWLEDGE)

PEO 2: Atain need based skills and life long learning to ensure global employability (SKILL)

PEO 3: Become successful professionals and responsible citizens with good leadership qualities and strong ethical values (PROFESSIONALISM)

Programme Outcomes (POs)

PO 1: ENGINEERING KNOWLEDGE: Apply Knowledge of Mathematics, Science, engineering fundamentals and an engineering specializationto the solution of complex engineering problems.

PO 2: PROBLEM ANALYSIS: Identiy, Formulate, Research Literature and Analyze Complex engineering problems reaching substantited conclusions using rst principles of mathemamatics, natural sciences and engineering sciences.

PO 3: DESIGN / DEVELOPMENT OF SOLUTIONS: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

PO 4: CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS: Using research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

PO 5: MODERN TOOL USAGE: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering.

PO 6: THE ENGINEER AND SOCIETY: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO 7: ENVIRONMENT AND SUSTAINABILITY: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PO 8: ETHICS: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practices.

PO 9: INDIVIDUAL AND TEAM WORK: Function effectively as an individual, and as a member of leader in diverse teams and in multi-disciplinary settings.

PO 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.

PO 11: 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.

PO 12: PROJECT MANAGEMENT & FINANCE: Demonstrate knowledge and understanding of engineering and management and leaders in a team to manage projects and in multi-disciplinary environments.

Programme Specific Outcomes (PSOs)

PSO 1: Develop academic aptitude and apply knowledge of computing and mathematics to computer science problems and thereby design and develop Software and Hardware Systems.

PSO 2: Enhance research skills and utilize advanced computing tools for analysis, design and implementation of computing systems for resolving real life / social problems.

PSO 3: Utilize multi-disciplinary knowledge required for satisfying industry / global requirements and hence develop an attitude for life long learning.

PSO 4: Have all round personality with skills like leadership, verbal and written communication, team work, sensitivity towards society in order to become valued and responsible professionals.

TEAM

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MESSAGES

HOD'S MESSAGE

An idea that is developed and put into action is more important than an idea that exists only as an idea.

With NIMBUS - our departmental magazine, we provide everyone with a great platform to reflect their ideas and research into knowledge. The enthusiastic contribution of students even in such unprecedented times in form of articles not only boosts their linguistic, semantic and technical expertise, but also provides readers with beguiling and interesting information.

In this 9.2nd edition of NIMBUS, we bring you to a world with "New Paradigms", the pandemic has really changed everything and to mark that point in history we are looking forward to the changes it would bring in future. A new normal has emerged for all but can this change the age-old routines and systems? We hope that the readers grasp all that we wish to convey through this issue, acknowledging the hard work put in by the stakeholders of the department.

Lastly, we would like to congratulate and thank the committee and the students, and faculty for their exemplary contribution, valuable time and effort.

-Dr. Harshali P. Patil
Head of Department

FACULTY IN CHARGE'S MESSAGE

In an era that has witnessed unprecedented advancements in technology, exploration and awareness remain the two key components that separate individuals. Nimbus in its latest edition aims at unraveling the new paradigms for the future in an attempt to look at the decade that lies ahead of us. It takes one through a journey where they can witness as a first-hand observer, the transformations the pandemic will bring about in the future.

There remains no doubt that the future upholds a number of unique possibilities, many that would require adapting to living and interacting with everything around us in an enhanced way. Being at home for over a year, not only has given the students an opportunity to discover learning from online resources but also has made it possible to develop a moral and spiritual perspective by staying close to their families. Nimbus signifies a positive aura, a circle of knowledge and keeping the relevance of the meaning in mind, this edition of Nimbus gives us a chance to anticipate the sea changes of the future which would require upskilling oneself and being a consistent and quick learner.

As the future approaches, there will be no single skill set that will suffice. Future leaders and innovators will need to be multi-skilled, and highly flexible as the situation demands. Striking a balance between multiple disciplines of learning will be a necessity.

In a situation like this, a holistic approach towards learning would be extremely essential. Holistic development requires a pedagogy that takes care of the student's education, well-being, mental health, and happiness quotient using a progressive and inclusive approach. A wonderful concept to bring out the best in every student is called the 'Panchmukhi Shiksha'.

*'Panchmukhi Shiksha' or the five aspects of learning as the name suggests, is a powerful approach towards the overall development of a student. The five elements of this integrated learning namely Physical, Intellectual, Emotional, Moral, and Spiritual, add immense value to the student's life in a unique way. Learning like this would inculcate the aspect of relying on one's skills even in the most challenging times. The quote '**आत्म दीपो भव:**' by Gautum Buddha aptly captures this essence of being self-reliant and being a guiding light for others.*

I extend my sincere congratulations to the faculty, students, the editorial and design team who have dedicatedly worked upon the creation of this magazine, making it possible for all of us to undertake this exceptional journey once again.

- Dr. Rekha Sharma
Associate Professor

Editor's Message

If 2020 was the year that changed everything, 2021 begins with many questions about what lies ahead. We are trapped between a pandemic that is still raging in many parts of the world and the promise of a post pandemic world. This is a hopeful beginning for the decade ahead, especially with vaccine programs running at record speeds around the world.

So what are the contours of this new world and what does the decade ahead have in store for us?

To explore the same question, we chose our theme as New Paradigms - The Decade Ahead. What lies in front of us, or what possibilities the future holds, all these and many more questions have captured the curiosity of many people, but few have a definite answer for it. With the world rapidly changing and adapting to a new form of lifestyle where working from home or online is being considered more productive for firms, many changes are here to stay. As the editorial team of Nimbus, we kept these aspects in mind and chose our theme accordingly that helped us not only explore a variety of topics but also widened the horizon of our thinking ability where we understood things which don't meet the eye at a first glance.

We would like to extend our heartfelt gratitude towards our Principal Dr. B.K. Mishra, HOD - Ph.D Programs Dr. R.R Sedamkar Sir, for their constant and bountiful inspiration. We would specifically like to thank our Head of Department Dr. Harshali Patil for guiding us throughout the process of creating this magazine, due to which we were able to procure articles of great quality and could uphold the reputation Nimbus has held over the years.

On a closing note, we would like to thank our faculty in-charge Dr. Rekha Sharma, whose ceaseless support, guidance and motivation made it possible for us to achieve what we dreamt of.

-Anurag Tiwari, Gaurang Beli, Aunshuman Saha

CONTENTS

STUDENT ARTICLES

Click on the Article Name to read the Article

SMART FACE MASK

DAKSH AILAWADI
SE COMP A 09

A mask to a face has become quite normal nowadays, it might not be over-exaggerating if people did wear them even after the covid crisis have come to an end. After all, such a mask stops a lot more than just viruses. While there has been an exceedingly well accepted smartwatch, it is the perfect time to see what a smart mask could bring to us.

Narvalo a Dutch-Italian start-up shows promises to market and bring a face mask that even provides information about the air quality. And it also monitors your breathing.The company performed exceedingly better, by not only achieving half of the target in the first 2 hrs due to the active ventilation feature, but they also summed it up in 2 hours to 50000 Euros. At this point, more than 60,000 Euros has already been raised. The regular mask, which meets the FFP3 standard, features a passive filter. The new Urban Active mask features active ventilation. The attachment has integrated smart ventilation that continuously optimizes the airflow inside the mask. This reduces the build-up of heat, moisture and especially CO2. At the same time, the presence of an abundance of filtered air inside makes it seem as if you are not wearing a mask at all, according to the company. As a matter of fact, a dedicated app is available for the Urban Active. This allows you to read the data that the mask records with its sensors about your breathing. Based on the GPS position of the smartphone, the app also provides information about the air quality on site.

The app can be downloaded for free from the app stores and can also be used without the Urban Active mask.The smart ventilator can also be purchased separately and used on the regular Urban Mask that is already on the market. The filter fits securely over the face and prevents glasses from fogging up. This seal is antibacterial and therefore prevents any skin irritations caused by prolonged use of the mask.A Japanese company created a “smart” mask that aims to improve communication for people wearing face coverings. This invention is bestowed by the name of “c-mask” by Donut Robotics It is meant to fit over other kinds of face masks commonly worn by the public. The invented product is made of soft plastic material and contains a built-in microphone. When it is turned on, the mask uses Bluetooth technology to connect to a mobile device. An app then helps users perform several actions, including turning speech into written text, completing telephone calls and making the user’s voice louder. The device can also translate a person’s voice from Japanese into eight other languages.

With the increase in demand for face masks, a company named razer also steps up and announced at CES 2020/2021 that one of its concepts will now be a product. They boast that the product (face mask, HAZEL) would come with active ventilation, have the flexibility of personalized appearance, a silicon mouth guard, adjustable earloops and a Uv sterilizer. An important aspect of a smart face mask is ventilation, the product boasts its active ventilation bringing in cool air and releasing heat to prevent a build-up of condensation in the mask, which could impact your vision and cause headaches.

To increase the aesthetics the product is given 16.8 million colours and iconic effects, that can be customized along with 2 lighting zones. This smart mask features interior lights that automatically switch on when it's dark. Thus enabling you to express yourself—even when it's dark outside, so people can always understand you. This smart face mask sports a silicon guard that sits around your face—preventing air from leaking in. And this design keeps the mask from touching or resting on your mouth. Hence, you can talk naturally and avoid any discomfort against your lips. Moreover, the mask sports a built-in microphone and amplifier combination to ensure that your speech is clear. And its clear, transparent design encourages a more natural way of communicating, as people can pick up your facial cues. The most important part of wearing a smart face mask is to keep bacteria and viruses away. That's why when equipped with UV sterilizer the new masks takes care of all.

BITCOIN - The Internet of Money

SHIVAM DIXIT
SE COMP B

A decade ago, if someone had told us it is possible to buy a Tesla or book a flight ticket using a digital form of decentralized cash, it would be hard to believe them. However, that is where we are today. Bitcoin is the most successful decentralized digital currency that enables instant payments to anyone, anywhere in the world.

What is Bitcoin, and why was it created?

To understand Bitcoin fully, let us first take a look at the money system used before Bitcoin.

The evolution of money:

Money is one of the essential inventions in Human history.

- Before the time, a system referred to as bartering was in existence. A Bartering or Barter system is a direct exchange of goods and services against goods and services. However, due to drawbacks such as the lack of double coincidence of wants and standard measure of value, the following system was less feasible to practice.
- This rise to need in a standard system that everyone could easily understand, and thus some started to use precious metals like gold & silver for various purposes and as a means of transaction. The people could divide these metals into different values, and it made planning for the future easier. These metals were weighty, and it was not easy to transport more significant sums.

- Due to the disadvantages mentioned above of gold and silver, People started to store their gold in banks and, in return, received a statement indicating how much they had deposited. This statement could be signed over to other persons when the merchants wanted to buy something. As a result, paper currency, a piece of paper that functions as a medium of exchange, developed.
- In most countries, this system has evolved into a paper currency issued by the government's decree ("fiat"). It was a legal tender. It is called fiat money. The perceived authority and creditworthiness of the issuer derives the value of fiat money. National currencies are issued and managed by the central bank's fiat. (Central Banks are institutions that control the money supply of the country.) For example, The Reserve Bank of India regulates the Indian Rupee.

The idea behind Bitcoin:

The fiat currency is a centralized currency system.

Our financial systems rely on trust. The currency notes and coins have value in our society because the government and the central bank guarantee them. For example, a hundred rupee note. It reads - "I promise to pay the bearer the sum of one hundred rupees." It is a promise made by the Governor of the Central Bank, the Reserve Bank of India. This note will be reduced to ordinary paper if it does not carry this signature.

It helps us to guess how powerful the government and the country's banks are as far as monetary policy is concerned.

The fact of the matter is that when people deposit their money in the banks, they give the bank permission to play with that money in no sense. Making use of these deposits, the banks give loans to companies and individuals. It is what fetches returns, that is, interest on the money people have deposited. How banks use money is totally in their hands, and people have no right about it.

Along with banks, Government decisions can put money in danger. A similar incident happened in 2016 when demonetization took place in India. 86% of total Indian currency became unusable.The idea was to have a system where there was no control of people's money to any centralized system, and this was the vision of Satoshi Nakamoto.

How does Bitcoin work:

There is one public account in digital form of all the Bitcoin transactions- this is called a 'ledger.' A copy of this ledger exists on all the systems that are a part of the Bitcoin network. Those who run this system are called 'Miners.' The miners' job is to verify transactions. Say, A has to transfer 5 Bitcoins to B's account. Miners will have to confirm whether A does have 5 Bitcoins in his account or not. To complete the transaction, miners will have to solve a complex mathematical equation. Every Bitcoin transaction has a unique address. The job of the miners is to calculate it. All these calculations are automatically carried out of the computers because they are incredibly complicated, and their combination runs in crores. These miners require high computers with very high processing power. Once the equation is solved, other computers within the network confirm, and this transaction is added to the chain. A block of transactions gets created. Moreover hence, the technology is called 'block-chain.' The miners, in return, get Bitcoin. This system is called 'Proof of Work. The miners have to prove the communication work they do to get awarded the Bitcoins in return.

What happens to Bitcoin after all 21 Million are mined?
Bitcoins are more like digital gold. Like gold has to be extracted from physical earth, Bitcoin can are mined through a computer. Bitcoins have a limited and finite supply. There will be only 21 million Bitcoins on earth. After all, Bitcoins are mined, the planet's supply will be tapped out. As of 24th February 2021, 18.638 million Bitcoins have been mined, which leaves 2.362 million yet to be introduced into circulation. Once all Bitcoin has been mined, the miners will still be incentivized to process transactions with fees.

"BITCOIN PIZZA DAY"
22nd May 2018 marks the date the first-ever transaction happened using Bitcoins. A programmer from Florida, Laszlo Hanyecz, paid for two pizzas using Bitcoins. The day has become part of tradition not because of the transaction but for the price. The man had paid 10,000 Bitcoins for two pizzas.
Thanks to a record-breaking price of $60,000 (10th April 2021), Hanyecz's stash would now be worth $613 million (or £440 million). The day is known as "Bitcoin Pizza Day" and is the most celebrated date in the crypto calendar.
communication work they do to get awarded the Bitcoins in return.

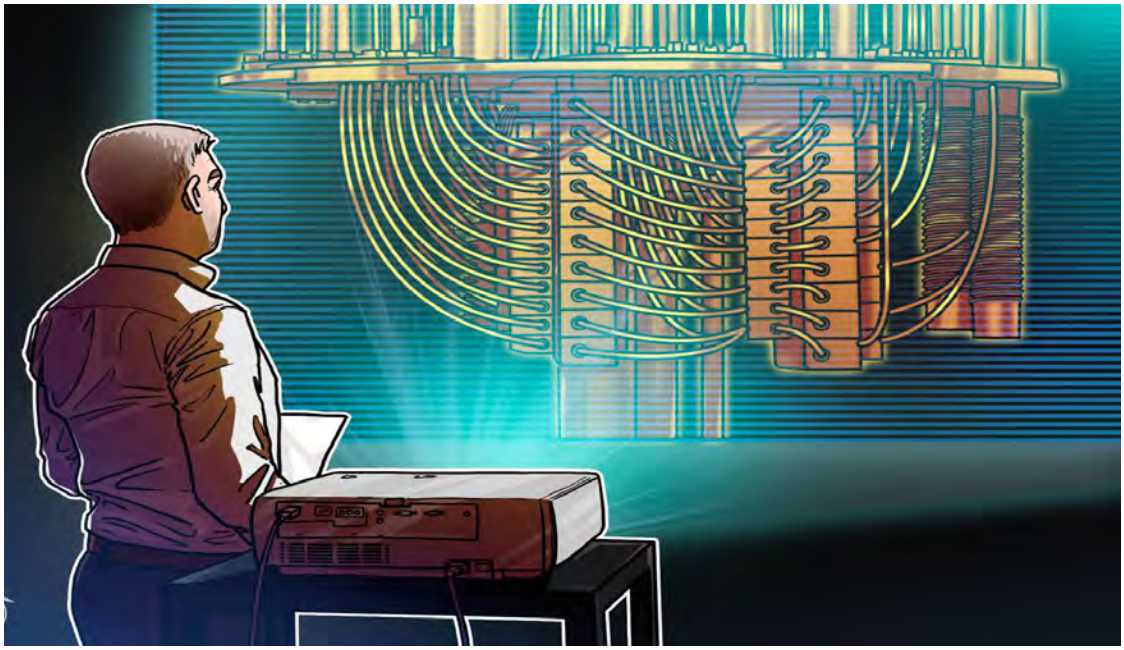
Quantum Computing

NIPUN AGARWAL
SE COMP A 02

One of the key scientific revolutions of the 20th century was the development of quantum theory. From its period, right until the advancement of the full scientific formalism and the ensuing improvement of the primary wave of applications (for instance, transistors, laser, superconductors, among others) quantum hypothesis has been exceptionally effective in different settings being affirmed in unprecedented accuracy.

Quantum computing is the utilization of quantum phenomena such as superposition and entanglement to perform calculations. Computers that perform quantum computations are called quantum computers. This is not just a better or a faster way of computing – it has a fundamentally different basis. Just as with the candle and the light bulb: while both throw out light, you recognize that the latter is unquestionably not an upgraded version of the former. Quantum computers perform calculations based on the probability of an object's state before it's measured which means they have the potential to process exponentially more data compared to classical computers.

As opposed to store data utilizing bits represented by 0s or 1s as conventional digital computers do, quantum computers use quantum bits, or qubits, to encode information as 0s, 1s, or both at the identical time. This superposition of states—alongside with the other quantum mechanical phenomena of entanglement and tunneling—enables quantum computers to control gigantic combinations of states simultaneously. Instead of having a clear position, unmeasured quantum states occur in a very mixed 'superposition', not unlike a coin spinning through the air before it lands in your hand. These superpositions are entangled with those of other objects, meaning their final outcomes are going to be mathematically related even if we don't know yet what they are.



The complex mathematics behind these unsettled states of entangled 'spinning coins' can be plugged into special algorithms to create short work of problems that might take a classical computer a long time to figure out if they might ever calculate them at all. Such algorithms would be very valuable in solving complex mathematical problems, creating hard-to-break security codes, or foreseeing numerous molecule interactions in chemical reactions. It's only if you examine the tiniest quantum particles – atoms, electrons, photons, and the like – that you see intriguing things like superposition and entanglement. Superposition is basically the ability of a quantum system to be in multiple states at the identical time — that is, something can be "here" and "there," or "up" and "down" at the same time.

Entanglement is an extremely strong correlation that exists between quantum particles — so strong that two or more quantum particles may be inextricably linked in perfect unison, even if separated by great distances. The particles are so intrinsically connected, they are said to “dance” in instantaneous, perfect unison, even when placed at opposite ends of the universe. This seemingly impossible connection inspired Einstein to explain entanglement as “spooky action at a distance.” The employment of quantum uncertainty for encryption as one of the most probable applications of quantum computing. It is believed that it might be used for creating private keys for encrypting messages sent from one location to a different one – so that hackers couldn’t copy the key perfectly because of quantum uncertainty. They would need to violate the laws of quantum physics to hack such keys. Imagine that level of security with regards to sensitive medical information: electronic health records, genetic and genomic data, or some other private information that the health system generates about our bodies. We believe that quantum computing could provide a significant push to the area: faster sequencing, as well as a more comprehensive and faster analysis of the complete genome, will be possible with it. Plus, predictions are going to be more reliable as quantum computers could take into consideration even more information as traditional computers, and that they could even build every bit of genomic data into health records. Quantum computing could cast off the guesswork from genomics and genetics for ensuring better health for everybody.

Quantum computers represent a paradigm shift in computation. We are entering in an interesting period in the advancement of quantum computers. Quantum frameworks are scaling up in both size and dependability and are drawing near to indicating a genuine preferred position over traditional computers. As this technology continues to be in such an early phase, it may be that its true impact isn’t even fully understood yet. This makes this field considerably all the more captivating to follow.

RISC-V: The Next Gen CPU Architecture

KUNAL AGRAWAL
FE - AI & DS

Semiconductors products like CPU & GPU are the heart & soul of any Modern-Day Machines. In smartphones, ARM licenses its products to other companies like Qualcomm, Samsung, Apple & Mediatek which then develop their own custom System On Chips (Also called SoCs. A SoC is an integrated circuit that will have CPU, GPU, Modem, I/O Ports, Memory & etc on a single microchip).
On the other hand, all the modern Laptops/Computers run on Central Processing Units (CPUs) which are x86-64 (or amd64/x64) architecture based. These CPUs are exclusively designed and developed by two companies, namely AMD & Intel. This CPU then sits on a motherboard manufactured by some other companies. These motherboards will then in turn have their own designs & support for different hardware (like GPU, Sound Card, Lan Ports & etc). The ARM model is now also penetrating the Laptop/PC space, as last year Apple started pushing its own in-house developed ARM-based SOCs to its Mac line-up following the Steps of Microsoft which has been porting Windows 10 to

RISC vs CISC: The long-lasting battle:
Before delving into RISC-V, let us first understand what do we even mean by RISC. Above, I have used ARM. So, ARM-based chips are a family of chips that use Reduced Instruction Set Computer (RISC) Instruction Set Architecture (ISA). While earlier iterations of x86-64 were Complex Instruction Set Computer (CISC) based but the modern-day iterations of x86-64 does have included bits of RISC too making it somewhat a hybrid.

