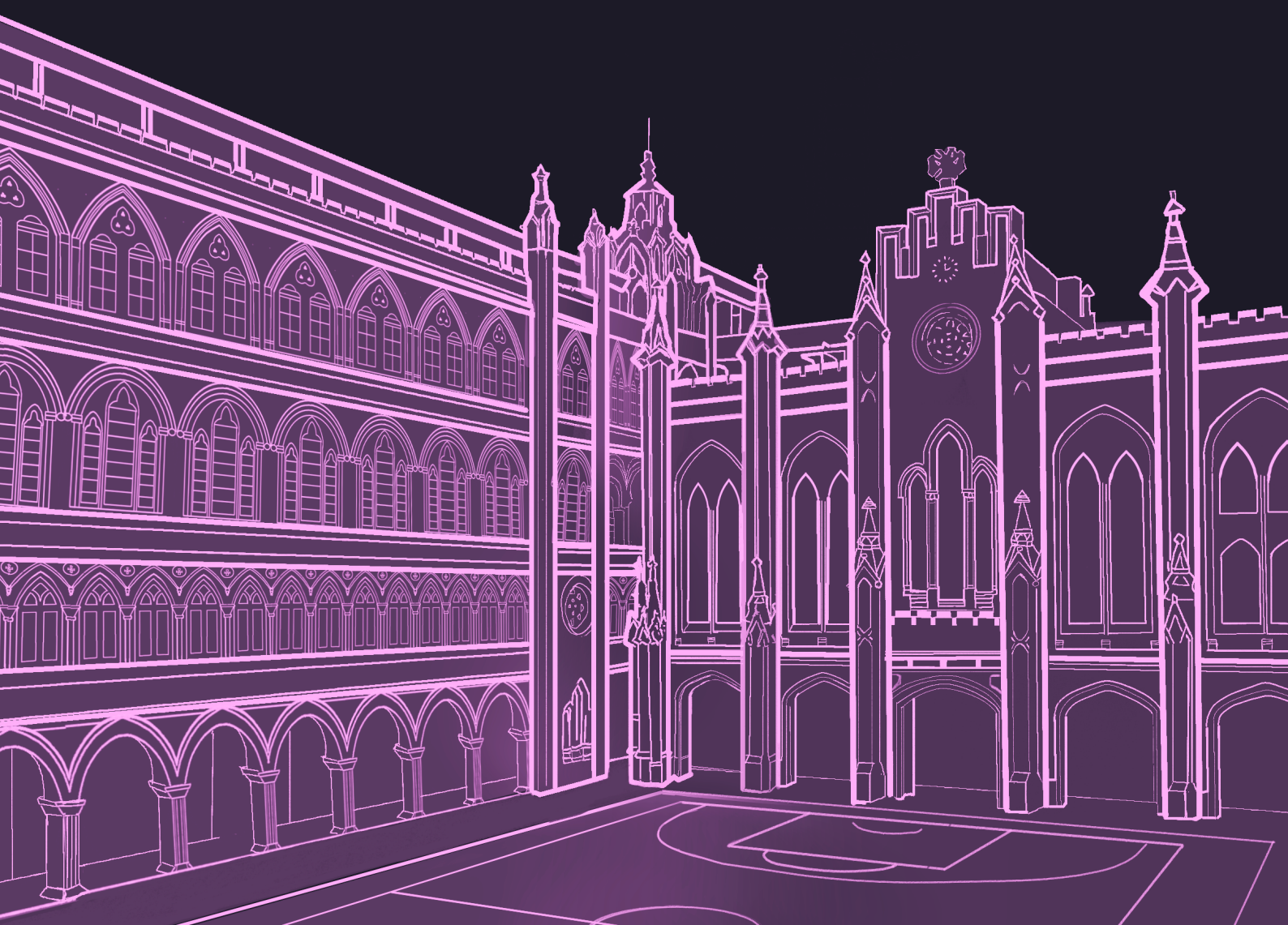
BITMAP 3.1

2021-22

IT & YOU



DEPARTMENT OF INFORMATION TECHNOLOGY

St. Xavier's College (Autonomous), Mumbai

A TRIBUTE TO THE MARTYR

St. Xavier's College, Mumbai
mourns its son

SQN LDR KULDEEP SINGH

(BSc. IT, Batch of 2013)
who passed away in the Coonoor Crash on December 8, 2021.

We also pay our tributes to all those who lost their lives in this unfortunate mishap

BITMAP 3.1

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Principal's Address

Invention and innovation are two words that I would want to emphasize, given that they were the college's two-year-long themes. Fun, creative, diversified, collaborative, and intuitive are some of the characteristics of innovation, according to Reimers-Hild and King (2009). With the IT syllabus, as with most other science courses in our college, there is a lot of opportunity to collaborate with students outside of your department to achieve great things. Taking risks and even viewing failure as "fuel for creation" might assist in the invention and innovation process (Ryshke, 2012). If something doesn't work the first time, we can learn from it, improve it, and try again.

Talking with one another, with teachers, and exchanging ideas and challenges creates a climate suitable towards "sharing ideas across disciplines for open collaboration" and interdisciplinary and capstone courses, as well as cross-class projects. According to recent study, the majority of learning takes place outside of the classroom. The interaction is the primary cause of this ccurrence. Instead of studying passively, people learn while doing it practically. As a student, I encourage you to optimise your learning potential by conducting independent rese arch on a topic in information technology that interests you. This will push you to retain more information. Take the next step by discussing your ideas with a mentor who can assist you in moving forward.

Because of the worldwide shutdown, we are now living in an era of accelerated IT office automation. The importance of IT cannot be understated, necessitating an even greater need for "You" to rise to the occasion and meet the challenge. However, it is not just technology trends and developing technologies that are changing; much more has changed this year as a result of the outbreak of COVID-19, which has made IT professionals recognise that their job in the contactless world of tomorrow will not be the same. In 2021-22, an IT professional will be constantly learning, unlearning, and relearning in order to address the need of the hour much more than the leisure. On that note, I would want to continue by saying that you should never stop learning, developing, or innovating.....because the day you do, you will become stagnant. Best wishes for an exciting year ahead and keep learning.

Dr. Rajendra Shinde
Principal
St. Xavier's College (Autonomous), Mumbai

Foreword

Our goal has always been to inspire students to go beyond the box and write articles that are both relevant and grounded in reality. We are pleased to see continued increases in student participation in this year's edition of BITMAP, as evidenced by related papers submitted by students from a variety of subjects and streams. The COVID-19 pandemic has put many things into perspective and restricted communication during the last two years. Regardless, our magazine this year gave us an insight into the thoughts of students about the most important event in our country's history, and it was eye-opening to say the Least.