RISC is built to minimize the instruction execution time by optimizing and limiting the number of instructions. It means each instruction cycle requires only one clock cycle. On the other hand, the CISC approach is to reduce the number of instructions on each program and ignoring the number of cycles per instruction. Therefore, a program might need less steps on CISC than RISC as often a single Complex instruction on CISC will equal to performing multiple instructions on RISC.

We might think that 2nd seems a better approach & might give better performance, but that's not how it plays as each system requires the same time to execute a program. This is mainly because CISC will take as many clock cycles as the RISC approach. Therefore, RISC based chips are also much more power-efficient than their CISC counterparts, allowing for longer battery life on Mobile/IoT based products, thus making them more useful & viable.

What is RISC -V then?

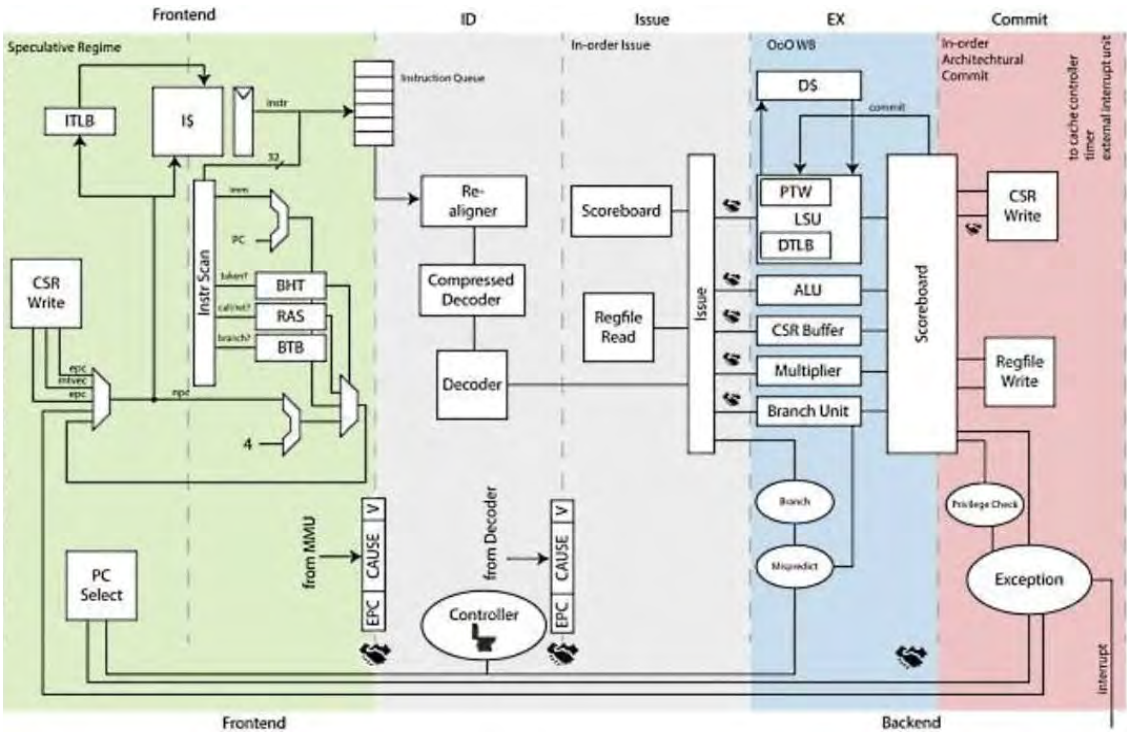
Reduced Instruction Set Computer - V or RISC-V is a free and open ISA that enables a new era of processor innovation through open standard collaboration. The project began in 2010 at the University of California, Berkeley along with many volunteer contributors. RISC-V is established on reduced instruction set computer (RISC) principles thus leveraging its overall benefits. The goal was to make a practical ISA that was open-sourced, usable academically and in any hardware or software design. The RISC-V ISA is thus provided under open-source licenses, allowing it to be used without royalties unlike ARM's licensing. RISC-V has a modular design, consisting of alternative base parts, with added optional extensions. Therefore, RISC-V combines a modular technical approach with an open license business model, meaning that anyone, anywhere can leverage the IP contributed and produced by RISC-V International to build products

Semiconductor Industry is very hard to penetrate for any company due to the enormous cost of development (Think Billions of Dollars) & production that is involved upfront. RISC-V was able to break down many barriers in the semiconductor industry, bringing together different companies, industries, and geographies for open collaboration.

The Indian Outlook:

A semiconductor is one of the key components that is very essential to build the infrastructure for modern, secure, self-reliant digital India. India has significantly lagged in semiconductor technology whereas many of its neighbouring Asian countries were able to keep up with development like China, Taiwan, Korea, Japan & etc.

India currently has no consumer foundries yet and thus Indian government is once again trying to get a fabrication plant setup in India. Recently, the Indian government has announced that $1 Billion+ will be made available in Cash to Chip-maker companies that set up manufacturing units in India as part of its “Make in India” Initiative. The government is hoping to build on its ever-growing smartphone assembly industry to strengthen its electronics supply chain. The locally manufactured chips will further bring down the cost of Smartphone & IoT based products and reduce imports. The chips that will be made locally will also be designated as “trusted sources” and will be used in products ranging from CCTV cameras to 5G equipment in future. It should finally help India Gain a foothold in Semiconductor Industry as the growing demand for electronic Smart Devices has only exploded since the COVID-19 era. In 2020, the government also announced a national competition to foster the use of the nation’s homegrown RISC-V microprocessor designs in the hope the tech will eventually replace imported parts, and be used to create products in demand around the world.



Shakti Processors - IIT M:
The SHAKTI Processor Program was started as an academic initiative back in 2014 by the Reconfigurable Intelligent Systems Engineering (RISE) group at IIT-Madras. It is a completely Open-source Project like RISC-V. The major aim of the project is to bridge the gap between academia and industry, to provide innovative and customized solutions without the hassles of royalties!

A family of 6 processors is being built by The Shakti project, based on the RISC-V ISA. The project has currently developed an Embedded class (called E-Class) and Controller class (called C-Class) of processor based on the RISC-V ISA. Shakti has been taped out and fabricated at 180nm by the Indian government's Semi-conductor Laboratory in Chandigarh (A 200mm fab owned by ISRO), and at 22nm by Intel's foundry with FinFET+ technology. Last Year, the Indian defence and strategic sector also started using the Risecreek processor (64-bit RISC-V based, clocked at 100-350 MHz) developed by IIT-M and fabricated by Intel.

C-DAC's VEGA:
The Centre for Development of Advanced Computing (C-DAC) is also developing a VEGA Processor. These Processors are also based on RISC-V ISA. VEGA is a series of 32-bit/64-bit Single/ Multi-core Superscalar In-order/Out-of-Order high-performance processors integrated with Multi-level Caches, MMU and Coherent Interconnect.

Future Prospects:
Linux Kernel & its related tools have already implemented support required to boot up RISC-V based processors.
RISC-V based CPUs are also already deployed in some data centres & many other areas of Server Infrastructure. Since the development cycle for processors is generally long (3-4 years at minimum), we should expect a lot more variety as more companies start releasing their own works in future. In mobile especially, replacing ARM will be a challenge that cannot be achieved in a year or two given its deep ties in both the Android & iOS ecosystem where apps & games are developed on ARM's architecture. Additionally, there is not much traction where RISC-V based SoCs are in development for such use cases. This might change in due time as more companies wouldn't want to continue paying for ARM's licensing fees and build around RISC-V for long term benefits.

Many companies like Alibaba Group, SiFive, Western Digital & a lot more institutes & organizations have already forayed into the building and developing products based on it. Recently, Intel announced its plan to open its foundries to fabricate RISC-V & ARM chips as part of a new business strategy. This could be very helpful in the long run as companies will have wider sources from where they could fabricate their chips.

Though maybe not this decade but surely in the next coming decades, RISC-V will definitely stand out as ISA for ALL and will get more mainstream as the time & resources that are required to build semiconductors are invested. On a different note, we should also think that the vast potential of RISC-V will be definitely tapped into in this decade as general IoT based products could be available by mid or end of the decade at the latest. So do keep an eye out on those when they are available. As we have also seen, RISC-V will also bring many benefits for India as a whole as many Indian companies could build around it to build their next-gen smart products to avoid licensing fees for ARM & avoid making something from scratch-up.

Is Online Learning Really Helpful?

ARYAN KAWLI
SE COMP B

The idea of online learning has been talked about for many years just as a concept towards the future, at that time it was a very vague idea and hence it was not properly structured and no one would have imagined that it would become a necessity so early! The coronavirus pandemic in 2020 saw a huge loss of human life and property and changed the ways of human interaction; many things changed but this article will focus on the numerous ways the learning process has been affected after becoming online entirely. Narvalo a Dutch-Italian start-up shows promises to market and bring a face mask that even provides information about the air quality. And it also monitors your breathing.

Due to the lockdowns in various countries (to curb the flow of the virus), the student life shifted to online learning. The majority of the education sector was not used to the concept of online learning, but it had to become the new normal. There is an obvious difference between learning online and learning in the actual classrooms. Firstly, the efficiency of the students gets dropped in the online mode because it is really difficult to stare into the screens for long periods especially when the person is not used to it. The students are expected to attend lectures, which obviously take up hours glued to their screens and study the concepts again from a screen. This sudden increase in screen time results in an increase in eye strain and mental fatigue thus resulting in loss of interest in the mere process of studying! Hence, this leads to a lack of interest in studying and the performance efficiency drops which is a really bad thing.

Now that we have had a little talk on the problems let us have a solution-based approach. For example, an engineering semester time period is about six months. This period was sufficient for offline mode since there was no digital eye strain involved. But attending lectures, practicals and completing assignments all of which to be done on a screen changes the equations entirely! Not only the students but the teachers and faculties are also facing an extreme amount of stress because of this. It is notable that the entire portion to be taught online does not get completed or gets rushed in the process just for the sake of completion. So why not increase the period of the semester to eight months (at least until the pandemic ends), so that the students can get more time to study properly, rest and not worry about the continuous stress of

Passing out the semester will be of no use if students have not studied the topics with interest, but under stress or for the sake of meeting deadlines to obtain marks. The loss of efficiency and interest is real and will affect an entire batch of students since their whole year will be wasted. In addition to the college portion, students also are expected to develop 'skills' to become industry ready but devoting time to develop those skills becomes impossible in the online mode because of the already tight schedule and fatigue due to the high screen time. All of the topics we just discussed referred to the college students but it is the school children who are affected the most. The digital strain leading to aggressive behaviour and loss of interest in studies will hamper their learning process, which is a very serious issue!

Online learning in general is not really bad, it is the management that really matters. The above discussion does point to the fact that going 100% online is not going to help in the future (unless properly planned). Once life comes back to normal after the pandemic, online learning along with offline learning should be implemented. For example, having one day a week online would save people a lot of time, resources, less traffic and fuel consumption hence leading to less pollution at least one day a week. The lectures which might not actually need offline presence can be shifted online as well, thus saving time. Therefore, we can conclude that online learning is really helpful, it's just that the way it has been carrying on until now has been stressful. Implementation of a properly planned online learning system will be a revolution towards a positive and bright future in terms of the learning process.

Tackling a pandemic with technology & the lessons for future

Prerak Khandelwal
Deep Kothari
SE COMP B

Pandemics are huge scope episodes of irresistible sickness that can enormously expand horribleness and mortality over a wide geographic zone and cause critical financial, social, and political interruption. Proof proposes that the probability of pandemics has expanded over the previous century because of expanded worldwide travel and joining, urbanization, changes in land use, and more prominent abuse of the common habitat. These patterns probably will proceed and will heighten. Critical strategy consideration has zeroed in on the need to distinguish and restrict arising episodes that may prompt pandemics and to grow and support speculation to construct readiness and wellbeing limit. The present coronavirus disease (COVID-19) pandemic has proven the urgency for new technologies to assist the health sector to create a society that will be able to tackle pandemic or such adverse challenges.

A scope of systems has been embraced overall dependent on the populace structure just as the medical care framework of every country. One of the issues that have been confronted is the postponement in the execution of measures. A model re-enactment by Lai Shengjie and Andrew Tatem anticipated that if China had carried out control estimates seven days sooner, 67%, all things considered, might have been forestalled; if execution had been done toward the start of January, it would have sliced the disease rate to 5%. China started its reaction to the infection is centred around man-made reasoning (simulated intelligence) by depending on facial acknowledgement cameras to follow the tainted patients with movement history, robots to convey food and medications, robots to sanitize public spots, to watch and communicate sound messages to public urging them to remain at home. Artificial intelligence has been utilized widely to find new atoms while in transit to discover help for Coronavirus. Numerous specialists are utilizing simulated intelligence to discover new medications and meds for the fix, alongside some software engineering scientists zeroing in on recognizing irresistible patients through clinical picture handling like X-beams and CT filters.

Simulated intelligence limits can be important to dissect, anticipate and explain (treat) Coronavirus defilements, and help direct monetary impacts. Up until now, most clinical usage of computerized reasoning to the Coronavirus response have focused on determination reliant on clinical imaging. The world is presently urgent to discover approaches to moderate the spread of the Covid and to track down a viable treatment. Innovation is turning into an empowering agent to make the interaction quicker. Man-made intelligence is assuming a significant part in proposing segments of an antibody by understanding viral protein designs and aiding clinical analysts to scour several stacks of important exploration papers at an extraordinary speed. Taiwan CDC focal pestilence war room (CECC) is joining wellbeing information with the movement information, to assemble an observing framework and give ongoing cautions. For instance, sending programmed alarms during clinical visits in the event that they have ventured out to the tainted area. Self-driving vehicles, drones, robots would all be able to help when the need is to maintain a strategic distance from human contact. Self-sufficient vehicles can be utilized to move influenced individuals to and from medical care offices effortlessly, without taking a chance with the existence of sound individuals. Robots can be utilized for conveying staple, cooking implies, disinfecting emergency clinics and watching the roads. In India, telecom administrators like Jio, BSNL, Airtel, and then some, are utilizing the guest tunes to spread mindfulness about the pandemic. Man-made intelligence-based danger evaluation apparatuses are being planned by simulated intelligence research organizations to give lucidity among the turmoil brought about by the pandemic. These artificial intelligence devices are helping in separating whether the patients have a typical cold, influenza, or Coronavirus, regardless of whether the individual should be tried, and what tests are required.

Baidu, a Chinese global innovation organization, has fabricated man-made intelligence-based answers to successfully screen enormous populaces and identify an adjustment in their internal heat level while they are moving. This framework can look at around 200 individuals each moment without upsetting the progression of individuals. As pandemics or different catastrophes continue compromising the business world, telecommuting guarantees business progression just as encourages social separation

In such a situation, advancements that empower secure admittance to information, venture applications, virtual gatherings, cloud conferencing, and virtual/blended/increased truth are the cutting-edge pioneers to guarantee expectations are not affected. Far off working is a gift that comes because of innovation and is one the best arrangements that helps us in friendly removal.

Thus, we should take lessons from the present conditions, and devise plans and techniques which would help us to deal with any such future catastrophe because at the end of the day,

“Any sufficiently advanced technology is equivalent to magic.”

- Arthur C. Clarke

INTRODUCING THE GEN-B

AMAN JAIN
SE COMP A 63

Blockchain appears to be byzantine, and it could probably be, but its fundamental notion is indeed simple. A blockchain is sort of a database. To understand blockchain, one should first understand what a database actually is. unprecedented

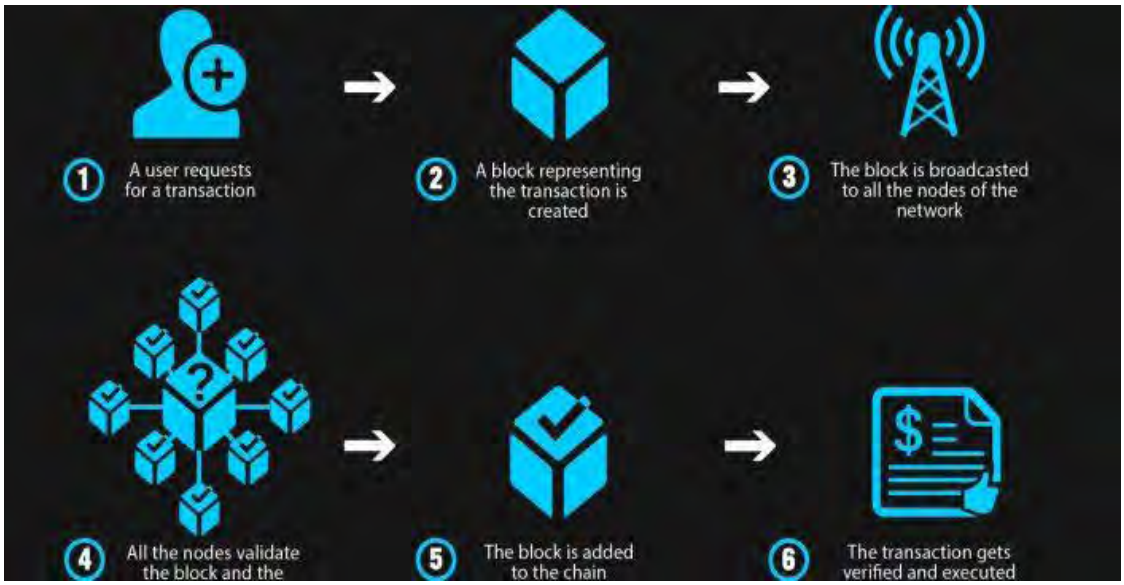
So how are the two terms blockchain and database dissimilar?

One major dissimilarity between a typical database and a blockchain is the method by which data is organized. A blockchain gathers information together in clusters (known as blocks) that hold the particular set of information. Blocks have specific storage volumes and, when completely filled, they are chained onto the previously filled block, forming a chain of data known as the "blockchain." This process repeats whenever a newly added block is compiled into a newly formed block that will be added to the chain as well (once filled).

Decentralisation:
To understand this blockchain technology, it is instructive to view it in the framework of how it has been executed by Bitcoin. Corresponding to a database, Bitcoin needs an assembly of computers to hoard its blockchain. In context with Bitcoin, this blockchain technology is simply a specific sort of database that can account every Bitcoin transaction ever completed. In the case of Bitcoin, and contrasting most of the databases, these computers are not all beneath same roof, and each computer or group of computers is functioned by unique individual or group of individuals.

Transparency:
Due to the reorganised or decentralised nature of Bitcoin's blockchain, all transactions can be clearly viewed by either having an individual node or by using blockchain explorers that permit anybody to see transactions happening live! Each node has its own replica of the chain that grows and gets updated as renewed blocks. After this, they are confirmed and added. This means, if one wants to, it could trace a Bitcoin wherever it goes.

Security?
Blockchain technology is responsible for the issues of security and belief in some ways. Firstly, new blocks are always queued (deposited linearly and chronologically). Which means, they are always enqueued or added to the end of the blockchain. If you take an aspect at Bitcoin's blockchain, you'll see that each block has a location on the chain, called a height.



Once a block has been added in the blockchain, it is very problematic to go back and modify the contents of the block except the majority reached an agreement to do so. That's because each block comprises of its own hash, hash of the preceding block, as well as the previously cited time stamp. Hash codes are produced using a mathematic function that coverts digital information into a string of numbers and alphabets. If that information is altered in any way, the hash code gets changed as well.

How is Blockchain Used?

As we are now aware that blocks on Bitcoin's blockchain technology store information about monetary transactions. But it looks like blockchain is indeed a dependable way of storing data about other types of transactions, as well. Few Multi-national companies that have already incorporated blockchain include IBM, AIG, Walmart, Siemens, Unilever. In fact, IBM has created its Food Trust blockchain to track the journey that food products take to get to its locations.

FACTS:

-The height block had reached 656,197 blocks so far.
-Overall size of Bitcoin Blockchain is 338.22GB as of April 4.

An Uncontrolled Infodemic

SHRINJAY KAUSHIK
SE COMP B

In this era of never-ending competition between people, information plays a vital role. Information has become one of the basic values of society. Knowledge and information have become major factors in ensuring economic stability for any society. We have spent generations gathering information and storing it so that we may pass it on to the younger generation who are expected to do the same for the betterment of society. With the help of information, we can find answers to the most extreme and vague questions of the universe.

After so many centuries of gathering information, it would not be difficult to prognosticate the problem of finding the right information when the time arrives. With the advent of the world wide web, or simply, the internet, we never had to face any such problems. All the information that one could be looking for can be found on the internet. The internet has served its purpose of sharing information and connecting people all over the world so impeccably that it has led to another problem, An Uncontrolled Infodemic.