One of the most demanding jobs that one has been hearing about and realizing in the 21st century is none other than that of a Data Scientist. Then what does one mean by this job profile? So here is what it takes to be a data scientist. Data analytics is the process of exploring and analyzing large datasets to find hidden pattern, unseen trends, discover correlations and derive valuable insights to make business predictions. Data Analytics is important because it helps businesses optimize their performance. The scope of data analytics is unlimited. It will help the management in taking better decisions, providing better customer service, formulating better marketing strategies and ensuring efficient operations. The main application areas of data analytics are Retail, Healthcare, Manufacturing, Banking, Logistics, Sports, Bioinformatics and many more. Those who are good in Mathematics, Statistics and Information Technology can explore the area of data analytics.

In Mathematics especially the concept of matrices, system of linear equations, Eigen values and Eigen vector, Graph theory, Singular Value Decomposition, High Dimensional Space and linear programming knowledge are essential for this profile.

In Statistics, the basic concepts of statistics like measures of central tendency, dispersion, skewness, correlation, regression, the probability concepts, Stochastic process and introduction to time series are essential. In Information Technology essential subjects are Relational and Non-Relational
Data Base Management Systems, Graph database system Neo4J, Python Programming, R programming language for statistical computing, Big data technologies, Spark, Scala, data visualization tools like Tableau or Power BI, Machine learning and Artificial intelligence.

In St. Xavier's College, we started M.Sc. in Big Data Analytics in collaboration with Tata Consultancy Services in 2019. This program will ensure that students acquire all the skills required for a data scientist. The most important part of this program is the internship from industry in semester IV. After acquiring the basic knowledge in the first three semesters, the industry internship exposure which varies from 4 to 5 months will make the students industry ready as data scientists.

The Information Technology Department of St Xavier's aims at providing our youth with an answer to the various queries that they may have with regard to the profession they need to choose in these challenging times …Please feel free to drop in to the Information Technology Department physically or send us an email for any queries that cross your mind regarding the subject in particular.

I would finally like to express my heartfelt gratitude to everyone involved in the publication of this magazine, especially our Editor in Chief, Kriti Jain, who has played a pivotal role in the process. Thanks also to Ms. Lydia Fernandes for her unwavering support and assistance over the past few months as she worked closely with the small but successful magazine team. Last but not least, I want to convey my heartfelt gratitude to Dr. Rajendra Shinde, our college's principal, who has been supportive and sympathetic in all of our department's endeavors.
Lastly, I wish everyone a happy and healthy new academic year ahead.

Roy Thomas
Head of Department of Information Technology
<roy.thomas@xaviers.edu>

From the Editor's Desk

Having an aptitude for technology has become essential today. It may seem intimidating at first, but it makes human life easier. The world is moving towards the time where technology rules and guides us further in doing our day to day jobs. Now, whether it is a boon or a bane, I leave it up to you.

The team and I welcome you to the 3rd edition of annual IT magazine of St. Xavier's College Mumbai, **B.I.T.M.A.P.'22**. This year we wanted to focus on one's relationship with technology and what changes the IT field has brought about in our lives, leading us to the theme **"IT & YOU"**. We are really proud and exuberant to bring out this issue of the magazine which is a humble initiative to make readers tech savvy, to get your minds to roam free in the realm of technology and experience how technology has made things easier.

With the growing times, we must be aware of the technologies that surround us. If IT seems jejune and tedious to you, you haven't experienced how zesty and piquant it is at the same time. This edition is an attempt to make you reassess your prejudices and embrace technology as your friend.

With the diversifying IT field, it has become difficult to understand how things go about now and what actually is happening. The technical terms used make it more problematic to understand technology, which is why we tend to neglect and omit it, thus living in denial. That is why in our edition we aim at explaining technology in lay man's terms to make it easier for anyone and all to understand, which is in relation to our magazine name-
Boring **I**.T. **T**hings **M**ade **A**ccessible to the **P**eople, abbreviated as BITMAP. 'Bitmap' technically would mean understanding a language of 0s and 1s, which definitely would be boring and non- understandable. So, doesn't our full form of the same word solve the problem?

The enthusiastic write ups of our millennial writers are indubitably adequate to carry the interest and admiration of the readers. It is indeed a pious attempt to make our budding talents give shape to their creativity and learn the art of being aware and exploring. I hope that the positive attitude, hard work, sustained efforts and innovative and thought- provoking ideas exhibited by us will surely stir the minds of the readers and take them to the surreal world of technology where all you do is sit and watch.
Happy Reading!

Kriti Jain
Editor-in-Chief

BREAKING BARRIERS DURING THE PANDEMIC :

Imagine being stuck in a pandemic without access to any form of modern technology. Sounds scary, right? Considering the number of things you would miss out on - news, education, work, social interaction, entertainment, etc.
In this section, we will review some of the most phenomenal tech innovations that came about during the Covid-19 pandemic.

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E-COMMERCE

E-COMMERCE MODELS AND CONSUMER PURCHASE PATTERNS DURING THE PANDEMIC

ADOPTION OF OPTIMIZED STORES TO MEET ONLINE CONSUMER DEMAND

TRENDS IN ADVERTISING AND AN OVERVIEW OF ONLINE SHOPPING

SUPERMARKET RUN

-Daniel Pereira

E-commerce or online shopping consists of the buying and selling of products through digital media. It has been there since the 1990s. There are four types of e-commerce models-

- Business to Consumer(B2C) where a consumer purchases online products from a business.
- Business to Business(B2B) where a business sells its products to other businesses.
- Consumer to Consumer(C2C) where consumers sell their products to other consumers.
- Consumer to Business(C2B) where a business purchases goods from a consumer.

Since the pandemic took over, there has been a great rise in online shopping. However, the number of commodities being purchased has decreased. According to research, there has been an increase in the purchase of necessities along with a minimal increase in the sales of other products. Brand loyalty has also gone on a downward slope. The pandemic has also greatly reduced customer's offline purchases.

To overcome this issue, many offline stores have converted to dark stores. Dark stores get their name for being 'hidden' away from consumers. They are essentially mini-warehouses built for staff efficiency, where online orders placed by consumers are fulfilled rapidly through smooth product movement. This has advantages for both sellers and consumers. Consumers can shop from the comfort of their homes without worrying about transportation. Often, products sold in dark stores are cheaper than in regular offline stores as store maintenance costs are dramatically reduced with the elimination of aesthetics and ambience. The order processing speed can be increased with a smaller sales force.