What is an Infodemic? One might ask. An infodemic refers to a rapid and far-reaching spread of both accurate and inaccurate information about something. An infodemic can be quite scary and ugly since it can lead people to believe something that is factually incorrect. Such misguided and misinformed people might in turn influence other people based on this false information. This can lead to serious differences in opinion. Since the internet is used by so many people, one can only imagine the amount of false or incorrect information being shared on the internet. For instance, false information of Covid-19 if spread can end up creating havoc and makes a deadly disease even worse to deal with. In her recent Facebook post, Under-Secretary-General for Global Communications Melissa Fleming said: “We are not only fighting a ‘pandemic’, in the words of Dr Tedros, who leads the World Health Organization (WHO), we are fighting an ‘infodemic’...”.

Due to the internet being choke-full of people sharing information it becomes extremely difficult to differentiate between the correct and incorrect information. Hence, the only way left for people to sift out the misinformation is to keep the information shared by the authorised and authentic sources as a reference point for all other information. If we consider the case of Covid-19 safety guidelines, people are more likely to abide by the guidelines shared by WHO or the Indian Ministry of Health.

There is no such infallible way to ensure that no false information is being spread on the internet. When it comes to believing information, being vigilant is the only remedy. This is aside from the fact that there are many agencies that are explicitly dedicated to monitoring false information being spread on the internet, be it an article or a post on social media. These agencies fall under Cybersecurity.

Protecting the correct information that we as a society have is of utmost importance if we expect to improve.

A Future with AI Chatbots

PRAJWAL JAISWAL
SE COMP B

As we have entered a new Decade, so has the technology around us too. The decade 2020 and beyond is considered to be the Golden Age for Artificial Intelligence. The impact that AI has on our lives has increased exponentially. One of those technologies that have influenced our lives the most are Conversational Bots or simply put Chatbots. These chatbots have applications that range from simple daily life home assistants to advanced chatbots that are used in areas such as business and health industries. This emerging technology has attracted the interests of governments, manufacturing enterprises, healthcare institutions and huge investments are being made for its continuous development.

What exactly is a Chatbot?

A chatbot is an AI software that is used in simulating conversations directly or through chat messages with the user in Natural Language with the help of many messaging applications, websites, mobile apps or through the telephone. Chatbots come in various types such as customer-facing AI assistants, support chatbots, assistant bots and transactional bots. All these chatbots are used differently based on the requirements of a job.

So why are these chatbots so important? During these years, a lot of advancements have been made by technology, but a chatbot can be described as one of the most advanced and promising expressions of interaction between humans and machines. The chatbots are the representation of the evolution made in the field of Natural Language Processing (NLP). Formulating appropriate responses to the questions in natural language is one of the typical examples of NLP applied in various enterprises' end-use applications.

The 2020 Impact: Fight against Covid-19:

In 2020 the entire world was hit by a pandemic bringing all the worldwide businesses to a halt. Chatbots were already extremely popular before the pandemic. But now that the people have started working from home, these innovations are being utilized to their full potential for both household tasks and business endeavours.

Apart from regular usage, AI-powered chatbots have played a significant role in the healthcare sector for managing patients' needs during the pandemic. With everything going virtual, it created an optimal situation for chatbots and AI to effectively support the people no matter where they are. In a single year, these chatbots have helped us by sharing up-to-date information quickly, encouraging positive health impacting behaviours and lessening the psychological damage caused by fear and isolation.

What next for the Chatbots?

Ten years ago, managing databases and building websites were only done by specialists. Now anyone with a plan can build an entire company and bring smart services to their organizations by adopting AI. Today most of the businesses have chatbots for customer service and support functions. Human resources have started using them in handling first stage interviews, helping speed up traditionally slow recruiting processes. Soon AI decisions will be impacting all businesses.

In Banking and Finance, chatbots are being adopted for customer service, wealth advice and management, marketing, and more recently sales. In China, HSBC launched chatbots "Xiaofeng" and "Xiaohui" in 2018, to solve consumer and business banking customer queries and provide FX market updates. These bots are already evolving fast and the way they will work change fast too. Instead of getting a single text message as a warning for the customers, a chatbot could pop up and offer a series of immediate resolutions to solve the problem and help the customer in understanding the ramifications of each. The bots can also help customers make saving decisions in a growing range of situations and help in regular tasks such as splitting meal bills or paying tickets using technologies like blockchain.

Across the entire Healthcare system, AI-Powered Chatbots have remained a rising star. The digital medical record helps provide data analytics to track outcomes and the trends in the spread of new diseases. These complicated pieces of information can be delivered to the common public with the help of the apps providing chatbot services in simple terms. Clinical trials are better managed by AI delivery tools and genetic research will help provide one among the boom areas for health across the 2020s.

The chatbots started by sticking to a pre-planned script, often replicating an existing FAQ offering questions and simpler answers. Modern bots can now understand the user, identifying the keywords in their inputs to offer a better conversation. New and futuristic bots can offer specific and relevant information to each part of a complex question. Sentiment analysis can monitor the overall theme of the chats and help guide the businesses on how customers feel and how can a company boost positivity.

Chatbots won't be a single cursor on a screen very long, the use through Amazon Alexa, Apple Siri, Google Assistants and so on have changed the perception and helped in bringing these technologies to a wider audience. Text-to-speech and voice-to-text are essential features that have further enhanced the already bright-looking future of chatbots. As they become more integral to both our personal and professional lives, these assistants will only expand their utility from here on out.

Automating Future

ASHWIN SHARMA
SE COMP C

World Entered a fascinating ERA named Artificial Intelligence during the early 2020s. The rise of remote products and applications made a never-seen change in humankind's history in managing daily tasks to the most intelligence-demanding options. The Pandemic of Early 2020s hugely due to a highly mobile virus covid-19 caused series of lockdowns all over the world, creating havoc on human lives globally. To counter this situation and holding onto the development of technologies, many tech giants started working on connecting people throughout the world with AI-based automating technologies making it easier for humans to work proficiently and productively.

Automating tasks has always been a focus of humanity since ancient times. But the Technological Revolution helped it scale at another dimension, creating an environment of highly efficient machines helping humans to work creatively with fewer efforts on non-relevant or sometimes boring tasks. Modern-day computing provides an immensely huge opportunity for engineers and techy people to work on the automation of different time-consuming and redundant tasks over a vast number of fields. Automating techniques have been boon but using AI-powered automation has multiplied the usability of the technologies to the next stage. There are a huge number of applications already available to get implemented using AI automation, one of the most common usages in social media platforms is to handle Automated Digital Robots, widely known as BOTS. On platforms like Instagram and Facebook, Almost all small and medium-sized businesses use BOTS for handling the engagement and influencing in the most advanced way to provide a better user experience to product holders. These bots can engage artificially on customer content like reviews on comment section or DMs provided by companies for a direct way of customer interactions. Tech giants like Google have already developed a few highly efficient and advanced language models for Google Translation and Speech text encryption. These models can replace the need of people for doing such hectic tasks with almost no errors.

Automation has a great future ahead as Artificial intelligence application increases, usage of automating tasks become inevitable. Automation replaces traditional jobs with new optimized jobs for overall performance boosts of the subjective technology. Offices have come a far way in using automation in daily professional tasks like editing different serials number of millions of customers in mere seconds without any direct human necessity.

Companies these days are relying on efficient AI-Models to identify which candidate would be suitable for the vacant posts only on the basis of their resumes reducing the need for human readers. Such technology is getting more common due to the current pandemic as most of the official tasks are getting online compelling almost every type of business in using AI and automation making it more of a quality than quantity, directly impacting the needs of common people to be satisfied most conveniently. Automation has also come a long way in Coding and development allowing developers to use these auto-complete text models to complete their code or assist them in a most fruitful way reducing the need to remember the syntax details rather than working on quality outputs.

How tech enabled humanity to face Covid-19 Technology and Pandemic

AMAN SYED
SE COMP C

Humans have been using technology for the last many decades, it has played an important role in the development of almost all the fields, and day by day the technology is enhancing. With the enhancement in technology, human dependence on technology is also increasing. We all spent a lot of time with technology -- car, train, mobile, computer, microwave, refrigerator, etc. Now carrying just one mobile phone can do most of our day-to-day activities like digital payment, banking activity, news, online shopping, music, video, movies, learning, games, and many more. A day without technology is myths now.

In the digital era of enhanced technology, this is the first time we are facing a pandemic. The pandemic is caused by a very contagious and invisible virus. To control the spread of the contagious virus i.e coronavirus the government all around the world imposed strict lockdown. In lockdown all the shops, market, the mall was shut down, Office, colleges and schools were closed, sports tournaments stopped, the gathering was banned, movement of people prohibited, International boundaries were closed and many other prohibitions. The only things that were allowed are essential services. For safety purposes all the people are staying home. Nobody wants to go outside and contract the disease. While everyone is at their home the world has halted for a moment. But we humans don't want to stop ourselves while we are at home. So we humans with the help of technology have done all the things while being at home. Although pandemic in the past had affected a lot of the world but now with the help of technology the effect of pandemic is somewhat controlled. Technology has helped us in many ways to fight against Covid-19. In this pandemic situation, everything has changed, Like the work from home is now mandatory not an option, students now have to learn through mobile, the seminars have become webinars, physical classroom lecture replaced by online lecture through an application, wearing the mask is no more unusual now, etc.

Here are some areas in which technology helped us to manage the pandemic.

1) To Spread Awareness

Many misinformation was passing all across WhatsApp, YouTube, and Facebook about Covid-19 which causes panic among the people. To tackle false information, companies like Google, Facebook, and YouTube are working tirelessly to guide people to the right, verifiable information such as that published by WHO or local authorities and government. By providing the right information to the population can help them to take the right steps.

2) For Vaccine development

Whenever a pandemic occurs the first question asked by the people is, is their medicine available to cure it or a vaccine to prevent the disease. The world now wants to control the spread of Covid-19 and wants a vaccine as soon as possible. Technology is helping to boost the process for making vaccine. AI is playing an important role in suggesting components of a vaccine by understanding viral protein structures and helping to predict the structure of the virus. AI is helping scientists to find the vaccine for Covid-19.

3) Controlling the spread

We all know how important it is to control the spread of coronavirus to put an end to the pandemic. To control the pandemic the first thing to do is limit its spread, like isolate the infected people and quarantine the close contact. To do contact tracing the technology played a vital role. Like to inform people that a coronavirus infected person was found in your vicinity, use mobile data to know where the cases have gone in the last few days, use CCTV to recognize who they meet. Even CCTV cameras along with facial recognition technologies can help in identifying infected people who break the rules and step out despite being quarantined. For this purpose Indian Government launched the Arogya Setu application.

4) Safety and Precautions

Many engineers and scientists made equipment and application for safety and precautions purposes. Like made equipment that can be used without touching it, made UV ray sanitization machine, made ventilator at less cost, made an application which shows social distancing, etc. to take the right steps.

5) Services

While we are staying at home we don't need to go outside. So with the help of technology, we can do our all day to day activities by staying at home like for groceries shopping. We can order it online, attending lectures and meetings through the application, counseling with a doctor online, etc. The government also uses the online portal to provide e-pass if anyone wants to go somewhere in an emergency. In some cities and states some hospitals are overwhelmed so many patients have to run to 3-4 hospitals for their admission in hospital so the government started an online website or application to show the availability of beds in every hospital and covid care centers.

6) Mathematics Modelling

We all don't know when this pandemic will end but with the help of technology, we can predict it. So with the help of the mathematics modeling by making some assumptions we can predict how many cases can be there in the future that makes our government take measures before, it also tells us when the peak time in cases and when will it end. Although mathematical modeling prediction is not always true it helps in many other ways.

Conclusion

Even though we are having many advanced technologies till now we are not able to stop it or develop a vaccine and still many people are losing their life due to coronavirus. This shows us that we were not prepared for this kind of pandemic situation. So the next pandemic is not a matter of "if it happens", but "when it happens", would we be prepared in advance against the pandemic at an individual and collective level. What we need is preparedness. Indeed, the technology has advanced more and will continue to advance exponentially, but human institutions and societies need to accelerate in adapting to it and continue investing in building the technology systems for preparedness. After the COVID-19 outbreak, it is evident that, from AI to robotics, the technology innovations are helping to manage the epidemic and better equip to fight future public health emergencies in a timely, systematic, and calm manner.

Blockchain: The Futuristic Digital Trust Network

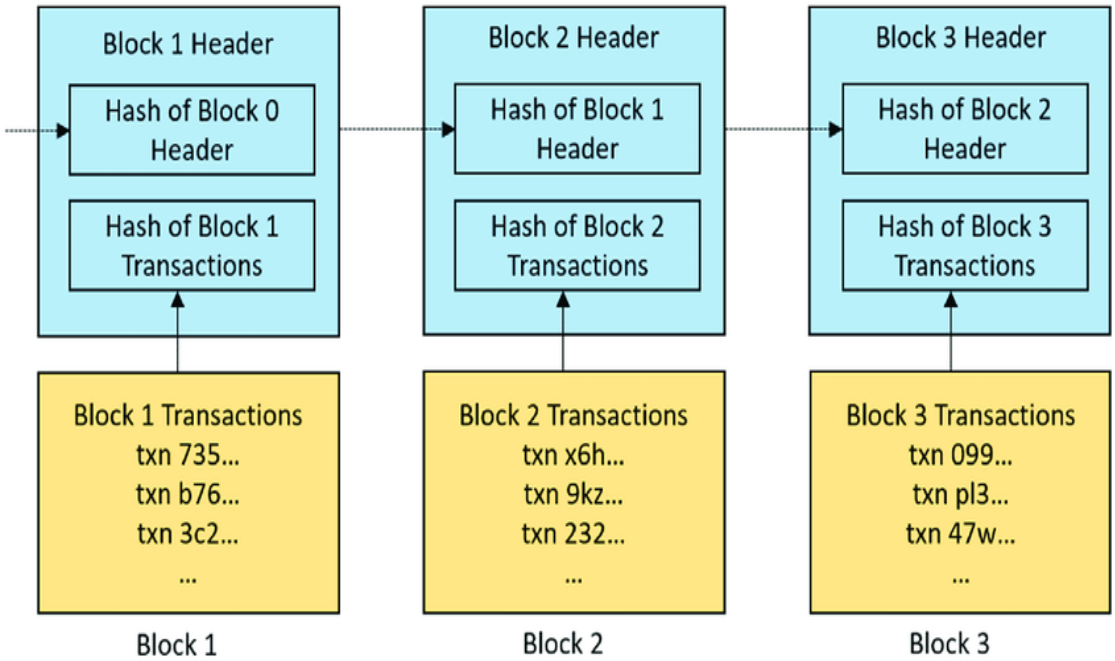
KUNAL AGRAWAL
FE – AI&DS

The buzz words of this decade “blockchain” & “cryptocurrency” are often used interchangeably. Both of these words are misused & often confusing as they are poorly explained elsewhere. Therefore, the scope of this article is to understand the difference between them and discuss future possibilities for Blockchain.

So, What is Blockchain?
It all started in 1982 when a Cryptographer named David Chaum proposed a blockchain-like protocol in his dissertation but it only gained traction in 2008, when a single/group of Developer(s) under the pseudonym Satoshi Nakamoto released a white paper and thus established the blockchain.

The simplest dictionary definition we can say is “A blockchain is a digital ledger of transactions that are duplicated and distributed across the entire network of computer systems on the blockchain. Each block within the chain contains a cryptographic hash (Hashing is a method to map arbitrary data into a bit array of fixed size) of the previous block (to form a chain. With this, you can trace back it back to the very first block, which is also often referred as the genesis block), a trusted timestamp & batch of verified transactions which are hashed & encoded into a Hash/Merkle tree. Each time a brand-new transaction occurs on the blockchain, a record of that transaction is added to each participant’s ledger. This enables the Blockchain Technology to be used for fund transfers, settling trades, voting & many other”

In simpler words, think of Blockchain as a register where you note down transactions but with permanent ink. The new transactions are recorded immediately and cannot be changed. This register is accessible to all. People can also register themselves as Accountants (think Miners) who can verify the transactions added on the register(mining). This technology is termed Blockchain

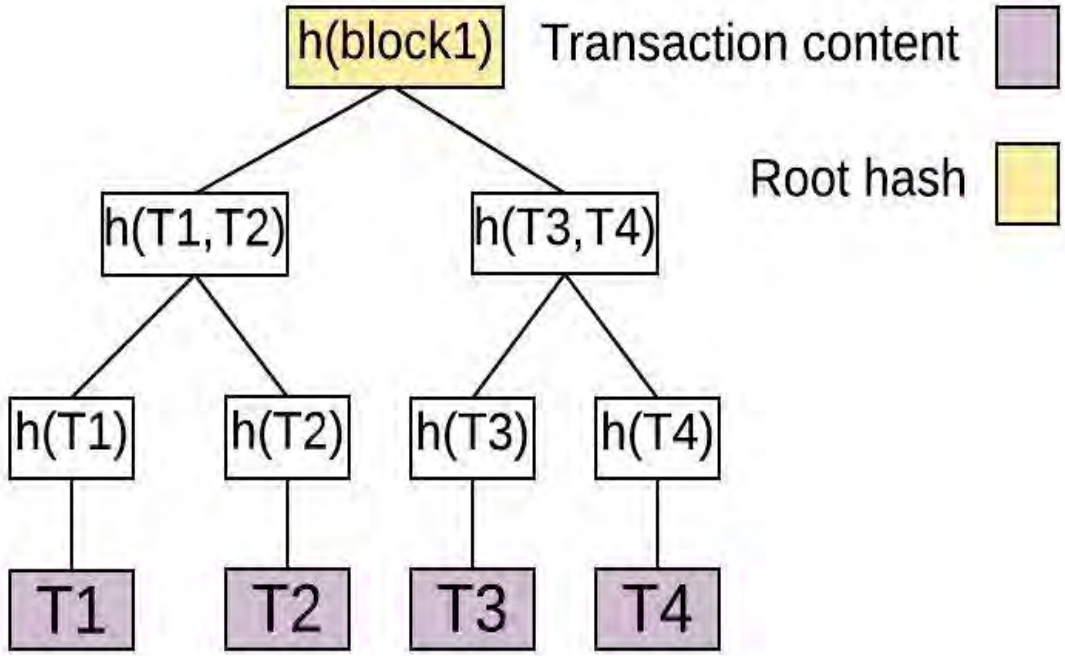


An Example of Blocks in Blockchain. Credits: Blockchain Technology in Healthcare: A Systematic Review by Cornelius C. Agbo, Qusay H. Mahmoud & J. Mikael Eklund

This blockchain network is decentralized, such that all those who want to use a blockchain network run it instead of some central entity. This doesn't allow any misuse & nobody can change the value in the register to give themselves an X amount, increasing overall trust in the network.

The Proof War: Proof Of Work VS Proof Of Stake

How do we verify the transactions without any third party? Meaning, we can be 100% sure that no one is double-spending or doing some mischievous work. Well, Proof of Work (PoW) & Proof of Stake (PoS) is the answer. PoS is older than PoW and works on the basis of Advanced Mathematics called "cryptography". Cryptography refers to the use of very difficult mathematical equations that only powerful computers can solve. The drawbacks of PoW are that it requires a significant amount of electricity & it can only process a limited set of transactions in a limited time given the complexity to solve the problem. Example: In Bitcoin, every 10 Minutes a new block(think a page in register) is created & as we learned that each block contains multiple transactions, therefore each block that is created comes with its own set of unique transactions which is to then be independently verified. To tackle these issues, PoS was created in 2012 by Scott Nadal and Sunny King. In PoS, participants will stake their own assets and may get selected randomly or by using a predefined algorithm. The system purely works on economic incentives & punishes the participants who try to add false transactions by taking away their part/full of their stake & rewarding them with transaction fees.



An Example of Merkle tree. Credits: MOF-BC: A Memory Optimized and Flexible BlockChain for Large Scale Networks by Ali Dorri, Raja Jurdak & Salil S. Kanhere

Ok, I somewhat understand Blockchain, then What is Cryptocurrency?

Simply stated, Cryptocurrency is a use case of Blockchain Technology. It refers to digital currency which uses strong cryptography to make it almost impossible to counterfeit & double spend. The most Widely used Cryptocurrencies are Bitcoin, Ethereum, Litecoin and many more. Each of these currencies employs its own version of the Proof Of Work (PoW) or Proof Of Stake (PoS) system to verify the validity of blocks/ transactions thus in the end giving some value to miners/stakes. The value of these currencies depends on Supply/Demand as each currency is limited in the amount at the time of creation. The post-pandemic has definitely given cryptocurrency a huge surge causing the current market cap for crypto (As of April 2021) to be a whopping $2+ Trillion. To give some perspective, India's stock market is $2.7 Trillion.

The Future Of Blockchain:

I always like to think that the past decade was only the testing ground for this game-changing tech. The most successful use was obviously in CryptoCurrency, where "Bitcoin" , its oldest Player, was in headlines at various points throughout the decade. At the start of the decade, Bitcoin had just reached parity with the Dollar and by the end of that decade, it was more than $30,000, it all-time high throughout that decade. In this Year (2021) alone it reached its all-time High Value in Mid May 2021 at $61,000+ & is currently (As of April 10, 2021) sitting at the price of ~$60,000 and has a market cap of $1.1+ Trillion.

Some of the Emerging use of Blockchain Technology:
Now that we understand the fundamentals of Blockchain, let's take a look at what the future may hold for Blockchain as Technology. Below listed are some of the best use cases that we should definitely keep an eye on.

1) Smart Contracts: It is probably one the most promising use case outside cryptocurrency. A Smart Contract is program that automatically enforces a contract once a predetermined condition is met & verified. The program is stored on blockchain & works on conditional statements that are written in the code. Therefore, it cannot be changed once deployed. Let's take an automobile as an example. So we start by defining a smart contract for every automobile, and then we record every transaction (sale, service, etc.) on the blockchain. This gives buyers/sellers the ability to easily inspect and trust the history of every car before someone buys.

2) Financial Services: A research by reason revealed that many Banks in the US has shown interest in moving away from their existing systems to create private blockchain and implementing distributed ledgers for use in banking

3) Supply Chain: Walmart is already using Blockchain in their Supply chain monitoring system in partnership with IBM & other players. It will allow for tracing of the products very easily & will be very helpful in finding out problematic suppliers or finding the source of contamination in a product. More companies are expected to introduce a similar system in their supply chains as fear of COVID-19 like Virus will persist throughout the decade. This will be a key technology to keep track of any contamination thus avoiding the risk of shutdown for those corporations.

4) Domain Name: With Blockchain-based domain names, the domain names would entirely be the assets of the owner of the domain and can only be controlled by his private key. This will allow more freedom & resist censorship as no third party could hijack the domain and take it under their control. This is also a very emerging use case that can cause rippling effects throughout the web.

5) Data Storage: One potential use is decentralizing cloud data storage. This will improve reliance & will allow the data to be accessible in case one node is disturbed. Further trusted timestamp will allow people to know who changed the data & when.

6) Identity Management: Personal ID has always been targeted by malicious people to gain access either to your bank accounts or profit from your data. With the help of blockchain, storing digital information will be a lot easier & safer and importantly unalterable. They will use Public & private Keys to verify ownerships & gain trust. The Identity is to be self-sovereign, meaning the Owner could update their data (verification by the third party in case required), Hide particular information & etc. A more standardized ID could be made that can be accepted globally & be trusted could arrive in this decade.

All Big & Small Enterprise have also started developing & testing products based around blockchain technology. We should expect a lot more real-world use case Blockchain-based Technology in this coming decade as more people fiddle around the tech & build more reliable & successful products. The coming decade is full of promise considering the wide commercial success it had in the previous one.

Disclaimer: At the time of writing, I own various cryptocurrencies including Bitcoin

Stock Price Prediction

MAYANK ROONGTA
TE COMP B

Stock market prediction is a very important aspect of the financial market. It is important to predict the stock market successfully in order to achieve maximum profit. This research article focuses on the algorithms for the stock price prediction and the factors on which the stock price depends. Our objective is to identify the best possible algorithm for predicting future stock market performances.

Introduction:
Stock market trading is an activity that consists of various buyers and sellers of stock who need fast and accurate information to make effective decisions. Stock market prediction means determining the future scope of the market. But since there are many factors that determine a stock price it becomes very difficult to predict the stock price. Hence a system is essential to be built which will work with maximum accuracy and consider all important factors that could influence the result. This research article studies on machine learning techniques and algorithms that can be employed to improve the accuracy of stock price prediction. Our objective is to identify the best possible algorithm for predicting future stock market performances

Factors that are to be considered while determining the stock price :

1) CAGR of the company and the industry
CAGR is one of the most accurate ways to calculate and determine returns for anything that can rise or fall in value over time. Investors can compare the CAGR of two alternatives in order to evaluate how well one stock performed against other stocks in a peer group or against a market index.

2) PE Ratio
P/E ratios can be used by investors and analysts to determine the relative value of a company's shares in an apples-to-apples comparison. It can also be used to compare a company against its own historical record or to compare aggregate markets against one another or over time.

3) Cash Flow
Cash flow per share is the after-tax earnings plus depreciation on a per-share basis that functions as a measure of a firm's financial strength. Many financial analysts place more emphasis on cash flow per share than on earnings per share (EPS). While earnings per share can be manipulated, cash flow per share is more difficult to alter, resulting in what may be a more accurate value of the strength and sustainability of a particular business model.

There are some mechanisms for stock price prediction that comes under technical analysis [1]**:**

1) Sentiment Analysis:
Sentiment Analysis of the stocks can be done on the basis of the financial news and the tweets that come out for the stock. The sentiment analysis systems will work by looking at words in the news, giving positive or negative points for positive or negative words, respectively, and then summing up these points in the order in which it is written to determine the stock popularity in the market.

2) Pattern Recognition:
Pattern recognition of the stocks can be done by seeing the patterns of the stock prices that can help in predicting the future of a stock. It studies data rigorously and identifies a pattern and later an analysis of the pattern is done by studying charts to develop predictions of the stock market.

The machine learning algorithms that we can use for these mechanisms are [2]**:**

1) Random Forest Classifier:
Random Forest will be a great algorithm for stock price prediction based on pattern recognition as it is a very versatile algorithm capable of performing regression as well as classification. It will take into consideration the factors discussed above to classify a stock as Good or Bad to invest. Along with it Random Forest Regressor can also help us to predict the price of the stock in the future on the basis of the historical stock price data and the factors that we have considered. The other advantage of using Random Forest is that it is an Ensemble learning algorithm and has many hyperparameters to build the model upon.

2) SVM (Support Vector Machine):
Support vector machine (SVM) is a learning technique that performs well on sentiment classification as the performance of SVM depends on the used kernel function. Hence, if a suitable kernel is chosen, the efficiency of classification should be improved. For the stock price prediction, we can use a Non-negative linear combination of multiple kernels in order to enhance the performance of sentiment classification for the stocks based on the data available into positive and negative.

Conclusion:
In this article, the mechanisms for determining the stock prices along with the algorithms and the factors that can be considered are discussed. The factors that we considered if implemented on the algorithms selected will surely help the investor to ascertain the price of a stock company.

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Technology for a hybrid workforce and creating more employment opportunities

APEKSHA KAMATH
SE COMP B

After Harjas Sethi aka the Work-From-Home video girl's very relatable post in which she rants about going back to the office after working from home for over a year went viral on social media, I started wondering if it's that important to get back to offices or colleges ever again. The COVID-19 pandemic has forced the employees worldwide to settle into a routine of remote work and the companies planning for the long run are trying to decide on the best path towards the future of work. Though the pandemic has stalled the lives of people in almost all aspects it has also demystified the process of working from home and, as a result, many organizations are looking forward to a new hybrid model that combines remote work and office collaboration. While Covid-19 forced us into the "remote work" or "no work" edict, there have been surprising benefits.

Since the pandemic, companies feared that employees working from home would be less productive but that proved to be a fallacy. In fact, surveys revealed that remote workers significantly improved their productivity since working remotely led to increased efficiency which may be attributed to reduced/no commute, minimized workplace distractions and more freedom to work at their own pace. Mom Corps, a national professional talent acquisition and career development firm revealed that about 42% of employees agreed to a salary cut in order to have more flexible work options from their employers. As a consequence, many businesses that never offered remote work before are now embracing it. Organizations around the world are considering alternative hybrid models to aid the future of work.

Another major reason for organizations being reluctant to adopt a remote or hybrid workforce in the past could be the lack of operations management and the lack of appropriate technological aids to support it. However, COVID-19 has forced organizations to quickly adapt to a largely remote workforce. For many, this meant switching to video calls for meetings with team members, to interview candidates. Nowadays, some recruitment processes require candidates to submit their video resume which in a way fosters creativity and encourages people to learn and use technology.

“A hybrid workforce invites a much larger talent pool.”

One of the perks of a hybrid workforce is that it allows organizations to invite a much larger talent pool. There is no need for employees to look for job seekers within commuting range of the physical office location. While a hybrid workforce means that remote work will also happen in conjugation with in-person work, it’s unlikely that organizations will suddenly start hiring from anywhere across the globe. But if the organization adopts a hybrid model, it allows for the possibility to hire that perfect candidate, even if they aren’t in the local area. This can be especially useful when hiring for in-demand roles that are onerous to source.

Considering all these factors, it is important to understand about the technology to identify and overcome the loopholes in the process of establishment and success of a hybrid workforce.

1) As organizations switch to the hybrid model, implementing new strategies is critical to securing remote employees, protecting their digital assets and guarding against cyberthreats. The Covid-19 pandemic brought about an accelerated migration of business applications and infrastructure into the cloud for better performance. According to a survey, an estimated 76% of companies adopted cloud services faster than they had planned, which inadvertently increased the risk of cyber-attacks and created security gaps for hackers. According to an FBI report, cybersecurity complaints had increased up to 4,000 new complaints per day, i.e., about a 400% increase, after the onset of the pandemic.

2) Automation is a pedestal that can increases efficiency by reducing dependency on humans and reducing errors. We can think of AI-enabled solutions for processes like document management, device management, expense filing and invoice processing to help bring in the necessary levels of automation. Currently, Cloud-computing and storage are helping the hybrid workforce with on-demand delivery of IT resources, eliminating the need for physical equipment and aiding document accessing and sharing from anywhere, anytime to ensure steady productivity levels. The field of AI and automation has currently grabbed attention of a lot of researchers and has a lot of scope in future.

3) The pandemic has forced the workforce to switch to virtual project management techniques. Whereas only building a virtual project team will not guarantee success of the team several others factors like the industry, infrastructure, project nature and complexity, technology, communications, and team dynamics play a significant role. Managing and coordinating work would need the help of more efficient project management software tools Slack, Zoom, GitHub, Trello, Jira, etc. that would help different teams to set goals, divide and delegate tasks, track progress, track time and identify any issues as soon as they crop up. This would help the teams to keep track of deadlines, utilize resources optimally and increase the overall

4) Virtual collaboration between employees to a great extent have reduced the negative impacts of pandemic on businesses. To ensure optimal results, managing and coordinating work would need the help of mobile-friendly advanced chat and video conferencing tools that ensure glitch-free connections while not consuming up a lot of the internet bandwidth of the people working from their homes or other locations. Organisations need to compete on customer experience, innovation, and the speed and agility with which they can respond to opportunities which means that organisations need to have a highly talented, motivated and agile workforce, which can leverage technology to drive performance and growth.

Though it is not possible to fully replicate the workplace in the remote environment, companies should try to assess the digital tools and capabilities that would culminate in a successful remote workforce. Next the firms can assess how those tools could be utilised to build collaboration between an in-office and hybrid working environment and think through the actions that may be required to be taken to do so. Many IT teams are known to have adopted new interactive whiteboarding tools, for example, and companies too are willing to invest in the training needed to ensure teams are well positioned to use them. Needless to say, simply implementing the needed tools will not lead to greater collaboration. Leaders also must be ambitious about driving adoption. Success on the journey to a hybrid workforce will greatly depend on an organisation's ability to engage and motivate its people, taking into account each individual's drivers, fears and needs.

Information and Pandemic

PARINITA PRAJAPATI
SE COMP B

The word Infodemic is a combination of the word 'Information' and 'Epidemic'. It typically means the rapid spread of inaccurate information about some topic to a very large population. Inaccuracy of information is very dangerous and equivalent to a pandemic. Infodemic is a term used when the entire country or continent or a large portion is exposed to invalid, indiscriminate and false information. It becomes very necessary to stop it as it may lead to misinformation and may mislead people. This may in turn result in misconceptions and chaos.

During this Covid-19 pandemic where the entire country is suffering, infodemic has made it even worse. Starting from the spread of the virus to its prevention and vaccination, a lot of misinformation has been circulated to people through social media, the internet and fake messages. People got trapped in the infodemic and started to follow wrong precautions and false treatment. This led to worsening the condition even more. Infodemic takes place when an individual, group or community spreads wrong information for their benefit, grudges and even to spread hatred among people. Misinformation can be harmful to people's mental and physical health and also lead to poor observance of public health measures. Infodemic is the main cause of anxiety, stress and depression. Too much information about a particular topic is hazardous. It creates an environment of stress and false assumptions and deteriorates an individual's mental health. Infodemic costs lives. Taking the example of the COVID-19 situation, people have started losing trust and hence it is endangering the country's ability to stop the pandemic. Without appropriate trust and correct information diagnostic tests go unused, the campaigns that promote awareness and immunization are questioned and let down. As a result, the virus will continue to thrive.

Furthermore, misinformation about COVID-19 is causing debates, conflicts and amplifying hate speech, which is turning into a battle. People are not cooperating and are directing towards violence. We all are well aware that when wrong information is spread we are +subjected to making wrong decisions and start to compromise on our health and welfare. Infodemic is spread both online and offline. People are spreading it to achieve their agendas and objectives. Lack of confidence and surety can lead to infodemic. Any information or guidelines must be circulated and followed only if it is from an authorized organization or if it's coming from a trusted source. Reading inaccurate information can affect people's performance on any task. Misinformation misleads people and results in creating a wrong impression on people's mind. At the same time, as the pandemic continues to create anxiety and uncertainty, there is an urgent need to manage and stop infodemic.

Image Inpainting with GAN's

Nitisha Pradhan
Rahul Pal
Ashutosh Pandey
TE COMP A

Many times, it happens that we come across an old damaged photo of ours from our childhood days. There are a few missing patches here and there, and we wish for it to be restored somehow. This is exactly what is done in the task of Image Inpainting. As the name suggests, Image Inpainting is the process of reconstructing lost or deteriorated parts of images and videos. The digital version of the image is made up of pixels, missing in places where the scratches are present. It is these missing pixels that we try to fill in by the use of deep learning- based methods. This blog aims to explain the generative adversarial take on Image Inpainting, that has been achieved over the years.

So, what are GAN's?

Generative Adversarial Networks (GAN's) are a relatively newer field in the world of Deep Learning. They were first proposed by Ian Goodfellow in 2014 in his paper "Generative Adversarial Networks". They are deep generative models, that consist of two networks, namely the Generator G and the Discriminator D. What the generator does is that it learns to generate possible data (images) and these generated examples are then fed to the discriminator whose job is to learn to differentiate the fake examples from the real ones. Initially, the job of D is quite easy as the G produces very poor examples. But over time, as the G receives feedback from D, it tries to improve the images and they start becoming more real-like and it starts becoming difficult for the D to distinguish. This is the main and the original aim of GAN's, to generate realistic images from random noise. Over the years, they have been used for various applications such as data augmentation, anime generation, image to image translation, etc.

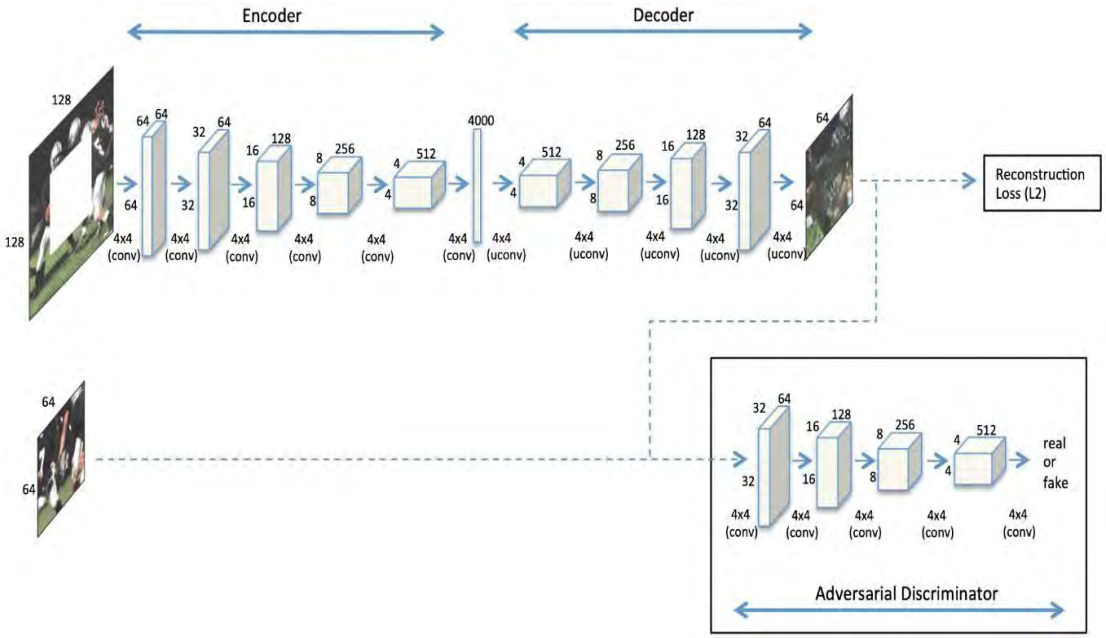
And how will GAN's help in Image Inpainting?

As you may have figured out by now, we can indeed use GAN's for generating the missing pixels in images. The task of the generator would be to fill in the missing regions in the images, and the discriminator, as expected, would try to determine how real the images look. The discriminator, (while training) has to have the original and complete images as well, so that it can learn.

Epoch after epoch, the generator will get better at filling these missing regions and the end result is aimed to be good quality reconstructions. It is easier to train GAN's for inpainting, if the image contains a central square hole of missing pixels in the middle. In real life, this would hardly be the case, but those who are just starting out with GAN's and image inpainting should best try to do this first.

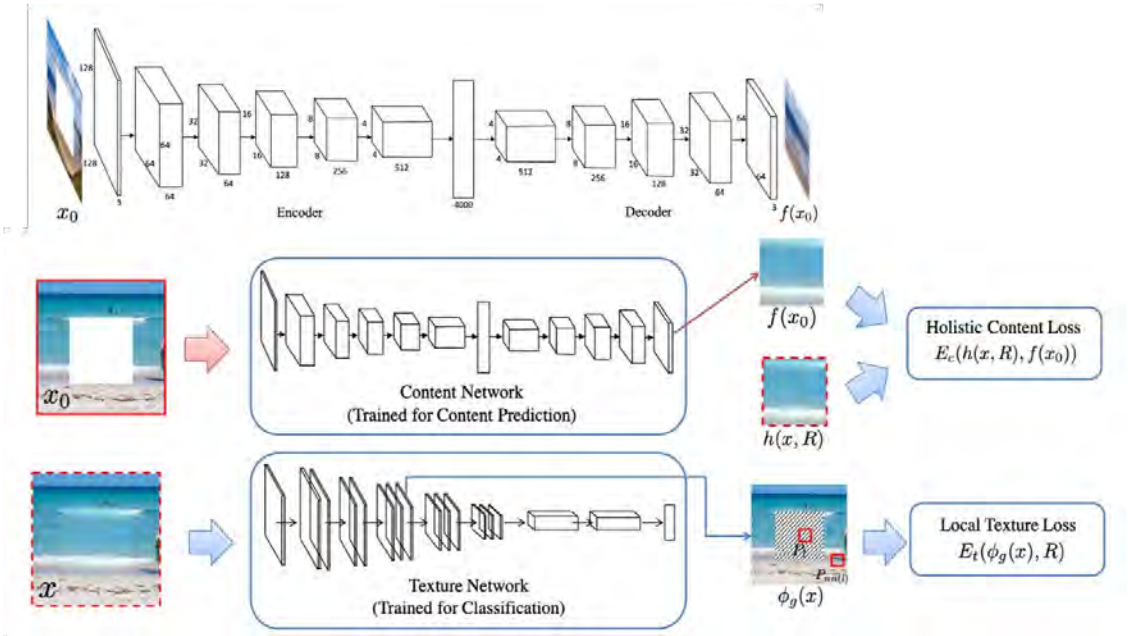
A small history of GAN's and Deep Learning based Image Inpainting approaches:

1) Context Encoders (2016):



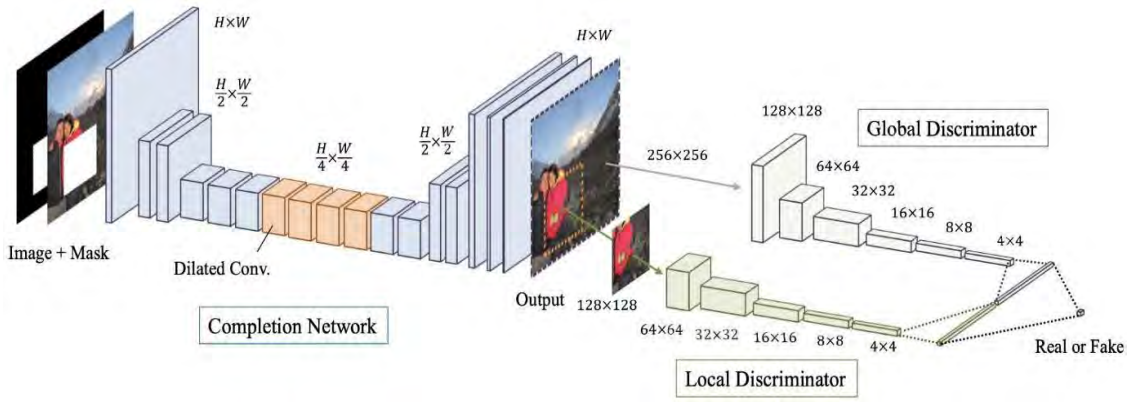
Context Encoder (CE, 2016) [1] is the first Generative Adversarial Networks based inpainting algorithm. This paper has laid out some basic and useful concepts regarding Image Inpainting. The term "Context" relates to the understanding of the entire image itself and the core idea of CE is Channel-wise Fully Connected Layer, which is similar to the standard Fully Connected Layer. It is notable that the feature locations of the previous layer contribute to the feature locations in the next layer. Thus, a deep semantic understanding of the whole image is observed.