Another change brought about by the pandemic is the change in payment options. Consumers from all economic strata have become comfortable with the idea of paperless transactions. There has been a rise in payments through net banking, cards, UPI, digital wallets and more, during and after the pandemic due to convenience, transparency and contactless interaction.

A lot of consumers also find online payments safer as they can make transactions via their phones and do not need to carry large amounts of cash.

There has also been a major change in advertisements. As consumers stay at home, products are advertised online. Social media apps like Instagram and Facebook have been very helpful for sellers. Nowadays, a lot of advertisers use targeted advertising, which enables e-commerce businesses and search engines to track consumers' product searches and past purchases data. Based on that, they recommend certain products to them. This is the main reason why some consumers purchase products they see in online advertisements on impulse. A huge setback of this approach is the exposure of consumers' private data. Therefore, it is important for consumers to be careful when they are purchasing products and using certain software. They should also be wary of disclosing private information such as card details on suspicious websites, apps or devices.

Online shopping v/s Offline shopping

Online shopping, as mentioned previously, is cheaper as consumers purchase goods directly from the manufacturer. Consumers can buy products from anywhere around the world, though they may have to pay for the shipping cost. Consumers can have their goods delivered to their door without physical contact, hence avoiding infection. Unlike offline stores, online stores are open 24x7. Another important factor of online shopping is that we can compare different products. Online reviews help in making an informed choice before purchasing the product.

On the other hand, there might be a delay in the delivery of goods. The consumer may be shown edited or bogus images of the product and the product may be faulty or not what the consumer expected. Occasionally returns, refunds, and exchanges of products can be very tedious. Hence, consumers need to shop from trusted e-commerce sources and practice online safety measures to protect their interests. To conclude, online shopping has its limitations however, it has been a boon during the pandemic.

GOVERNMENT INITIATIVES AND SERVICES

THE COWIN PLATFORM AND DIGITIZED VACCINATION DRIVE IN INDIA

AAROGYA SETU FOR MEDICAL SAFETY INFORMATION AND SERVICE PROVISION

THE UMANG APP UNDER THE DIGITAL INDIA INITIATIVE

DIGITALIZED INDIA

-Rovin and Richmond

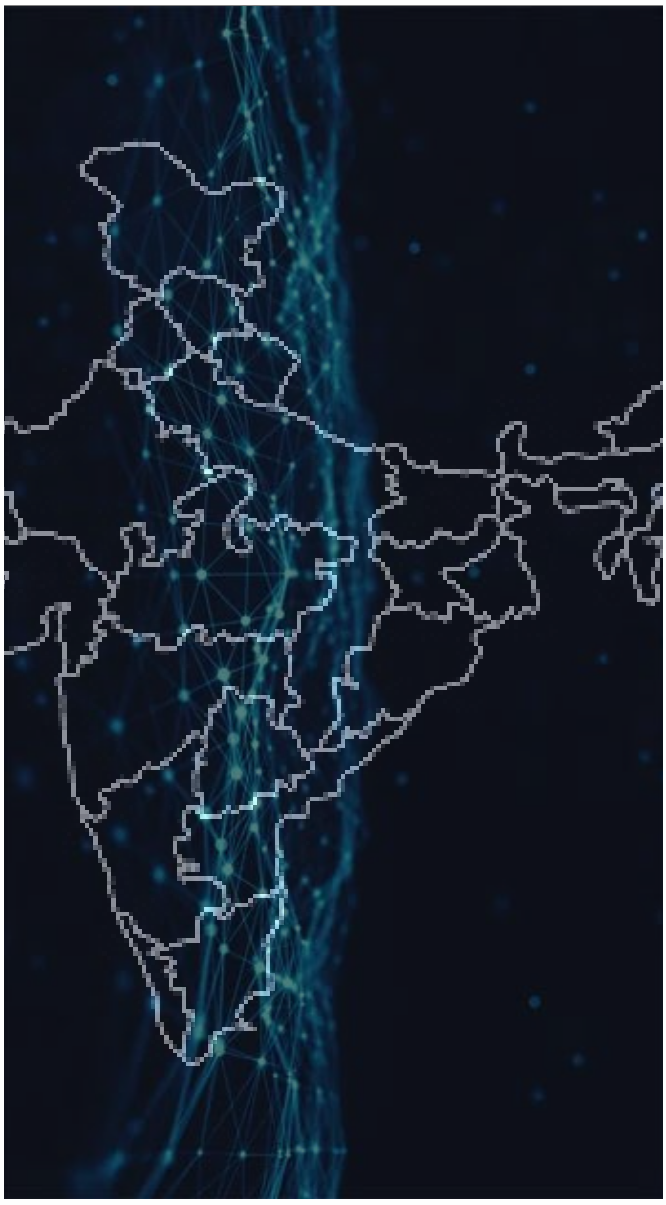
During Covid-19, IT became an indifferentiable part of every field. Digital literacy rates rose to an all-time high in the span of a few months. In the onslaught of the pandemic, virtual meetings became a vital part of our lives and many offline services went online, bringing about potential revolutions for the post-pandemic world. The Indian Government also took to technology to overcome the pandemic.

UMANG

THE SPIRIT OF NEW INDIA

One critical asset of India's vaccination drive is a digital platform called CoWIN (Winning Over Covid-19) which the Government recently declared open-source for other nations. It is a cloud-based system that facilitates registration, immunizations, appointments, and issues digital vaccine certificates to users. It reflects the citizen-centric design of India's vaccination program. The portal has a simple user interface for users to register themselves and select a convenient facility, with an option to choose any available vaccine. They get a digital vaccination certificate, delivered in a QR-code format via a text message or a printed copy at the facility. Vaccinators use the app to verify registered beneficiaries, enter the vaccine doses given and record any adverse events following immunization. People having no access to the Internet can walk into any health facility and get themselves registered on CoWIN. Aarogya Setu is an Indian COVID–19 'contact tracing, syndromic mapping, and self-assessment digital service, primarily a mobile app, developed by the National IP Centre. The app reached about a hundred million installations in forty days. The purpose of this app is to increase awareness about the pandemic, to share the best practices and advice about covid, and to make essential COVID–19 health services easily accessible to Indians. It's a pursuit app that uses the smartphone's GPS and Bluetooth options to trace COVID-19 cases. The app is offered on all mobile operating systems. With Bluetooth, it tries to work out the level of danger if one has been exposed to COVID–19 infected individuals, by scanning through a database of reported cases across India.

The pandemic compelled the government to digitize India in every way possible.