2) MSNPS (Enhanced Context Encoder, 2016):



Multi-Scale Neural Patch Synthesis (MSNPS, 2016) [3] can be called an enhanced version of CE [1] as a modified CE is used to predict the missing parts in an image and a texture network to predict about the missing parts and improve the visual quality of the filled images. The texture network idea is derived from style filters. The local texture of the missing parts is to be generated by transferring the style of most similar and valid pixels of the image.

3) GLCIC (A Milestone in Deep Image Inpainting, 2017)



Globally and Locally Consistent Image Completion (GLCIC, 2017) [4] is a very significant work in deep image inpainting. It defines the Fully Convolution Network with Dilated Convolutions for deep image inpainting and this is a typical network structure for deep image inpainting. The Dilated Convolutions are an inexpensive way of understanding the context of an image without having to use fully connected layers. They also are able to handle images of different sizes.

Apart from this, two discriminators at two scales were also trained together with the generator network. A global discriminator looks at the whole image while a local discriminator looks at the filled centre hole. The two discriminators ensure that the filled part has both global and local consistency.

Conclusion:
It is hoped that anyone who reads this blog at least gets a basic understanding of GAN's as well as image inpainting and how the former can be used in the latter. The main issues with using GAN's for image inpainting is that GAN's are somewhat unstable and thus, difficult to train. Also, high-resolution image inpainting is another really difficult task.

On a personal note, our team is currently working on image inpainting using DCGAN's. I'll update this blog with information once we are successful and have the results of our experiment.

Thanks for reading! And keep learning!

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Importance of STEM

PREETI VERMA
SE COMP C

STEM
What is it?
How is it of any use to use?
How is this going to help the future?

STEM is an educational program that is developed to help improve the process of educating students. It is designed to prepare primary and secondary grade students for college and graduate courses concerning the fields of science, technology, engineering, and mathematics. To impart integral knowledge in students about the subject they want to pursue. This program is designed to inculcate into students a better pattern of learning as compared to the usual way.

The purpose of this method is to incorporate skills in students like logical reasoning, collaboration skills, and the tendency to inquire. All the skills they will require to think, research and create something new. Another objective of this technology is to provide subject-specific education to students. This will ensure that the student has a better touch with the subject before reaching the core concepts. This program also helps immigrants in the United States acquire skills that earn them work visas and better pay.

To educate students in their respective domains, the program can be divided into the following standards of practice:

Learn and apply content:
This shows students the practicality of the theories given in books.

Integrate content:
The core concepts and their applications in different domains can be understood

Interpret and communicate information:
While interpreting information, students are given the opportunity to think and understand about the concept. This way the theories are better understood. Communicating that acquired information can prove helpful to students in many ways.

Engage in inquiry:
Engaging in enquiry helps them to find flaws in the present system Thus giving rise to interesting problem statements.

Engage in logical reasoning:
Trying to solve the faulty systems of problem statements gives the possibility of a new innovation/invention.

Collaborate as a team:
Working in teams helps us understand people and the community around us. It fosters a healthy relation between fellow mates. It can also help us to understand different points of views and discover different ways in which a solution can be found.

Apply technology appropriately:
After finding a solution, practically applying it is very important. And for an efficient solution to any problem, the technology behind it must be appropriately applied.

Children learn all of these aspects of studying under the STEM program.

In recent times, it is very obvious that the majority of the educational curriculum is just theoretical knowledge of the concept with just the bare minimum of the practical information. And even though it makes their concepts clear, it doesn't foster them to think on their own. It doesn't boost their gears to turn and create something new. This is where STEM comes into action. Project and practical-based learning are some of the core principles of STEM. All the STEM practices push students forward to understand science, technology, engineering, and mathematics in a practical aspect rather than just theory.
It helps them to think for themselves and make their own discoveries.

Why is it important you ask? Because the sole purpose of these subjects is to find the solution to a particular problem statement. To find a new possibility for the future by understanding the present aspects. To find the loopholes and fill them with their creativity. And all of this is being lost to time as we concentrate our focus towards just theory. STEM helps us to reach the core objectives of these subjects.

STEM can be incorporated into the syllabus or can be an extracurricular activity. It can also be conducted in fun sessions totally apart from the school course. Making it an enjoyably learnable activity will surely gain the students' interest and willingness to learn. As for adults, it can be conducted as training sessions before employment. This will not only train your future employees but also increase their efficiency in work. Training your employees to be can help save you from future confusions, time loss and error in the job done.

Hence, it could be said that STEM proves to be an efficient way to help us nurture the future in a better way. It helps us to make students understand the power they hold. It helps us in bringing out the potential of a person in a better way.

Hope this helps you in understanding the core concept behind the STEM project. Try applying it in your life. Find some answers. Innovate something. Start thinking something new. Move towards a brighter future.

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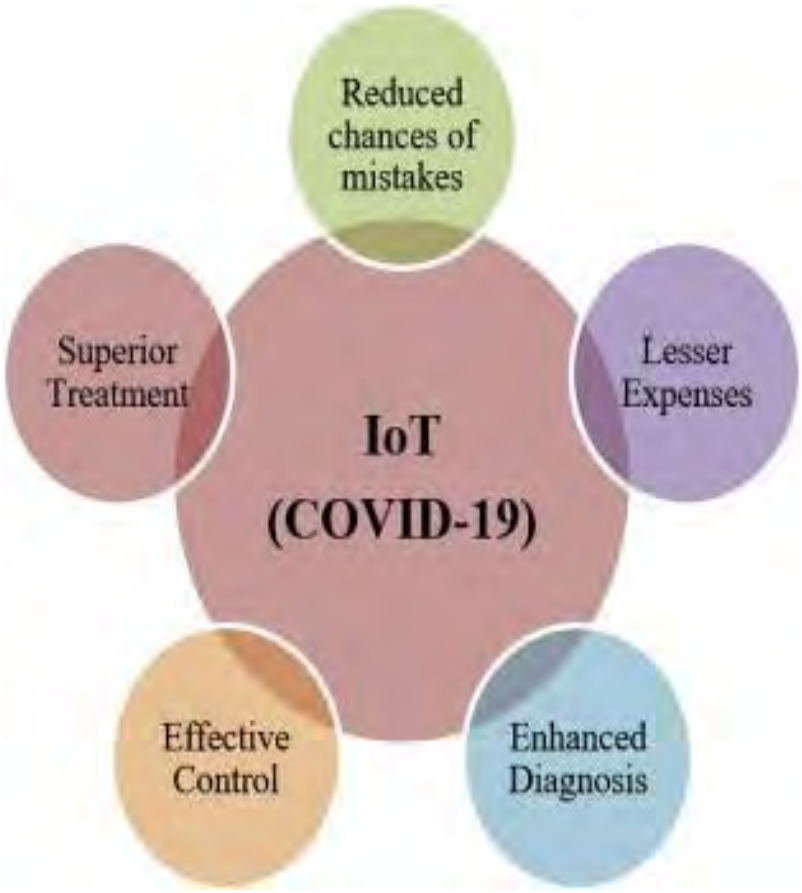
TECHNOLOGY, PANDEMIC & THE FUTURE

HARSHPAL SINGH
SE COMP C

The covid-19 outbreak is one of the most recent pandemics that has hit mankind in recent years. Many have incurred a huge loss while a minority of the population has faced gaining profits i.e. sanitizer manufacturing companies, Mask making handlooms, software companies that provided a platform for social interaction via various online meet apps.



Many have tried making the best out of it within the quarantine period but no one or a less number has actually discussed or reminisced on how and what measures could actually provide optimal benefit for the general public.

Some have come up with few precautionary measures as in abiding by the rules of social distance, frequent use of sanitizer, and masks. Now that First world countries have come up with patenting their own vaccines. Humans are majorly inclined towards getting inoculated, some part of the world has already been vaccinated, but still, the risk of being infected has not been completely defied. Therefore, there must be some sort of technological human-friendly constraint which not only provides precautionary measures but should also (as the topic suggests) should help in tackling through mediums of technology and should also be a great lesson for the forthcoming Generation as well.

As far as my opinion is considered on this the very foundation of the problems aroused during a pandemic cannot resolve it by itself. There must be some solution to resolve, considering that lockdown imposed by various countries for the safety of the general public is due only short time or else the entire world might face a severe recession period.

The technological tackling technique which would be ideal would be a smart app using concepts of INTERNET OF THINGS (IoT) .

SMART E-MOBILE APP USING INTERNET OF THINGS:
The internet of things medium can be used to monitor the data received by the user through the cloud. It will monitor various parameters. IoT sensors can also detect whether the quarantine norms are being followed by the concerned person or not, once all the data has been collected, the gauged-out parameters would be sent to the cloud, and once the cloud receives the parameter.
The processed data would provide an output to the person and would come up with the most optimal solution for the person to minimize the risk of being infected. Working as a smart app which would also utilize the sensors and would provide the optimum range of temperature and when the odds are high of temperature increasing which can also provide precautionary guidelines. This will not only make the best out of technology but would also keep the chances of getting infected at stake. For creating such an app, a high skilled panel would be required who are well versed with the concepts of CLOUD COMPUTING and INTERNET OF THINGS. Optimal and efficient use of technology, may help us as well as the general public to tackle the difficult and testing times due to the pandemic.

American Sign Language (ASL) into text in real time using AI

Khyaati Shrikant
TE COMP A

In the era of modernisation, with the aid of advanced technology we are connecting with people every now and then for our professionals as well as personal activities. However life is a bit difficult for the deaf and hard of hearing people to communicate with others comfortably. Since the general public are not quite familiar with sign language, so smooth communication becomes a barrier for these people. There is a way one can make it much effortless for them to communicate with others. Sign language helps to build all aspects of communication in addition to bridging missing gaps.

Why American Sign Language (ASL) Translation?
We opted for ASL as it is the most common Sign language in current times and it is regarded as the sole cultural norm for the deaf. By Translating ASL to spoken English text in real time, we equipped one's smartphone camera to communicate the sign language in the text form on the screen. With the help of this application, the person with hearing or speaking disability would communicate using Sign Language while the general public would be able to translate what the person wants to convey and can reciprocate it in the same manner.

Current Development Enabling the real-time sign language detection in video conferencing is challenging, since the application needs to perform classification using the high-volume video feed as the input, which makes the task computationally heavy. In part, due to these challenges, there is only limited research on sign language detection.
In “Real-Time Sign Language Detection using Human Pose Estimation”, presented at SLRTP2020 and demoed at ECCV2020, Google presented a real-time sign language detection model and demonstrated how it can be used to provide video conferencing systems a mechanism to identify the person signing as the active speaker.

Planned Model
To enable a real-time working solution for a variety of video conferencing applications, we needed to design a light weight model that would be simple to “plug and play.” Previous attempts to integrate models for video conferencing applications on the client side demonstrated the importance of a light-weight model that consumes fewer CPU cycles in order to minimize the effect on call quality. To reduce the input dimensionality, we isolated the information the model needs from the video in order to perform the classification of every frame.

Because sign language involves the user’s body and hands, we start by running a pose estimation model, PoseNet. This reduces the input considerably from an entire HD image to a small set of landmarks on the user’s body, including the eyes, nose, shoulders, hands, etc. We use these landmarks to calculate the frame-to-frame optical flow, which quantifies user motion for use by the model without retaining user-specific information.
Each pose is normalized by the width of the person’s shoulders in order to ensure that the model attends to the person signing over a range of distances from the camera. Optical flow is then normalized by the video’s frame rate before being passed to the model.

Further Ideas

The planned model uses both sign detection and pose detection for the translation, we are further thinking to add another layer of the face emotion detection to predict the words and grammar for the impending sentence. Though this idea is quite new and hence its implementation and research is hard to come by, we hope this additional layer of detection would help us increase the accuracy as well as quality of the translation.

About Us

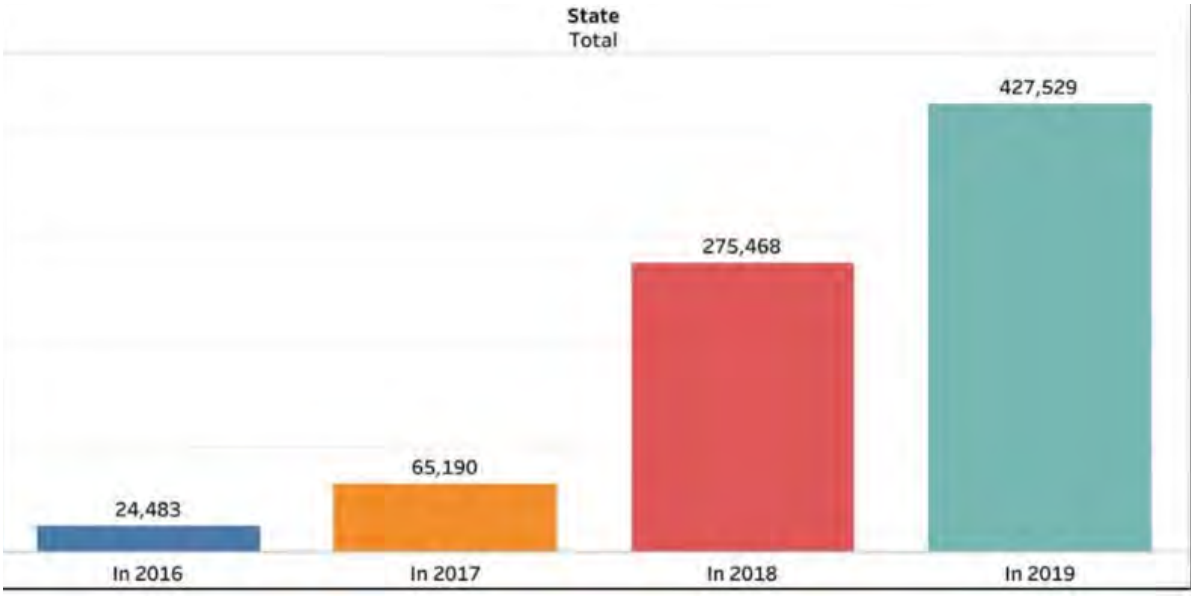
We are Computer Engineering students pursing the degree from Thakur College of Engineering and Technology, Mumbai. The purpose of coming forward to create this application is for the welfare of the privilege community to communicate confidently with the same pace in the society. Under the guidance of Dr. Manish Rana, the team members: Aayush Hatekar, Khyaati Shrikant, Ayaan Farooqui and Prateek Angadi, are working on the implementation for the said project.

Upgrading Standard Surveillance with AI

ANURAG TIWARI
KARTIK RAWOOL
RAMESHTA VISHWAKARMA
TE COMP B

Ever wondered what a camera coupled with the latest AI could do in your immediate surrounding?

There are a multitude of possibilities and potential applications that can create a huge impact with an intelligent surveillance system in place. Compared to 2016, the number of CCTV cameras in the country has increased exponentially from a mere 24,483 to 4.27 lakhs in 2019. This is an increase of 17.5 times in four years. The following chart depicts the number of CCTV cameras available with the police as of the first of January of each year.



Interestingly, this significant increase hints towards a positive change. With a surge in the number of CCTV cameras, there is an enormous amount of data being generated that can be utilized very effectively to combat myriads of problems encountered in our daily lives.
Imagine a future where the entire city is monitored by responsible AI, providing law enforcement and critical evidence, with the tools and intelligence to stop atrocities and virtually all crime in real-time.

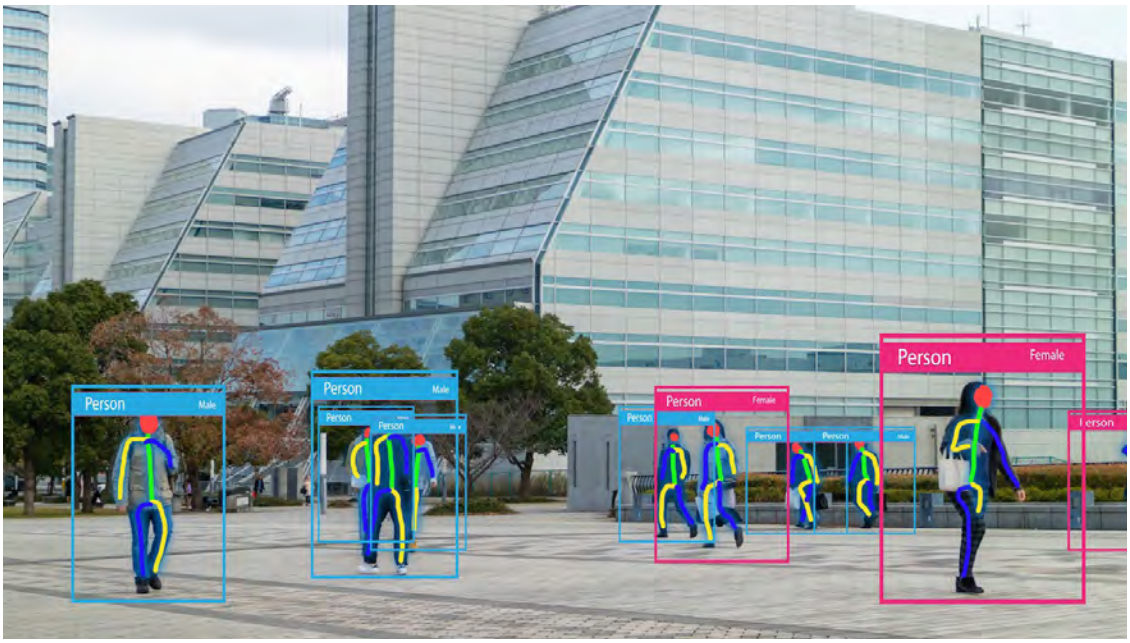
Cameras could detect people fighting, falling, damaging public property, carrying weapons, or even items left unattended in public places. A suspicious group of people who could turn out to be a menace could be tagged well in advance, to further diminish the chances of any violations. The 2002 movie, starring Tom Cruise, titled The Minority Report, showed a similar futuristic technology that made it possible for the cops to not only predict crime but also convict criminals before the actual crime was committed. Although the thought is far-fetched, with advancements happening all the time, it surely does not look like an extremely distant possibility.

AI-driven solutions aim to integrate world-class detection, recognition, and prediction software that could enable us to form a virtual shield over cities, effectively allowing non-disruptive, accurate, and effortless surveillance. Artificial intelligence is giving surveillance cameras digital brains to match their eyes, letting them analyze live video with no humans necessary. This could be good news for public safety, helping police and first responders more easily spot crimes and accidents and have a range of scientific and industrial applications. Not to ignore the fact that this also raises questions on the premise of privacy, and poses a risk to act according to its own accord in terms of classifying an activity as a crime. What may sound like straight out of a science fiction movie right now, intelligent surveillance systems are already being developed and deployed. IC Realtime is one such example. Their product, named Ella, is a counterpart of Google for video footage. Ella can recognize hundreds of thousands of natural language queries, letting users search footage to find clips showing specific animals, people wearing clothes of a certain color, or even individual car makes and models. In the demo below, Ella loops through footage of over 90 days to find out people wearing red and conveniently showcases the results according to the date and time, giving a Netflix-like view to an advanced analytical system.

Imagine taking a stroll on a lazy afternoon, when suddenly, you witness a blue Honda Amaze sedan, apparently with a scratched out number plate, and a masked driver, screech to halt at a distance from you. You look around, panicked at the sight of a girl being forcefully pushed into the car, carefully avoiding the surrounding CCTVs. Before you could react, the girl is swooped into the car, and it has merged with the ongoing traffic, speeding hastily.
You just witnessed a kidnapping. With no CCTV that could capture this blue sedan, black-masked driver story of yours, there is little lead that the cops will be able to track down the vehicle. Well, not anymore, Ella to the rescue!

In this imaginary scenario, Ella could be searched for a blue, Honda amaze sedan at the specific time and day when you witnessed the crime. The results can be narrowed down quite conveniently because although the crime wasn't committed under CCTVs, they still could very well be used to track down the path where the car was headed. All this without any manual intervention, or zooming into blurred CCTV images, using a map and still not be misled by another similar car.
This is one such example of where the world is already headed, to make citizens feel safe and reduce crime.
Ella runs on the cloud and can be integrated into a website. But what about hardware-integrated CCTV AI that can capture and analyze footage without the internet? Boulder AI is a startup, based upon selling 'vision' as a service and offers cameras already integrated with AI, which surprisingly function without an internet connection.
The company is already working with the banking and energy sectors, but who told you, that pizzas cannot be scrutinized by AI as well? As amusing as it may sound, Boulder AI utilizes their cameras to even determine the right shape and size of pizzas.
One interesting problem that Boulder AI solved was counting the number of fishes that passed over a dam, for a customer who wanted to meet certain environmental regulations. A person used to sit and manually tick the number of fishes passing over it until someone suggested using a camera. This lead to Boulder AI and they created a custom fish identification AI to detect the fishes passing over the dam.
In both cases, though, what these firms are currently offering is just the tip of the iceberg. In the same way that machine learning has made swift gains in its ability to identify objects, the skill of analyzing scenes, activities, and movements is expected to rapidly improve.