Another such app is the Unified Mobile Application for New-age Governance (UMANG), a Digital India initiative of the Ministry of Electronics and Information Technology (in short form MeitY), for access to central and state government services. The app supports 13 Indian languages and is available for all platforms. The app is aimed at all citizens of India and offers hundreds of services including income tax filing, aadhaar and provident fund queries, gas cylinder booking, and passport seva. It is part of the Digital India initiative which seeks to make government services available to the general public round the clock.

There have been other digital initiatives by the Government, such as DigiLocker. UPI payment technology, which was developed by the National Payments Corporation of India (NPCI) in collaboration with the RBI and IBA, was greatly propagated by the Indian Government as a medium for online payments. These digital services are a major step towards the dream of a 'Digital India'.

DIGITAL WALLETS

ORIGIN AND EVOLUTION OF DIGITAL WALLETS, FROM CLOSED TO SEMI-CLOSED PAYMENT SYSTEMS WITH THE ENTRY OF MULTIPLE COMPANIES IN THIS SPACE

EXPLORING THE METEORITIC RISE OF UPI DUE TO ITS TECHNOLOGY, CONVENIENCE, COST-EFFECTIVENESS.

LOOKING AT AN OPTIMISTIC FUTURE FOR THE INDIAN DIGITAL MONETARY SPACE

CASHLESS FUTURE?

-Gavin Mendonza

I remember how just a few years ago, I always needed to carry physical cash or my wallet when I went out to buy something. Those days are now long gone, ever since digital wallets and UPI got popular. Now I can confidently move out with just my phone, knowing that I can pay for anything I need by simply scanning a single QR code.

UPI is revolutionary because unlike the previous online payment methods (like NEFT), all you need for paying using UPI is the receiver's UPI ID, which could be anything from a mobile number to something like an email address.

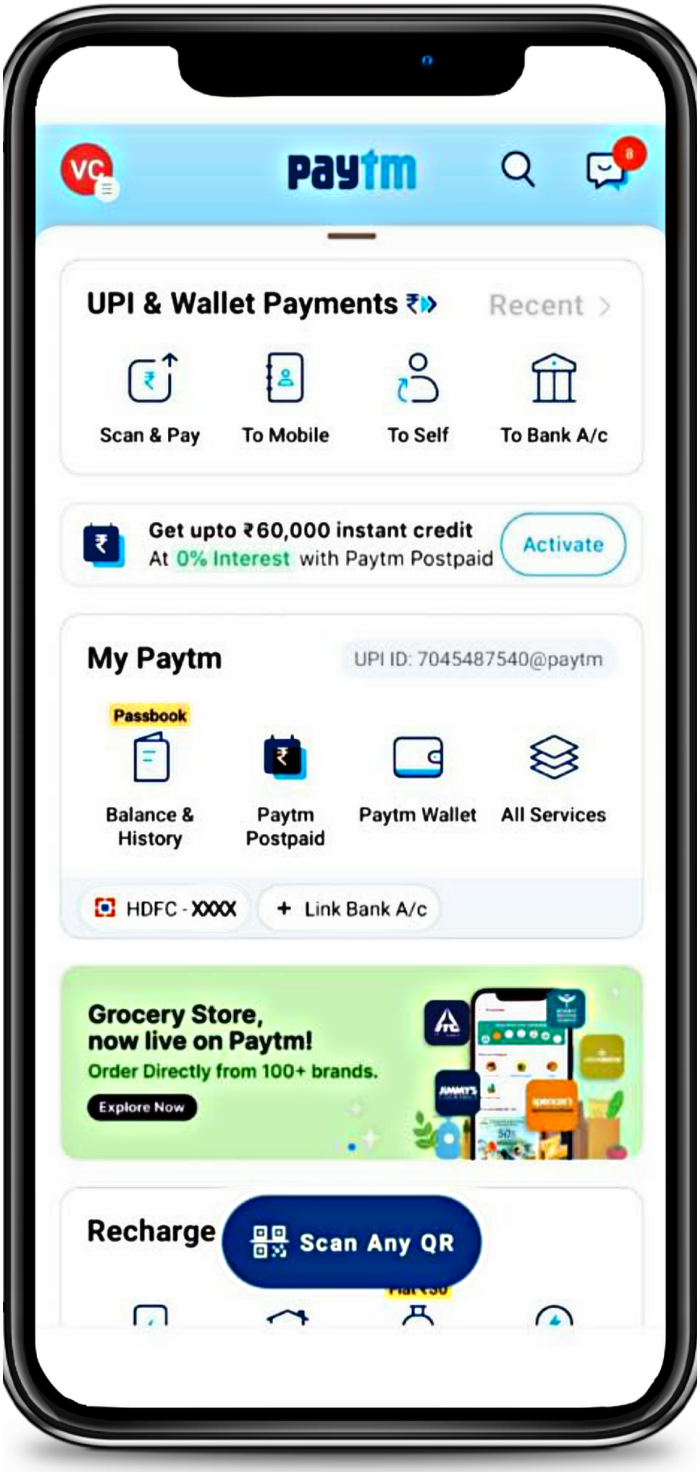
Digital wallets in India have existed ever since 2004! However, they only gained popularity in 2009, when MobiKwik looked out to revolutionize the mobile recharge market. MobiKwik followed a closed wallet payment system, which meant you could only use MobiKwik to pay for services that had a partnership with it.

Eventually, when the mobile phone market exploded in 2013, MobiKwik quickly shifted over to a mobile app interface, which also saw many other competitors such as Paytm, Tez(now known as GPay), airtel money, etc coming out with their own versions of mobile payment apps. Since the users were scattered over various platforms like these, the digital wallet industry had to shift to a semi-closed wallet payments system.

With this system, digital wallets could now be used to pay other merchants, as well as competitor wallets.

In 2016 the NPCI (National Payments Corporation of India) looked toward unifying all digital payments with the launch of UPI(Unified Payments Interface). UPI finally allowed for digital payments from one bank account to another. UPI was revolutionary because unlike the previous online payment methods(like NEFT), all you needed for paying using UPI was just the receiver's UPI ID, which could be anything from a mobile number to something like an email address. This made it possible for all of the receivers' data to be contained within a barcode, which makes it very convenient for users to just scan and pay.

Additionally in 2019, the ministry of finance decided to nullify MDR(merchant discount rate), which meant people could make a transaction of any amount of money without having to worry about transaction fees!



With this in place, the number of low-value transactions using UPI skyrocketed.

Now, many digital wallet apps provide UPI such as Google Pay, Paytm, PhonePe, etc.