A key example of advanced analysis that these companies look forward to integrating is movement, detection, notification, and suggestive prediction by looking over the footage. For example, Boulder AI looks at developing a camera that could filter suspicious-looking individuals in a bank, by watching their actions, expressions, and movement.
All this brings us down to two major aspects of the capabilities this has to offer — technical and ethical.
Technical would mean, can an accurate AI, free from judgemental or algorithmic bias be created?



All this brings us down to two major aspects of the capabilities this has to offer — technical and ethical.
Technical would mean, can an accurate AI, free from judgemental or algorithmic bias be created?
And ethical concerns would include, that once created, would they be allowed to make serious classifications and taking decisions for us?
From a technical perspective, there still is a limit on the resolution of cameras available in public, not allowing to effectively capture the faces of people, and making it an arduous task to track a certain individual in a crowd. One of the biggest barriers is still pretty common — low resolution. Analyzing human movements through a low-resolution camera is one way that could very well lead to inaccurate detections, conclusions, and almost little analytical insight as to what a human is doing, walking, running, or playing basketball.

If these systems are in work, there remains a question of algorithmic bias and ethical concern. Studies have shown that machine learning systems soak up the racial and sexist prejudices of the society that programs them — from image recognition software that always puts women in kitchens, to criminal justice systems that always say black people are more likely to re-offend.

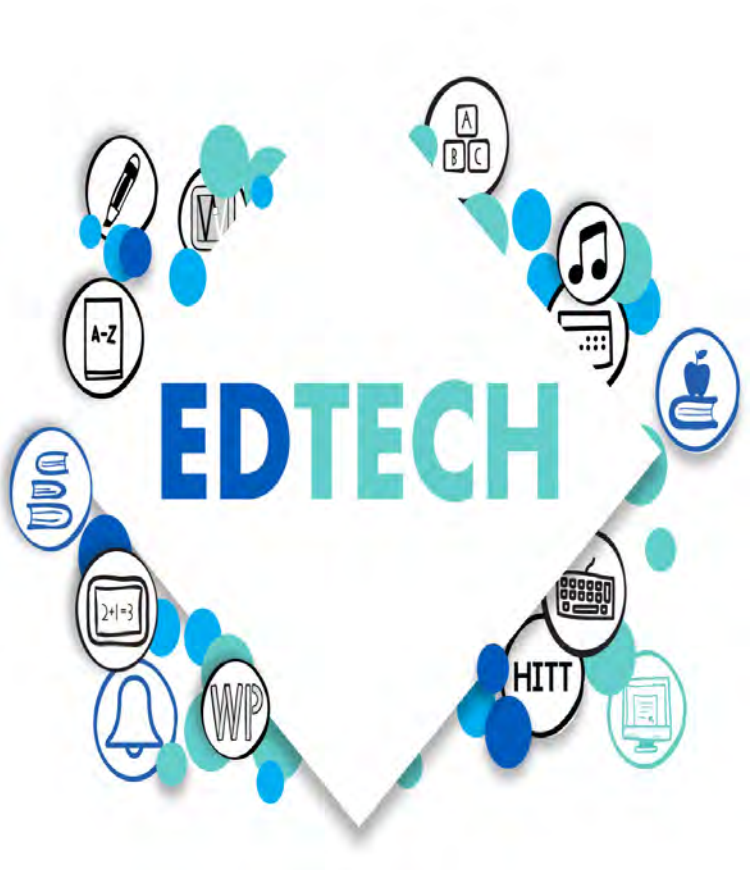
This is a real concern as it could lead to a dangerously perpetuated bias against a certain set of people committing crimes. The more grave concern would be the absence of any physical authority and complete freedom to AI to apprehend anyone it deems scandalous. This is still a futuristic possibility but would be needed to be addressed as and when the time arises.

The possibilities are endless. But one thing is for sure, camera surveillance would never be the same — laborious, unyielding, but would transform to become deeply critical, and analytically focused to procure vast applications.

EdTech-The New Way?

Yumna Khan
SE COMP-B

Technology, a common term used in almost every scenario when it comes to living a comfortable lifestyle. Education conveys a huge message to society more than our imagination. It is not just about putting thoughts on paper, memorizing facts, giving exams and scoring astonishing scores.



Today, innovative educators in both the education industry and corporate learning & development are refining learning through technology/ expertise, as proved by the rapid adoption of technology-assisted teaching methods and blended learning models. What is Blended learning?

What is Blended learning?
It is a method that integrates technology and digital media along with instructor-led classroom activities, benefiting students by giving more flexibility and customization of learning experiences. It basically refers to learn online in a way where students can have control over the pace and path at which they engage with content. Some learning happens in a classroom led by an instructor. So, blended learning is a combination of online and in-person learning, creating a truly integrated and interactive learning environment.

Technologies emerging in recent times:

A study by the Georgia Institute of Technology showed that computer-based multimedia appears to help people learn more information and gain knowledge in less time than traditional classroom lectures. EdTech has been empowering educators to improve training by mixing digital material with the help of Artificial Intelligence (AI) – thereby recreating an integrated classroom environment remotely.

The in-built methods for providing feedback to both teachers and learners during the process helps in improving the mode of imparting knowledge and how lessons are imbibed by learners. Technology also helps teachers to understand the educational gaps that need perfection. AI – the most demanding technology serves the best in every field thereby developing an automated world that eases the lifestyle of people. Here, AI uses data-mining techniques by collecting valuable data regarding students' skills and interests that can be further used by teachers to ensure that they are provided with an exceptional, modified experience and guidance in constructing their careers. There are students who are scared by the idea of failing an exam, resulting in emotional disorders for something as simple as not able to answer when asked in front of a class. The use of technology and AI for learning can also empower students to learn more effectively. These technologies can support them come to terms with the process of trial and error, a test in a judgment-free environment, and learn without anxiety.

The next big name in the EdTech industry is the immersive technologies like Augmented Reality (AR) and Virtual Reality (VR) that can change the students' perspective and engagement towards education. Virtual reality will help in creating hands-on training for students and also will revolutionize the impact of education in the country.

The VR technique will make study fun, easy, interactive and understandable through practical experience. While originally invented for gaming, AR and VR now provide virtual, visual experiences to students in all topics ranging from archaeology to astronomy. During the current pandemic, where the whole world has come to a halt, schools and colleges are conducted digitally, where students are denied access to science labs, AR and VR came as a ray of hope, used to replace the practical lessons in labs and was handy for schools.

Though it can never fully replace real-world experiences, AR and VR can provide a significant experience that can aid learning. It can democratize education in India and can be used to create fruitful discussions and interactions among students and the same can help interpersonal and social learning as well. Considering the ongoing advancement in the field of AI, Chatbots are another area that can be included in the EdTech domain. Researchers have tried this technique in help desk functions and even websites for student orientation proving it to be convenient and comfortable among the people (digital natives). The growing craze of eCommerce sites that use chatbots has helped people to get more familiar with using this technique. There are many examples around the corners regarding chatbots like a Google Duplex AI which uses Robo-vocalisation. There was a demonstration seen where the AI-driven automated assistant made an appointment through telephone with a hairdresser and a restaurant booking with live humans on the other end who seemed to be unaware of the fact that they were interacting with a machine.

It can be said that the changes that have come around are the results of widespread and endless innovation in the field of education. Teachers are not limited by monotonous tasks such as marking attendance, scheduling a timetable, report generation or marks generation. Instead, they will continue to use the fresh methods of student engagement that allow them to truly understand whether the students have efficiently understood what has been taught. An important point to be noted here is the use of EdTech during the COVID phase has made teachers into adopters of technology; something that was previously a huge challenge for the society. Embracing the new age teaching methods, there is no harm in saying that a complete transformation will be seen in the field of education. The coming years will witness how EdTech empowers students in the most unfriendly regions of India to access quality education, thus enabling them to become self-contained. The whole purpose of EdTech is to turn mirrors into windows - adapting the new way of learning.

A highlight of the Scientific Breakthroughs of 2020

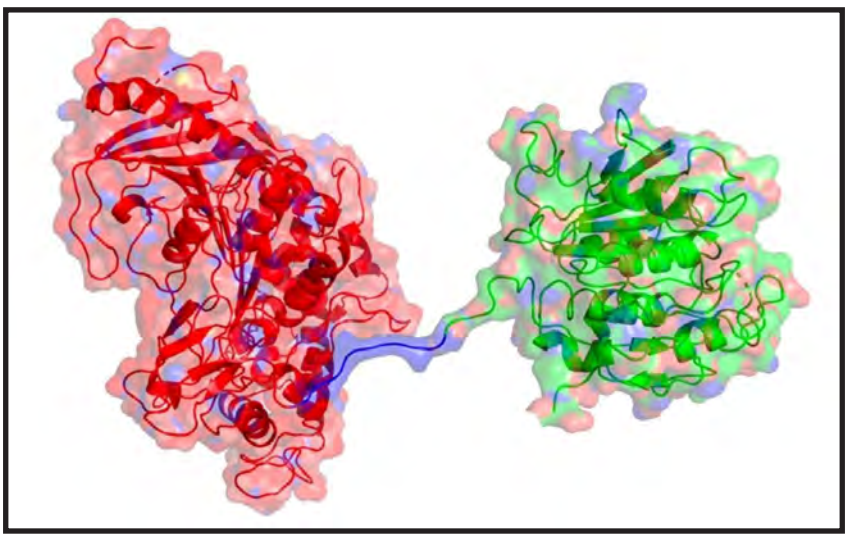
Gurleen Pannu
SE COMP B

A look back at some of the most mind-boggling scientific discoveries and achievements of 2020.

Even with the pandemic affecting many thousands of individuals across the world, this year managed to usher in some truly groundbreaking discoveries and researches in science, from spotting prostate cancer with the assistance of AI to achieving superconductivity at room temperature.
As a new year starts, here are some of the science updates that caught our eye in 2020, in no particular order.

Plastic-eating "super enzymes"

Global plastic pollution has posed an issue for our planet for ages. The first ray of hope out of it had been the invention of the PETase enzyme discovery, albeit with the tons of PET waste bestrewing our planet PETase wasn't fast enough to make the procedure commercially viable.



MHETPET ('super enzyme')

Later, a second enzyme called MHETase was combined with PETase, to get an enzyme 'cocktail'. A simple mixture of PETase with MHETase had doubled the speed of PET breakdown and creating a 'super-enzyme' by engineering a connection between the two enzymes, increased the rate by further three times.
The initial enzymes and the super-enzyme both return the indigenous building blocks of PET plastic by digesting it. This permits us to make and reuse plastic endlessly, reducing our dependence on fossil resources such as oil and gas.
But this doesn't solve the issue of the plastic waste completely. There are still several problems such as acquiring plastic waste from the oceans and other corners. Hence, it's safe to say that even though our challenges haven't been entirely solved, this discovery has still brought us close to solving them!

Space-X NASA's Crew-1 mission

The general ideology regarding space travel is that it is highly expensive, but NASA and SpaceX together have managed to launch a mission that makes space travel more affordable by making it possible for anyone to buy a ticket on a commercial rocket. This undoubtedly marks the start of a new era of spaceflight, the dreams of which we've been seeing since 2011.

NASA's SpaceX Crew-1 mission lifted off on Nov. 15, Sunday at 7:27 p.m. EST from Launch Complex 39A at the agency's Kennedy Space Centre in Florida. Crew-1 is the first of the 6 crewed missions that NASA and SpaceX will operate as part of the Commercial Crew program. It is the primary operational flight of the SpaceX Crew Dragon spacecraft on a Falcon 9 rocket to the ISS and is additionally the first of the three such flights which are scheduled over the course of 2020-21.

The Crew-1 mission launched the agency's astronauts Michael Hopkins, Victor Glover and Shannon Walker along with Japan Aerospace Exploration Agency (JAXA) mission specialist Soichi Noguchi for a 6 months long mission aboard the ISS, where they're going to join the members of Expedition 64, the space station crew currently at residence there.

The objective of the mission is to make access to space cheaper. With Crew-1, the cargo and crew can be easily transported to and from the ISS, which further enables greater scientific research.

The Crew-1 mission marks many firsts for NASA and SpaceX:

1. The first crewed flight to launch from American soil since the conclusion of the space shuttle era in 2011.

2. The first flight of the NASA-certified commercial system.

3. The first international crew of four to launch on an American commercial spacecraft.

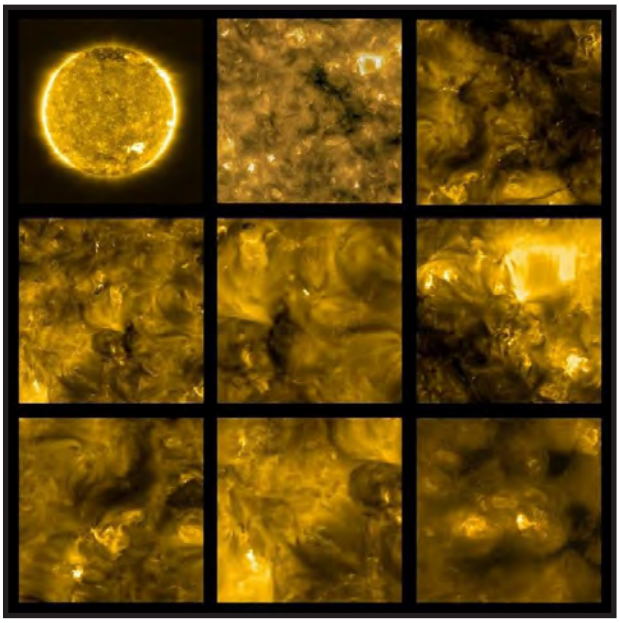
4. The first time the space station's long-duration expedition crew size will increase from six to seven crew members, which will add to the crew time available for research.

5. The first time the Federal Aviation Administration has licensed a human orbital spaceflight launch.

Amongst the various experiments happening aboard Crew Dragon is a student-designed experiment titled, "Genes in Space-7" which aims to know how spaceflight affects the functioning of the brain. The other experiments onboard include research to enable scientists to be able to understand the physical interactions on liquid, rocks and microorganisms as well as an experiment to know the role of microgravity on human health and how microgravity affects the heart's tissues.

The closest images of the sun ever taken

It isn't wrong to say that it was a banner year for solar observations! The ESA-led Solar Orbiter mission released the closest images of the sun ever taken, from just 47 million miles away (about half the distance between Earth and the sun). The images revealed the existence of miniature campfire-like solar flares near the surface of the sun. Constant stormy activities emanating from the sun's corona were also noticed in the images.



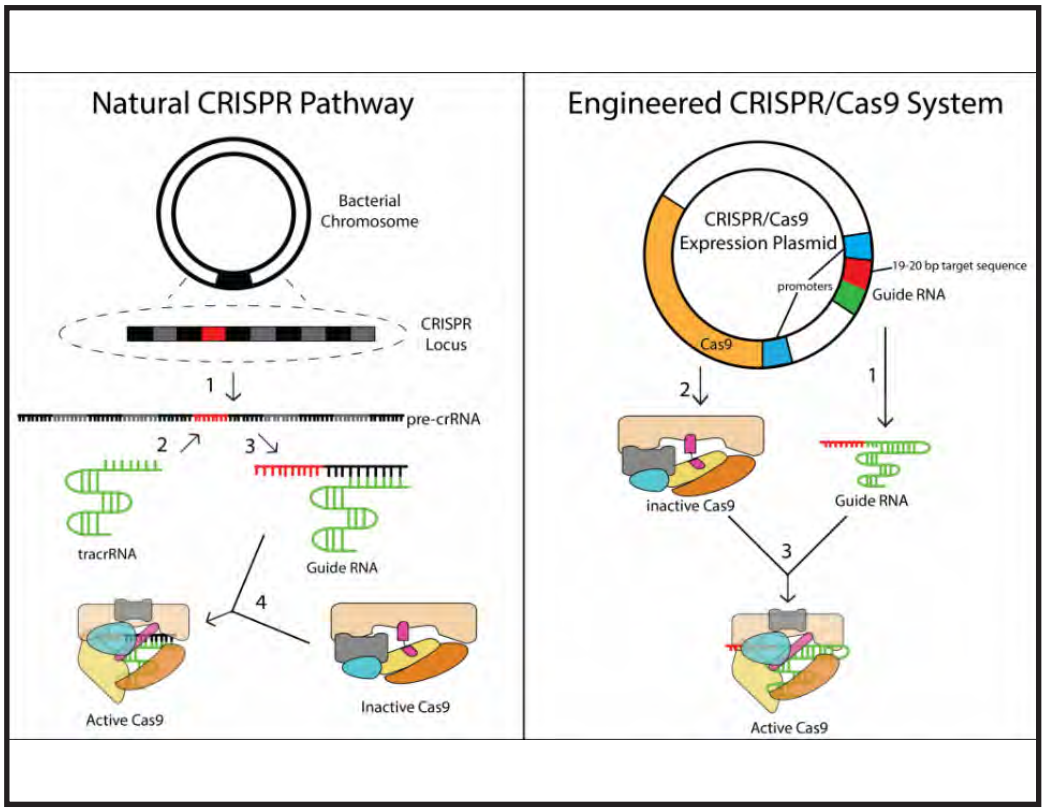
A high-resolution image from the acute Ultraviolet Imager (EUI) on ESA's Solar Orbiter spacecraft

The temperature difference between the sun's atmosphere (over 1 million) and its surface (about 5,500°C) has been a pressing issue. These new observations propose that the heating could be caused by numerous small events happening everywhere (i.e., the campfires), all releasing energy that torches the corona and collectively raises the atmospheric temperatures.

The purpose of the Solar Orbiter isn't just limited to understanding the sun's physical properties but also understanding space weather in order that we can better protect ourselves (extreme space weather can fry any electronic equipment in orbits such as critical satellites used for GPS and communications). For this, we ought to understand more about the interaction of the sun's magnetic field with its active regions which results in rise of solar flares and extreme solar winds.

Meanwhile, the spacecraft is in its cruise phase and moving farther away from Earth and behind the sun, so its telescopes won't be able to study these campfire features until the start of the science phase in November 2021. The spacecraft is expected to get just under 30 million miles away from the sun (even closer than Mercury's orbit) by early 2022.

CRISPR's clinical trial triumph



The past few years have been a very exciting time for gene editing therapy! 2019 saw the results from the first human clinical studies whereas 2020 saw the CRISPR gene editing tools inserted directly into the human body for the first time.

The CRISPR-Cas9 gene therapy was administered directly into the body of a person suffering from a rare genetic condition called Leber's congenital amaurosis 10 (LCA10) which is one of the leading causes of blindness in childhood for the first time, making the treatment a landmark clinical trial of 2020.

Mark Pennesi, a specialist in inherited retinal diseases at Oregon Health & Science University in Portland is collaborating with Editas Medicine of Cambridge, Massachusetts and Allergan of Dublin to conduct the trial, which has rightly been named BRILLIANCE.

BRILLIANCE trial is the first to deploy the very renowned CRISPR-Cas9 technique which has been hailed for its versatility and simple design directly within the body, Gene editing is used to delete a mutation in the gene CEP290 that is responsible for LCA10, in BRILLIANCE.

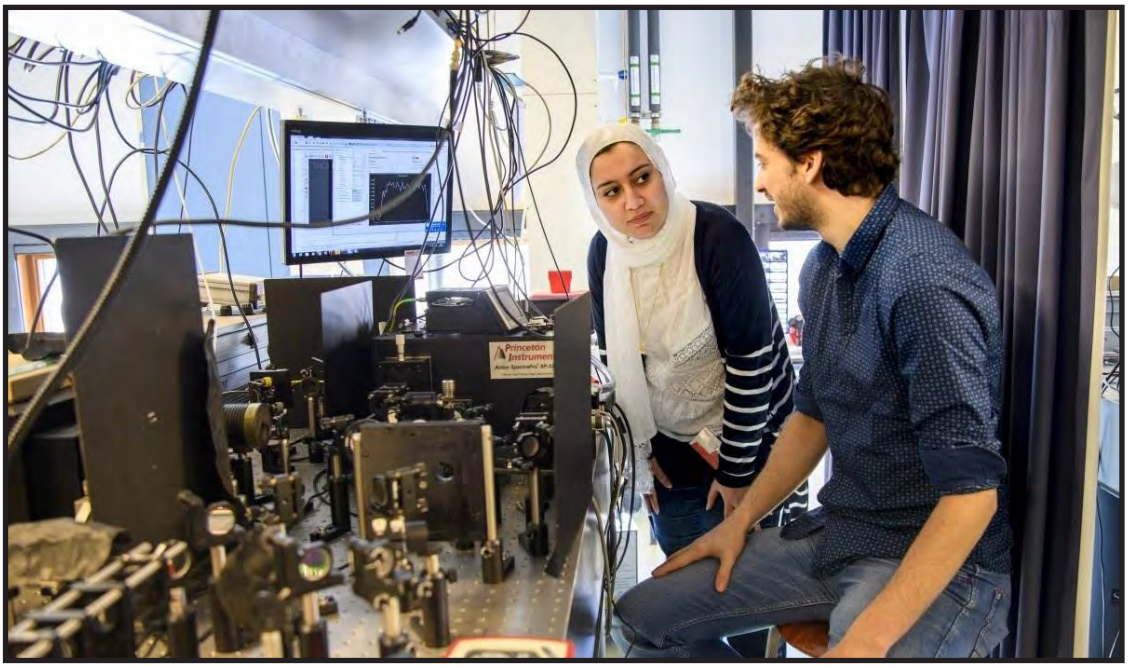
The Royal Swedish Academy of Sciences also decided to award the Nobel Prize in Chemistry 2020 to Emmanuelle Charpentier of the Max Planck Unit for the Science of Pathogens, Germany, and Jennifer Doudna of the University of California, Berkeley, for the development of CRISPR-Cas9, a method for genome editing, thus signifying the importance of the CRISPR-Cas9 technique.