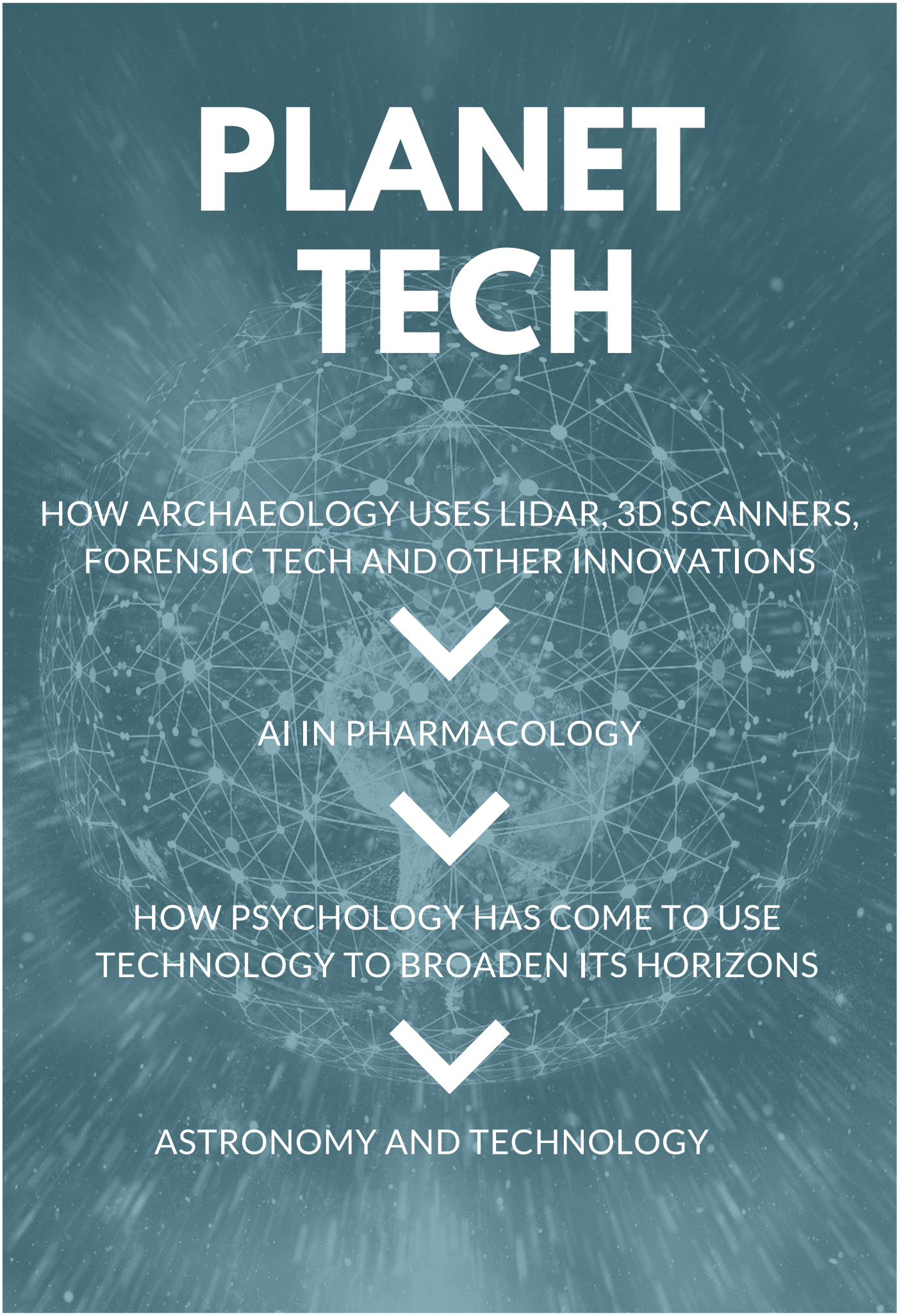
The users create their UPI ID which is linked to their bank account. While receivers and merchants do the same, they can also print out their QR codes which can be scanned to automatically enter their UPI ID on the device. Upon final authentication, the money is transferred from the senders' bank account to the payment apps' current account, which is then transferred to the account of the recipient.

By 2020, funds transferred by UPI had already surpassed the transfers done by debit or credit cards. With the rise of COVID in 2020 digital transactions saw a huge jump in numbers!

In its 20-21 annual report, the RBI stated that the pandemic has fast-tracked the digital transformation of the payments ecosystem in India. "Besides augmenting the broad-based use of technology, the pandemic has fuelled the proliferation of digital modes of payment, propelling the country towards 'cashless' alternatives"

The history of digital payments is great, but its future is going to be much greater! Digital payments have grown a lot in the past years. A report in march 2021 stated that digital payments had a 30% share in all transactions, which is a huge number for digital payments!

The industry is projected to expand to 300% of its current size! Neither are the competitors nor the government making any plans to slow down. With the government rolling out more sanctions in the union budget and with things like 'gold wallets' and 'crypto gift cards' coming into play, we can be certain that the digital payment market will keep expanding.


PLANET TECH
HOW ARCHAEOLOGY USES LIDAR, 3D SCANNERS, FORENSIC TECH AND OTHER INNOVATIONS
AI IN PHARMACOLOGY
HOW PSYCHOLOGY HAS COME TO USE TECHNOLOGY TO BROADEN ITS HORIZONS
ASTRONOMY AND TECHNOLOGY

TECH REVAMPS SECTORS

-Karen Aguiar

When the world comes to a standstill, technology keeps us going. It is the use of technological advancements to propel the speed at which fields improvise and adapt, which has sustained the fields of Archaeology, Pharmacology, Psychology and Astronomy during the pandemic.

Archaeology and its relationship with technology

When we think of archaeology, we think of people with ragged clothes, fat books, small shovels, and a teeny tiny brush. Well, this might've been the case…..5000 years ago. Indeed, archaeology does sound ancient to a layman, although modern archaeologists have a ton of tools at hand, making it easier to work. Let us have a look at some of them:

LIDAR(Light Detection and Ranging Technology): LIDAR is a tool that produces three dimensional maps of the earth's surface within seconds. It is a laser remote sensing system that acts as a laser that penetrates the surface, and measures the distance by the time taken for the laser(light) to return.

3D Scanners: Artefacts can be easily damaged while being examined by humans, but 3D scanners make the process contactless and accurate while scanning the components and providing the constitution of the artefact at the molecular level!

Forensic tech: It helps determine the exact way a historical entity died, by examining DNA in the fossils.

During the COVID- 19 pandemic, physical excursions, and excavation trips were completely halted. But this did nothing to stop archaeological advancement. Websites like Google Earth are based primarily on satellite imagery, and drones that allow access to inaccessible crevices of the earth. The pandemic failed to slow down the field's progress.

With further advancements in artificial intelligence, like using machine learning for site mapping, the future presents a plethora of exciting opportunities in Archaeology.

IT is the backbone of all sectors with hardly any arena that's not being positively affected by it.

Pharmacology and its relationship with technology

Pharmacology is a branch of biology and medicine that is concerned with the development of medical drugs. The paradigm shift in the understanding of curative treatments propelled the onset of modern pharmacology which now includes studies about the composition of drugs, synthesis of drugs, drug design, molecular and cellular communication, molecular diagnostics, interactions, toxicology, chemical biology and much more.

IT enables a structured storage record for patients, facilitates the electronic prescribing of medicines, provide tools for monitoring the efficacy and safety of medicines in use.

During the pandemic, a tech and a vaccine company collaborated to develop a transformer-based generative AI that is extremely efficient in increasing the speed of drug discovery in pharmacology.

Chemotherapy is also something in which technology is helping specialists save lives. New technologies allow for a less invasive photo-dynamic therapy treatment.

Psychology and its relationship with technology

Psychology is known to be a field that is very keen on in-person contact. So when the pandemic hit, the future of offline therapy was uncertain, to say the least. Then, how did the mental health professionals and researchers conduct their business during the pandemic?

- **Teletherapy:** Platforms such as Meet, Zoom, Skype as well as online therapy portals such as betterhelp.com, etc. have proved to be lifesavers for therapists and patients alike.
- **AR and AI:** Augmented Reality is enhancing real-world experiences with the help of technology. Therapists have used AR to provide relaxing coping mechanisms to people with anxiety disorders. In the case of AI, there has been some success in creating robots that talk to people with PTSD.
- **Self Report Inventories:** These had been widely used before the pandemic, but their popularity skyrocketed during the pandemic. The assessment tests automatically tabulate and interpret data that is imputed. Personality Inventory and tests have enabled more people to obtain information about themselves.
- **Social Media:** A lot of therapists have taken to Instagram and Facebook to share information about coping with the pandemic with the general public. The algorithm of these sites favours such informational video tools.

The future of Psychology is certainly bright; with more technologies coming into mental health research and development.

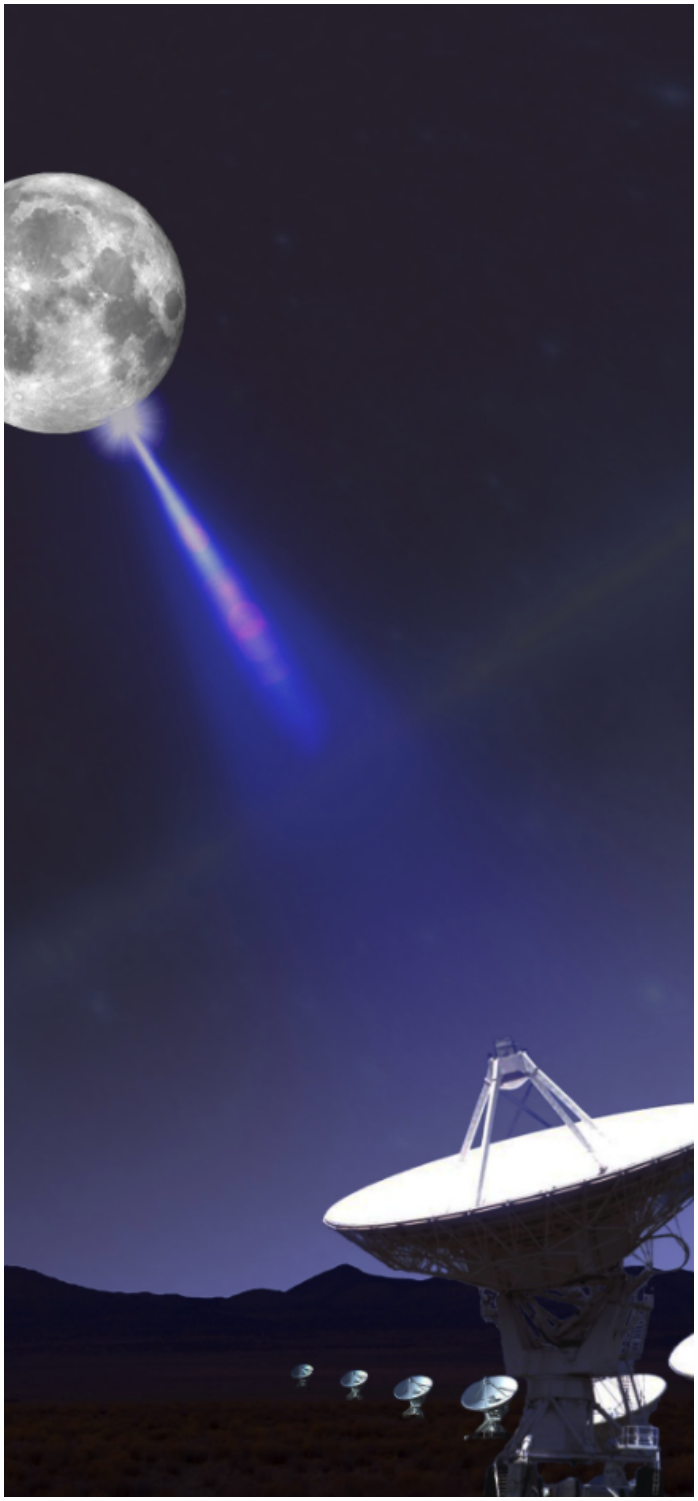
Astronomy and its relationship with technology

Astronomy is an ancient discipline helping us understand the universe that lies beyond the Earth. During the pandemic, tons of people took a fancy to astronomy. Here's how Astronomy professionals and beginners used technology during the pandemic as a means to enhance their knowledge.

- **Telescopes:** The Celestron EdgeHD series is supreme with the showstopper-1400 XLT (a massive, modified Schmidt Cassegrain Telescope with corrective optics that provide flawless images for astrophotography).

- **Planetariums:** Virtual planetariums come loaded with interactive sky maps, a library of stunning imagery, and updates on the latest space events, space weather, and aurora for successfully navigating the night sky with ease.

While this article just highlights four fields that use technology, it is safe to say that the infusion of technology in all fields is here to stay. Automation can aid with repetitive, dangerous, or intricate tasks, leaving the bigger tasks like ideation, decision making, and more, to humans. This streamlines workflows, reduces costs, and leads to faster development of these fields.