Silicon-based material with a direct bandgap

Silicon, the element with atomic number 14 is one of the most used semiconductors because of its highly stable nature. It finds a lot of extensive application in the telecommunication and computer technology industries in the form of transistors, computer chips etc.

The observed inherent property of silicon states that it has an indirect electronic bandgap, making it unsuitable for emitting light unless it is integrated with other direct-band-gap semiconductor materials to create the optoelectronic devices that provide the pulses of light that drive the information on the web. This integration makes it a very difficult and expensive process.

In April this year, TU/e presented a game-changer within the chip world, silicon that emits light!



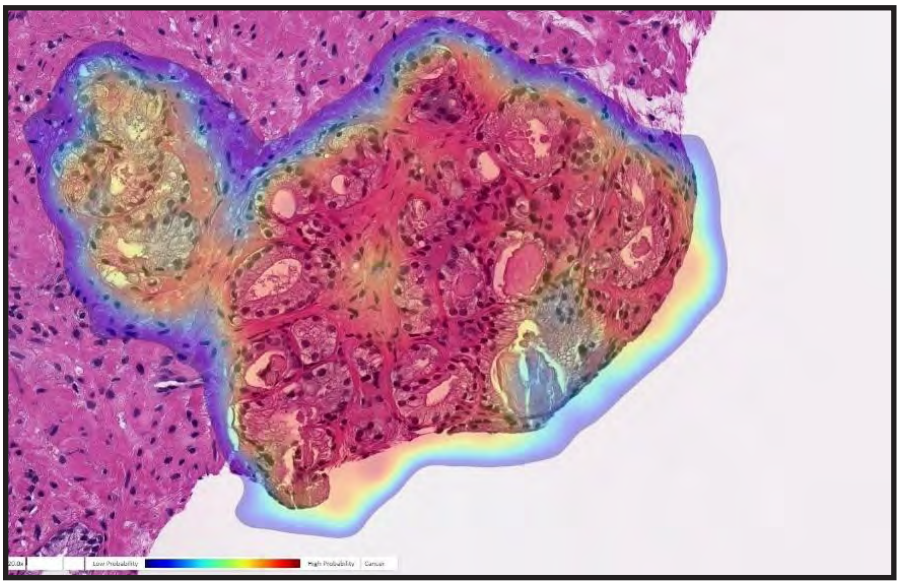
Elham Fadaly, Alain Dijkstra and Erik Bakkers at the Eindhoven University of Technology in the Netherlands, Jens Renè Suckert at Friedrich-Schiller-Universität Jena in Germany and an international team were credited for finding the Physics World 2020 Breakthrough of the Year for creating a silicon-based material with a direct bandgap that emits light of wavelengths used for optical telecommunications.

To create a direct bandgap, Bakkers and his colleague had to look for a way to grow the crystals of silicon-germanium alloy with a hexagonal crystal structure, contrary to the normal diamond-like structure.

By creating a silicon-based material that emits light, Bakkers and colleagues have opened the door to a brand new world of applications for silicon devices. For decades this has been regarded as the “Holy Grail” in the microelectronics industry since it can make computer chips faster than ever.

Artificial Intelligence Spots Prostate Cancer Near Perfectly

In July, researchers of the University of Pittsburgh trained an AI program to recognise prostate cancer by providing it images from more than a million parts of stained tissue slides taken from patient biopsies. The AI was taught how to distinguish between healthy and abnormal tissue by labelling each slide carefully by an expert. The algorithm was then tested on a different set of 1,600 samples taken from 100 consecutive patients.



Here the red region depicts a higher probability of cancer while the blue region depicts a lower probability of cancer. Source: University of Pittsburgh

During testing, the AI demonstrated 98% sensitivity and 97% specificity at detecting prostate cancer — significantly more than previously reported for algorithms working from tissue slides.

This kind of algorithm can prove to be beneficial in diagnosing atypical lesions. Another added advantage is that the machines unlike the humans don't have any personal biases or past experiences, they're detached from the entire story making the care more standardized.

Conclusion

These were a couple of the silver linings to a year when the entire world was brought to a standstill by the COVID-19 pandemic. On one side, where the plastic-eating 'super enzyme' paved the way to a cleaner world, on another side, AI made the process of diagnosing prostate cancer meticulous and faster. Of course, that's just a small taste of the many significant scientific achievements we've seen in 2020. It was a rollercoaster year for everyone, but our researchers managed to make the best of it.

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Artificial Intelligence Identifies Prostate Cancer

Silicon-based material with a direct bandgap
Silicon-based light emitter is 'Holy Grail' of microelectronics, say researchers
Light from silicon proclaimed as 'Breakthrough of the Year'

FACULTY ARTICLES

1. Tackling a Pandemic with Technology andthe Lessons for Future
2. Blended Edtech- the newnormal?
3. Tackling a Digital Informative Technology during COVID-19 and Learn for Future
4. Streamlining communication for the hybrid workforce

Click on the Article Name to read the Article

Tackling a Pandemic with Technology and the Lessons for Future

Dr. Harshali P. Patil
HOD COMP

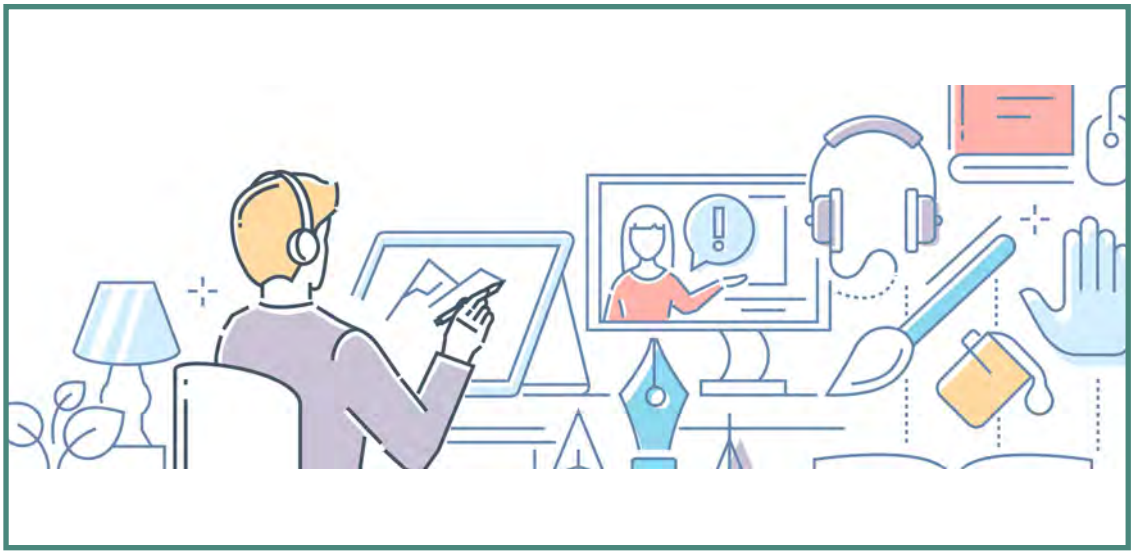
Tarunima Mukherjee
ME COMP

Time and again, Epidemics and Pandemic have been threatening mankind. H1N1, Ebola, and many more such pandemics have affected the human race to a great extent. One such pandemic which the world faced is COVID 19. The first case of COVID 19 was observed in 2019 in China resulting in a contagious outbreak across the world in 2020. This brought a complete lockdown throughout the world and everything came to a halt. The workplaces, schools, colleges, transportation, industries, and factories were closed. The worst part was that this shutdown was for an indefinite period. It was uncertain when things will come back on track, so the only option was to find new ways to cope up with the situation

To help us fight with this standstill situation technology came as a rescue. Although the onset and prevention of pandemic cannot be prevented by technology, however, we can leverage technology to make people aware of the situation by having a proper warning mechanism, educating the people about the pandemic, letting people communicate with each other virtually thereby maintaining social distancing & empowering people to make appropriate decisions and thereby help in reducing the spread of the pandemic. Mobile, cloud, analytics, robotics, AI/ML and high-speed internet etc has enabled us to tackle these unprecedented times.

During these uncertain times, People and organizations across the world had to adapt and adjust to new ways of work and life and our inclination to adopt technology have impacted our lives in many ways. Education, Remote working, Health care, Contactless deliveries are the few major areas where technology has influenced our day to day working.

Digital Learning has proved to be a boon in these pandemic times for educational institutes. During a lockdown, all the educational institutes were closed and so most of the educational institutions and schools started to offer their courses online and made sure that education is not disrupted due to the pandemic. To bridge the gap between the teachers and the students, the interactions were made virtual and they were connected through digital platforms/ software using a laptop or mobile phones. This transition in the education sector has helped to eliminate the physical need of teachers and students in the classrooms. Technologies used in digital learning include lectures on Virtual medium (Zoom/ Google Meets), Google classroom, augmented reality, Virtual reality, E-textbooks, adaptive learning, online learning management system etc.

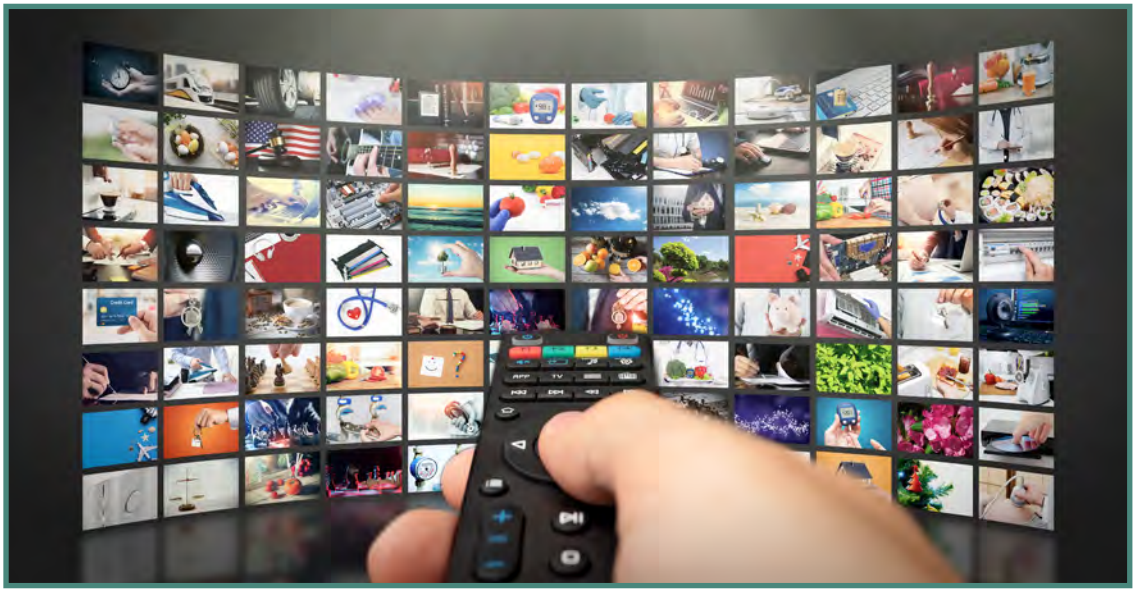


Remote work was rare before the pandemic and Working from home was usually only available as a special arrangement to accommodate specific cases. However, the outbreak of the pandemic prompted the companies to shift to a remote working model for all employees possible to limit the spread of the coronavirus. The work from home enabled business continuity for various companies and businesses. VPN which stands for the virtual private network is the most critical technology of all. VPN allows having secure communication using public Internet connections.

Voice over Internet Protocol reduces the communication gap by allowing the employees to easily access their phone calls, send direct messages, and teleconference with co-workers and clients from anywhere. Keeping critical data safe is a challenge and so cloud storage which has robust data backup and recovery features enable remote workers to easily access the data and also maintain its integrity. The Collaborative Tech Tools are the key to increasing employee productivity and efficiency. Think apps like SharePoint, Microsoft Linc, and GoToMeeting enables the employees to connect and collaborate virtually and deliver results

Within a few days of the lockdown home delivery which was treated as convenience became a necessity for medicines and food supplies. Given that customers are ordering deliveries online to avoid crowded retail locations; Contactless deliveries have gained paramount importance. In contactless delivery, the customer and the delivery person does not come in direct contact during the retail of the product. The delivery order is placed online and the customer does the payment online itself. With contactless deliveries gaining momentum across the world the end to end delivery system starting from Order preparation to Notifying customers of arrival, managing proof of delivery digitally along with returns are being ensured with no contact. The major factors which have given thrust to contactless deliveries include the ability to make Digital Payments using platforms like Paytm, UPI, Internet Banking, e-wallets payments along with the ability to choose a preferred delivery time slot of the orders is alluring more consumers towards the online delivery models.

Worldwide public-health response to COVID-19 is being supported by Digital technologies which include people surveillance, contact tracing and exploring interventions based on mobility data and interaction with the public. Data-aggregation systems, including ProMED-mail, GPHIN, HealthMap and EIOS, which use natural language processing and machine learning to process and filter online data, have been developed to provide epidemiological insight. These data sources are combined with the formal surveillance system and play a major role in COVID-19 surveillance. Crowdsourcing systems used to elucidate the true burden of disease are also supporting syndromic surveillance Data dashboards are being used extensively in the pandemic, collating real-time public-health data, including confirmed cases, testing figures, to keep the public aware and support decision making by the policymakers.



The pandemic has changed the way we consume media and entertainment (M&E). With people confined to their home due to enforcement of social distancing and lockdown, external entertainment models like movie theatres, theme parks, museums are suffering huge losses. Also, due to the pandemic, the social lives of people have moved online, and entertainment consumption has risen notably in the segments of online gaming and over-the-top (OTT) platforms. Online streaming of live shows, sports, concerts has gained traction across the world. To reduce further losses several production companies have started releasing their movies and shows via OTT platforms such as Amazon Prime Video, Hotstar, Netflix etc.

The pandemic along with the lockdown has forced everyone to figure out how to function and survive in this dynamic external environment. In many cases, the changes had to be made overnight and thereby people needed to adapt themselves to the new normal in no time so that things business kept moving forward (cosmetics producers such as Nivea, L'Oréal, started manufacturing hand sanitiser to meet the soaring global demand. Dyson, a household appliance manufacturer started developing ventilators using its air-compression technology). There are numerous lessons that the pandemic has taught us the hard way but the only silver lining in the whole scenario is that the credibility on the usage of technology has gone up and increased multiple times. We need to resort to technological advancement in the future so that we need not again end up with the situation which the lockdown and quarantine times had forced on us. We need to leverage smart technologies to innovate our healthcare infrastructure, educational systems and look beyond traditional ways of manufacturing and services.

Smart technologies like the Internet of things (IoT), big data, and artificial intelligence (AI) will be widely used in the healthcare field and for enhancing medical care. Smart healthcare monitoring devices, connected patient imaging, usage of robots in Operation rooms, tele medicines, chatbots for OPD consultations, Machine Learning techniques for early detection and diagnosis of diseases, blockchain for creating a digital identity of patients etc. will prove to be the emerging trends and become essential for the future of the healthcare sector.

On one hand, the crisis is devastating but on the other hand, it is making our schools and colleges, technologically advanced. The use of technology in education will not only help in improving the quality of education in terms of understanding the subject but will also improve the skill set of the students. With a thrust on interactive learning increasing rapidly smart classrooms are making everything possible from online classes, to exams and even parent-teacher meetings. Also, these platforms are enabling staff/management meetings seamlessly thereby providing schools and educational institutes with adequate facilities to run virtually. Also, going forward, to gain knowledge other than the classrooms, open online courses will prove out to be highly relevant as they will be able to provide a wide variety of knowledge and skill sets.

The pandemic has silenced all the lingering doubts about the necessity of digital transformation for ensuring business continuity for the decade to come. The paradigm shift towards digitization of the businesses and economy had already started before the pandemic but the current events have accelerated this shift towards embracing digitization and technology by the industries as demonstrated by the marked shift in spending towards digital businesses. Technologies like robotic manufacturing, Interconnected machines, 3D printing, tokenization technology, eCommerce retails, digitized customer service and experience are few areas that will gain momentum in the years to come.

It is evident that a pandemic imposes a huge risk to the normal functioning of the society and if we don't learn our lessons now then the next pandemic is not a matter of "if it happens", but in fact, it will be "when it happens". We need to be prepared and geared up for any kind of pandemic situation, both at the society level as well as at an individual level. To ensure that we are prepared, advanced technologies will play an integral part and to achieve this we need to keep investing our resources in building these technologies. Once we are ready with our innovative technologies which will enable us to navigate through the day to day situations it will just be a matter of time for humans to adapt to these technologies and we as a society will be able to deal with the future public emergency in a systematic, calm and timely manner.

Blended Edtech- the new normal?

Ms. Pratiksha Deshmukh

Assistant Professor
COMP

With the schools and colleges all over the world redesigning because of COVID-19, a question arises; Is blended Edtech becoming new normal? Blended Edtech has been around for a while and is the combination of traditional face-to-face instructions with aspects of online instructions. These months during pandemic have served as a warm-up period for remote learning and teaching and have given us time to improvise on the usage of tech tools. Blended Edtech is the way forward for our education system. E-learning is the process of imparting education with the help of a combination of tools such as the internet, a medium in the forms of videos, audios, images carried out interactively. The new technology has led to teaching styles revolving from books, chalkboards to digital content, adaptive techniques and countless other developments in Edtech. This allows students to be ready and prepare for the job market in the future. With the world already needing to adapt to the digitised ' new normal', school students will be adequately equipped to take on a changing view of the future because of upskilling the opportunities that Edtech will constantly provide.

Keywords: *Blended Edtech, instructions, pandemic, e-learning, upskilling, opportunities, technology, tech tools, new normal*

The global COVID-19 pandemic has triggered new ways of conducting the teaching-learning process online. For some this has been a small move but for others, this is a completely new way of education. Many schools in India have also adapted to the new normal of education technology i.e. e-learning. Many progressive schools had already done a lot for the adoption of technology in their schools, which further helped in transitioning to completely online delivery of teaching during a current pandemic and with significant success.

Blended learning is key for colleges in the COVID-19 era. Many colleges are leaning towards blended Edtech. For colleges and universities, this requires an in-depth strategy that combines both structure and flexibility. College students are more capable and comfortable with the use of technology. This mix of in-person and online instruction could potentially offer students the best of both worlds: social safety and student success. There is an increasing number of online learning apps and platforms for students during this pandemic. Many surveys conducted showed that more than 92% of students and parents were happy with the online delivery of lessons.