MEDICAL AID WITH IT

HOW THE PANDEMIC FORCED THE PHARMA INDUSTRY TO FACE THE TECHNOLOGICAL CHANGES IT HAD BEEN RESISTING

USE OF TECH IN PHARMA SUPPLY CHAIN MANAGEMENT

DISEASE DETECTION TECHNOLOGIES THAT HAVE MADE IT EASIER TO DETECT CHRONIC AND FATAL ISSUES

PHARMA TECH

-Nitya Khanna

Humanity is no stranger to diseases. Historically the pharmaceutical industry has been highly resistant to digitization. There have been many reasons for this - lack of understanding of new technologies, lack of quality assurance, the heavy burden of expenses, lack of time to cope with change and a general fear of change in itself. Fortunately, the Covid-19 pandemic acted as a catalyst for a revolutionary change that had been brewing for quite some time. The pandemic, like the many before it, disrupted industries, however, the pharmaceutical industry could not afford any upheaval in its usual working. With millions of people dependent on its life-saving therapies, drug discovery and vaccine development were prioritized. The industry was highly responsive and adaptive in its work. One of the biggest threats facing pharmaceutical industries today is a lack of proper resources. This is a problem that existed before the pandemic but was only exacerbated by it.

The biggest example of a large discovery made with the help of technology during the pandemic would be in vaccine development, namely the discovery of the mRNA vaccine. The mRNA vaccine is safer to produce, more quickly and cheaply, compared with traditional vaccines. You no longer need huge bio-secure labs growing deadly viruses. Instead, just one lab can sequence the proteins of the antigen and email it around the world. With that information, a lab could make "a million doses of mRNA in a single 100 mL test tube.

Another rather important use of technology during the pandemic would be in building transparent supply chains. The Pfizer-BioNTech vaccine needs to be transported at ultracold temperatures. If the vaccine warms up too much during transit, the dose could become ineffective.

New technologies such as Zebra's Temptime, allow visibility in the manufacturing and delivery process to the final vaccination center. This device alerts users if the shipment has experienced a temperature deviation. Pharmacy personnel are able to capture and assess temperature recordings without ever having to open freezers or refrigerators. By installing data loggers inside the storage units, temperatures can be automatically recorded at regular, frequent intervals and transmitted via Wi-Fi gateways to the right people. The data loggers also have alarm notifications that will immediately alert pharmacy personnel if a temperature shift occurs.

Medical Technology is the fastest- growing sector, providing well- paying jobs across the world.

Detection of Stomach Cancer has become easier with the help of technology. A capsule with a fitted camera can be swallowed which takes thousands of images inside the stomach and those images get stored to a belt (to be worn for some time, minutes after eating the capsule) through NFC technology. It saves time and money spent for proper hospital diagnosis and is 99% accurate.

Many people die of undiagnosed high BP. Now, it's diagnosis has been made easier using a small machine which gives the ECG count in an app and tells you your health status. Usually, to check the sugar level a drop of blood is essential. Now, a device has been invented that calculates your sugar level with just a touch in mere 5 seconds and is 90% accurate.

Using software development platforms, a variety of technologies in an IoT network allow for real-time tracking of body temperatures using thermal imaging, AI-enabled cameras, real-time location data, enterprise systems and many other technologies.

Six pre-built components— symptom detection, physical distancing, contact tracing, access management, safety compliance, and asset monitoring—allow businesses to manage critical events in real-time so that automated systems and human responders can react with far greater effectiveness to help people to detect diseases.

The pandemic is a catastrophe that has wreaked havoc on our way of life but the pharma industry has managed to transform itself and rise to the occasion. It was once said, "Never let a good crisis go to waste" and this industry did not. The art of improvements at every level in production was refined and as we continue the fight against this disease we can only hope that the top players in the industry will keep up with their progress and help us defeat it once and for all. With the inclusion of tech, the horizons of pharmacology are always expanding. Integrated pharma-tech is a path to ensure successive wins in the field.

E-LEARNING

CHALLENGES TO EDUCATION AS A RESULT OF THE PANDEMIC.

VARIOUS APPS WHICH FACILITATE ONLINE LEARNING AND MEETINGS FOR STUDENTS AND PROFESSIONALS.

ED TECH

-Aryan Lalka

It's March 2020. You are studying diligently for your exams. You study till the sun is up and expect the worst to come. But right before you leave for school to give the exam, a message pops up on your phone, "All schools and colleges are to remain shut until further notice and all citizens need to abide by the lockdown rules to curb the spread of Covid-19." Fast forward 8 months, that further notice to reopen schools and colleges is still nowhere to be seen. The clock is ticking, the academic year has started but there was no sign of any progress in education. Thus came the time to rely on technology and to put into action the amazing world of online learning.

Due to the lockdown, the whole country was shut down, be it shops, stores, schools, or colleges. People had to stay indoors and the only escape was the internet. This led to an emergence of a highly technologically reliant society that affected every part of our lives. To adapt to this change and help continue our lives without wasting time, the Government decided to implement the idea of E-Learning.

In an event where the file size is too big, say 6GB, we can use a site called 'wormhole.app' for transferring files.
Note- File size needs to be less than 10GB.

This essentially meant that schools and colleges would operate remotely through the help of internet media channels, such as video conference apps and classroom apps, to not only conduct lectures in real-time through a screen but also be able to manage assignments, notes, and exams in the same way. This led to a tremendous shift in the methodology previously used in classrooms when schools and colleges were operational physically.

Talking about online education, Zoom Cloud Meetings is one app that has made its place in the past few years. Founded in 2011 by Eric Yuan, and launched in January 2013, this video conferencing app took off in 2020 during the global pandemic. Yuan stated in a blog post that over the course of May 2020.

Zoom was seeing 200 million daily meeting participants. The following month, this figure had risen to 300 million. The UK cabinet and 90,000 schools in 20 countries were among new users of the app. During the pandemic, Zoom's valuation exceeded $100 billion, a 383 percent increase in its value in January 2020. Offering features like HD audio and video, cross-platform messaging, end-to-end encryption, calendar scheduling, waiting rooms, meeting recordings, and many other features. Zoom has, without a doubt, been a very useful resource in this day and age of online education.

Another platform is Google Meet. Previously known as Google Hangouts, Google Meet has surpassed 50 million downloads on Play Store as work-from-home numbers grew during the COVID-19 pandemic period. Adding to that, by April 2020, Meet hosted about 3 billion minutes of video meetings and added roughly 3 million users every day, said the company in one of its blog posts. Meet was originally a tool for businesses and was part of Google's G Suite enterprise solution. But as video chat apps like Zoom took off during the lockdown period.