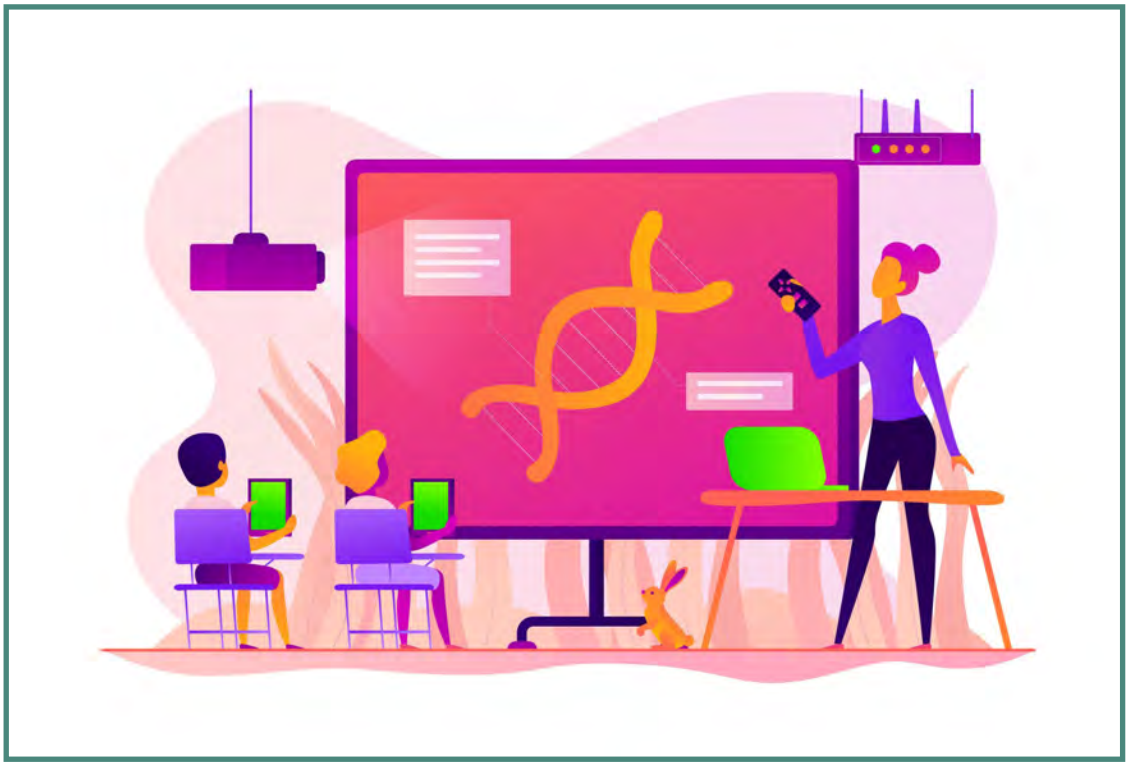
In response to significant demand, many online platforms are offering free access to their services including platforms like BYJU'S, a Bangalore- based educational technology and online tutoring firm founded in 2011, which is now the world's most 'highly valued Edtech company'.

Additionally, the company's recent investment in Whitehat Jr. that teaches coding, which was recently included in India's new education system to kids. Another app for online learning and education is Vedantu. It includes live classes and preparation for JEE, NEET and NDA exams.

As with most teaching methods, e-learning also has its positives and negatives. Understanding these will help in creating strategies for more efficient delivery of education and measuring its effectiveness.

Many educational institutions were unprepared for the switch to online learning. Also, many institutions struggled to provide the same quality of teaching especially during the first weeks of the pandemic. Moreover, students from rural backgrounds found it hard to keep up with their virtual classmates. Some didn't have regular access to a laptop or tablet, while many others had limited WiFi connections. In a developing country such as India, there isn't infrastructure to support a total overhaul of education online. E-learning is limited mostly to cities and metro cities. Most villages do not have the access to pursue online learning. Many places are lacking in proper electricity, internet connectivity and the tools required to access the internet. Many don't have the financial resources to invest in expensive cell phones, tablets, laptops, or PCs. Those who can, don't possess the basic knowledge for operating a PC or the internet. In a country like India with a diversity of languages, creating a single platform from such different backgrounds is quite challenging. On the top, India has yet to achieve full literacy. Incorporating so many languages requires many hours of clever coding, which can sometimes even make the website slower.

While on the other hand, online learning offers a very efficient way to deliver lessons. Use of videos, sharing of resources like links, serving assessment tests can all be done at the click of a button. The lectures can be recorded and shared for reference with a wide range of audience. E-learning is now applicable not only to learn academics but also to conduct extracurricular activities for students, online conferences, webinars and informative online sessions. The new technology provides smart access to the new environment for education.



Blended Edtech is set to revolutionize the way we learn to overcome social and geographical barriers. The increasing availability of internet connectivity and interactive web applications have contributed to the growth in the number of schools implementing blended learning. Although implementing blended learning is a complex process students have favourable opinions about participating in Blended learning. In the future, professional degrees would be conferred through electronic means and students will move to blended models, where remote and digital model platforms support in-person classroom teaching and contribute to minimising teacher workload. Pandemic has encouraged schools to adopt and use more of the functionality of Edtech tools. The demand for Edtech rose significantly and will continue doing so as society starts adapting to ‘social distancing’ post this pandemic. Blended Edtech will be normal and shift will be perpetual.

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Tackling a Digital Informative Technology during COVID-19 pandemic and Learn for Future

Ms. Niki Modi

Assistant Professor
COMP

Past decades have noticed extensive documentation amongst the relation of humans and technologies however it is yet to be reviewed through the lens of the current global pandemic crisis on the basis of various technological innovations and applications that have been developed to fight the coronavirus pandemic. The implications for the design, development, and use of technologies introduced due to the advent of the global pandemic not only brings in an urgent need for a greater understanding of what roles information systems but also of the technology researchers can offer in this global pandemic.

There are 28 various forms of technologies have been used, ranging from computers to artificial intelligence, almost 8 different populations of users are using these technologies most of them are primarily medical professionals. As many as 32 activities are involved that includes the provision of health services Remotely, analyzing data, and communicating, and 35 various effects have been observed, such as improved patient outcomes, continued education, and decreasing outbreak impact. It also provides insights and suggestions into how information systems and technology scholars can help fight the COVID-19 pandemic and if such time of problem or situation occurs then how a human being will fight in future.

The pandemic brought many opportunities such as information management, work practices, and design and use of technologies. While maintaining this mandate along with trying to maintain the status quo, various types of human behaviour (e.g., shopping, learning, working, meeting, and entertaining) shifted from offline to online which resulted in an accelerated diffusion of emerging digital technologies among ordinary people.

Since the digital gap widened further amongst citizens and technologies, the diffusion of unprecedented changes in both human behaviour and emerging technology generated a new opportunity for our research community to study technology-related behaviour in the global crisis Also, Information systems and technology researchers and practitioners can aid to conduct an analysis of the SARS COVID-19 pandemic data and engage in potential emerging research topics.

Many of them revolutionize the implementation of technology with respect to current scenarios such as;

1) A few companies also repurposed existing AI systems that were initially designed for other areas to assist in social distancing enforcement and contract tracing.

2) 3D Printing Technology can help make face masks and other Personal Protective Equipment (PPE) for healthcare workers.

3) In Taiwan, big data analytics has been successfully applied to help identify COVID-19 cases and generate real-time alerts through analysing clinical visits, travel history, and clinical symptoms.

4) Mobile apps via smartphones and video-conferencing tools can be used to track the day in day out working or locations of individuals and alert people from visiting COVID-19 hotspots. It could also assist doctors to diagnose patients remotely via video services and telemedicine/telehealth

These tools have also simplified the support for common people to online shopping, e-learning, online meetings, and telework.

We can say that the dominating effects in our rapid review for common users were the generation of privacy concerns and information, along with the implementation of policies to ensure safe standards to ultimately decrease the impact of the outbreak. A major discovery was found in addition to these effects that will help the technology to expose generally attitudes and perceptions among the public that can result in an effect of digital technology use during the pandemic.

With the state of the current world possibility of future pandemics seems a given. In such times scientific scholars and information technologies might not be affiliated with making vaccines, we can contribute knowledge, experiences, and time to help society to prepare for future pandemics. To mitigate future pandemics' costs and enhance data sharing during the global crisis. It is possible that some of the developed technologies and application for this pandemic may cease to be useful after the pandemic ends, however many of them will still either be retained, enhanced, or repurposed for other uses in which information systems and technology scholars can continue to might play a role after the pandemic. This rapid review provides an outline of the current knowledge of digital technology use during the COVID-19 pandemic by synthesizing the existing in four areas: technologies, users, activities, and effects

It suggests the following major findings: (1) digital technologies that were represented by the computerized tomography machine, video-based communication platform, and artificial intelligence have been broadly used in healthcare, education, work, and daily life domains during the COVID-19 pandemic; (2) the main user groups of electronic technology are categorized to providers and receivers, mainly including doctors and patients, teachers and students, and the government and the general public. It is worth mentioning that work professionals who use telework to accomplish their tasks have both identities at the same time; (3) providing health services and communicating were the most frequent activities associated with technology in healthcare during the pandemic. The majority of the activity present in this educational category includes transitioning from face-to-face to online, communicating, and delivering instruction. In terms of daily use and digital technology, the most prominent activities were tracing, analysing data, predicting/forecasting, and diagnosing the virus, and (4) digital solutions significantly protected and supported public health. It provided a better understanding of education and highlighted the transition to online learning. In the work and daily living domain, it very much blended personal and professional boundaries at the expense of decreasing the risk of burnout.

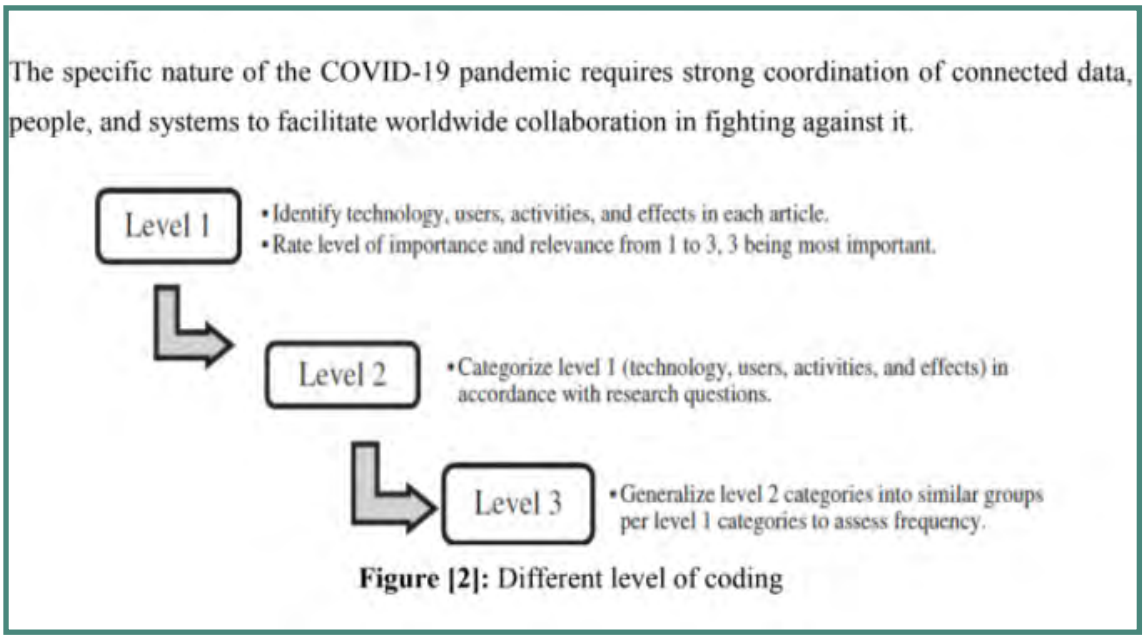


Figure [2]: Different level of coding

It can be foreseen that several future research directions including mid- and post-pandemic use new technologies and create a need, Zoom, effective, efficient and cost-effective applications. There can be monitoring applications for back to school and back to work, new users, access, digital divide, awareness, knowledge, new use in various sectors of society rather than just medical, education, and work, and new effects, especially negative ones such as misinformation, cybersecurity, and privacy.

Streamlining communication for the hybrid workforce

Mr. Vikas Singh
Assistant Professor
COMP

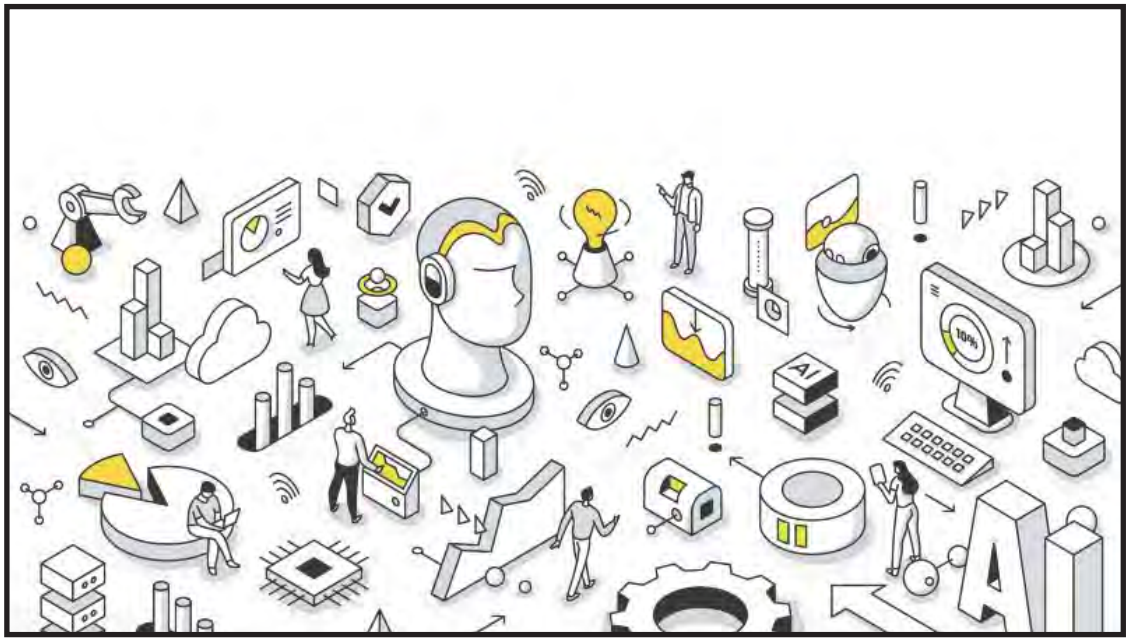
A recent PwC remote work survey confirms what many employees and business leaders already know: there's no going back to the pre-pandemic status quo. Most executives envision a future where employees spend some time at the office and work remotely other days in a hybrid workforce model. However, there's little consensus yet on the optimal ratio.

The move toward a hybrid workforce has many logistical and practical implications for businesses, including in the areas of commercial real estate and training and development. But one facet that isn't getting as much attention is the shift that's already taken place in internal employee communication, whether for collaboration purposes or support requests.

In their pre-pandemic office routines, employees grew accustomed to conversing with each other using platforms like Slack or Microsoft Teams. But when they needed support from HR or IT – to inquire about training opportunities or to ask for help with a technology problem, for example – they channelled their support requests through email. This continued when they moved to remote work.

But a bifurcated approach is inefficient, and organisations that reject it by consolidating communication on a single platform can realise important productivity, automation, and accessibility gains. Here are some of the ways consolidating communication can improve hybrid workforce efficiency.

Minimise interruptions to the conversational flow by offering support where employees are: With an email-based ticketing system, employees must log in to their work email to create an HR or IT ticket, then follow up via email to track progress or receive a resolution. That interrupts the natural flow of communication, which is now taking place on business communication platforms like Slack and Teams.



There's no advantage to using email rather than a business communication platform for ticket resolution. Technology compatible with popular help desk and knowledge base systems and business communication platforms now make it more efficient to handle ticket resolution on one platform rather than toggling back and forth between email and Slack or Teams.

Automate with AI to deliver conversational support: As HR, IT, and training professionals know, many employee questions are routine. The questions are important to the employee and the company and must be answered promptly, but every minute staff spends responding to mundane queries is time they cannot spend on higher-level work.

AI can automate responses when a ticket is generated on Teams or Slack. It can automatically respond to frequently asked questions via a chatbot that offers answers from the company's internal knowledge base, responding via Teams or Slack to keep the conversation in context.

So, routine queries such as 'how do I sign up for a training programme?' can be deflected in this way, while questions that don't have a knowledge base answer (or employee requests for more help) are automatically escalated..

Prioritise convenience as much as content: HR and training professionals understandably focus on content quality, which is incredibly important. But it's also crucial to keep in mind that the best content in the industry won't help employees drive company success if they don't access it because doing so is inconvenient. Prioritising convenient access is therefore critical.

Consolidating communication on employees' preferred channel streamlines their access to the information. Technology that incorporates AI works within the preferred business communication platform and is compatible with the existing help desk system can also bolster compliance by creating audit trails to track responses to employee inquiries.

As HR, training, and IT professionals plan for a hybrid workforce, the evolution in how employees communicate with colleagues and support personnel must be top of mind. Those who find a way to consolidate communication channels, automate routine tasks, and provide easier access to information will be positioning their companies for success in the 'new normal'.

COMPENDIUM

The pandemic brought a sea change in the world around us and even though the times were challenging, humanity together fought it and achieved unimaginable endeavors in a span of one year. Keeping the same in mind, the theme for this edition was finalized as New Paradigms - The Decade Ahead. The ever-evolving technology and advancements in various fields have been a critical instrument to bring out such immense changes in a relatively shorter period of time.
As humans, it is our responsibility to not only learn from the lessons of our past but also look forward to implementing innovative solutions for the future. The theme aligns with the same ideology which emphasizes using innovative solutions and looking forward to the next decade that lies ahead of us. Nimbus has given exposure to various technologies under this theme which includes Blockchain - the slightly mysterious technology behind Bitcoin, Deep Learning, Machine Learning, Quantum Computing, and Artificial Intelligence.

The question we aimed at answering was, a new normal has emerged for all but can forced changes outlive age-old routines and systems? Digital learning has been a crucial aspect throughout the past year that marked a paramount shift in the methods of traditional learning. Amidst all the chaos and anxiety due to the pandemic, technology has proven time and again its importance in bringing back normality globally. Nimbus highlights the impacts of it in the world we live in and the way it has allowed us to battle this difficult time. The times we are going through right now are going to be marked in history and in doing the same, we must not forget to pass on our lessons to future generations. Nimbus not only sheds light on tackling a global pandemic but also explored the lessons we can pass on to the generations to come.

INTERVIEW

Pandemic & Business Revelations

Tusshar Balande
SAP ABAP developer at Accenture, Hyderabad

Q1) Can you tell me about your profession?

A: I am currently working as a SAP ABAP developer at Accenture, in Hyderabad. ABAP stands for Advanced Business Application Programming. I work mostly in the development of business applications within SAP landscapes. I am responsible for the connection of business and software development. Previously, I used to work on my own ideas, based on mobile applications.

Q2) The pandemic has led to a business continuity challenge at an unprecedented scale. How are players like Accenture enabling businesses to become resilient in the post CoViD-19 world?

A: In the new normal, the ability of organizations to pivot and adapt their business and workforce models will determine their success. recognizing this, us large scale enterprises are exploring a new way to conduct business – they are looking at a hybrid work environment, virtualizing their workflows, moving their processes to the cloud, automating their supply chains, etc.In this journey, we have the need to prioritize developing an agile and flexible infrastructure and recalibrate for changing employee and customer experiences. In Accenture's annual letter to employees it describes its aim - Ultimately, is to build a resilient digital enterprise, where three things are crucial:

- No compromise on employee/customer safety, security, productivity, and experience across a flexible distributed working/business environment
- Flexibility to shift and scale IT capacity, capability, and resources where the demand lies and as the market environment evolves
- Ability to develop and automate new capabilities in an agile manner as the business need arises to help make this transition easy and seamless for our customers.

Q3) Clearly, there are new business challenges in the new normal. What have you and Accenture learned from this?

A: A year ago, it was hard to envisage having board meetings, industry events, and selling to customers virtually. The most significant learning is that anything is possible with the right mindset and innovative technologies. Also, new types of relationships and networks are emerging and evolving with increasing speed of change and complexity amidst blurring formal time boundaries.

Q4) As part of such a huge company with a myriad of projects at any given time, what are the top 3 buzzwords you have encountered at Accenture?

A: *Artificial intelligence, Privacy, ServerLess*
So AI will help automate devops. AI-driven application development will become ubiquitous in the next year or two. Many aspects of devops can be automated and, over time, made more efficient using AI capabilities.So activities like - Data modelling and auditing, data cleansing and maintaining integrity, Search functionalities across an application ecosystem with NLP, Automated testing suite with a focus on security and data privacy, are examples.

Privacy because data privacy will play a larger role.With the recent passing GDPR in Europe, privacy regulation is on the rise worldwide. While developers are concerned about users' privacy for the applications by default, we need to be cognisant of privacy policies for services they integrate with and share information with as well. For example, integrating an SDK into a developer's application can provide value for both the developer and the user, but the integration carries obvious data privacy and sharing concerns.

Serverless solutions for efficiency. While container solutions will continue to be a key aspect of development in 2021, serverless computing will also see growth that will outpace the already established containerisation model. Serverless, gives developers elasticity or dynamic scaling, such that resources can be increased or decreased based on demand. This leads to cost savings, which will be a prime motivator for serverless adoption in the coming year. The key consideration here is the speed of development and cost of maintenance.

Q5) How is the work/life balance now?

A: The work and life balance are currently going on well; if not, better. Earlier, people used to travel everyday to work. Such travel will be replaced by online meetings. Also, the families themselves are happy as they get to see more of their children. Travel will now be impacted because of the changes in the digital business behaviours.

Q6) Is Accenture giving employees more control over their schedules?

A: The employees are now saying that their productivity is much higher. There is also a digital dexterity that is being displayed across the company. Accenture managers don't believe in micro managing an employee's schedules rather they evaluate people on outputs and timelines.

Q7) Sincere thanks to you for lending your time. It will be a great addition to our magazine.

A: Thank You.

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