Google announced on April 29, 2020, that it was making Meet available for free to everyone with a Google account. It has amazing features such as using AI to make users more visible in low-light conditions, and for filtering surrounding noises and enhancing the audio quality during meetings. Along with that it also provides calls with unlimited duration (up to 24 hours). Meet is browser-based and users can access the platform without downloading any additional software. On smartphones, users can also access it via iOS and Android apps. Google Meet is also integrated with G Suite, so a user can join meetings directly through Gmail or Google Calendar events. These exclusive features related to Google have proven to be very useful and has made Google Meet an easy to use software for online education.

Modern educational trends include bite-size learning modules, live training, and the use of AR (augmented reality).
By 2026, the online education industry is set to grow by 11.6 billion.

Microsoft Teams is another app which has seen a tremendous uprise during this pandemic. In 2017, Microsoft shifted Classroom to Teams and announced it would discontinue Skype for Business and bundled most of its collaborative business software into Teams. Microsoft Teams saw a huge uptick in users during the pandemic, rising from 20 million users in November 2019 to 44 million in March 2020, then 75 million by April. It currently has 145 million active daily users, up from 75 million last year.

It was estimated that Microsoft Teams generated $6.8 billion in revenue in 2020, a 700 percent increase year-on-year. Teams offers unique features which go beyond just video conferencing. We can create different rooms or 'Teams' in which there are separate chat channels and video hosting options. The conversation is stored within that Team and can be accessed by any and all members of that Team. It also provides direct access to OneDrive and SharePoint through the app. These features make it stand out from the rest as an all in one platform for video communication and sharing making it an effective resource for online learning.

Aiding these video conference apps, there are also apps which help in submitting assignments, conducting exams, and supplying notes as documents. Apps like Google Classroom, Google Forms, and Canvas have been widely used for these purposes. Although the online education system has been thriving during this pandemic, there have also some shortcomings of the same. For instance, Zoom was found to be sending unauthorized data to Facebook. It was also found to be hoarding user data, and using a rather novel definition of 'end-to-end encryption'. Accordingly, Zoom saw itself banned by governments for official business (Canada and Taiwan), numerous organizations (SpaceX and Nasa) and school boards (New York and Taiwan). There was also a case of AI turning racist, tracking children of a certain ethnicity and accusing them of cheating due to their normal characteristics being interpreted by cheat policing AI as suspicious. After living through it all and still being a part of this online education system, do you think it's a curse or a boon in disguise?

CHANGE THE PANDEMIC BROUGHT IN MY LIFE!

EFFECT OF THE PANDEMIC ON ONLINE EDUCATION FROM A STUDENT AND A TEACHER'S POINT OF VIEW.

VARIOUS CHALLENGES FACED BY TEACHERS AND STUDENTS ALIKE.

ESSENCE OF LEARNING IN A CLASSROOM VS FROM THE COMFORT OF OUR HOMES.

A MACROSCOPIC CHANGE FROM A MICROORGANISM

-Jeremy Varghese

The one sphere which has been flipped 180, revolutionized in these past 2 years - has indisputably been the education sector. From age-old, physical, classroom teaching, the world has shifted to a modern, e-learning, online mode of teaching and learning. Since March 2020, every school across the world has been compelled to stop in-person classes due to the risk of infection. This decision was not very welcome in its prime. It received a lot of hostility from the teachers, parents, and most of all, the students. Quite literally overnight, schools and colleges were closed, and while the drastic change was accepted by a few, the majority were not very welcoming of the idea. After eons and eons of in-person schooling, an online change was frankly not expected in the least. From blackboard to zoom's black screen, from notebooks to apps and from pens to keyboards, it was a very unusual change for everyone.

Education plays a very vital role in the lives of all people- right from children to adults, we never stop learning. With the advent of online classes, the scope of learning has increased. Online classes have their perks – as well as drawbacks, the perks being developing certain technical skills, improved communication & collaboration, increased comfort levels. But that's where the good part ends - the cons heavily outweigh the pros for the teachers and students alike. Yes, both! There are so many out there who think that it's the students who are suffering. And the teachers are on a joyride - the teachers who are not technologically advanced, who have been teaching since the early 2000s and have been accustomed to offline teaching for decades, those teachers must just be just having the time of their lives now, right? To those who conform to this idea and believe that this is true, I am here to prove you wrong.

My testimonial is not your run-of-the-mill one given by the multitude of students who have been going through online education. The reason is - for the past two years, I've been on the other side of online education - teaching. I've been taking tuitions for 10th grade students from my school, for mathematics and biology primarily, but also for help with other subjects as well. Hence, I have experienced both sides of the spectrum. I know how online learning is, but I also know the struggle a teacher has to face. While the students' main issues are the lack of motivation to pay attention and procrastination to its extreme, the teachers have their own shares of woes and worries. Starting with adjusting to the new mode of teaching. For me, it was quite easy, as I am relatively quite techno-savvy, so I had that to my advantage. I am known for my knack for making very good PPTs and thankfully this gave me an edge over most other teachers, by creating engaging and attractive lessons. But this isn't the case for most teachers, considering the fact that they're from a totally different generation (no offense teachers)! There are so many teachers who probably don't even know how to operate any app; how are they supposed to function then? Ergo, this decision forced the teachers to do heavy training over months in order to prepare themselves for the upcoming academic year just a few months ahead. This was a major chunk of the woes faced by them.
The next major problem was the lack of motivation coming from the students. A teacher's main job is to impart knowledge and make sure that students are comprehending what they're teaching. But if the students don't show their faces or even respond in any way possible, how is the teacher supposed to know whether they have done their job or not? If the teacher doesn't know this, what's stopping them from just quitting and choosing a new career? It's because of the passion and love for this amazing profession that keeps them close by; their desire to create a new generation of intelligentsia with sound morals and virtuous behavior. And that's the same reason why I want to join this beloved profession.

This new medium of education has really grown on us, teachers and students alike. Everyone has gotten comfortable with this novel way of operating school. One that we never would've guessed coming at all. But one that we somehow adjusted ourselves to. Especially with the exams, the students and teachers happily accepted conducting online exams - for students, the chance of scoring well is much much higher, and for the teachers, the headache of pulling out the red pen & correcting bundles and bundles of papers is practically eliminated. This has become the new normal, one that could probably become permanent, possibly. It's said that change is a part of nature. But this wasn't a change we wanted to tolerate. And now when the change is going away, and we're reshifting back to the past method, it's again difficult. And that's the thing about change; as Mandy Hale said "Change is painful, but nothing is as painful as staying stuck somewhere you don't belong." And maybe we do belong to the age-old method of offline MO. it's very burdensome to change, I agree. But at some point, what if we do have to go back to the old way - then what? So, even though it's easier said than done, we need to find a way to live with the old way of things. And hey! We managed to survive so far, how hard can it be! So let's stop scrolling, and start living!

INNOVATION AT ITS FINEST

“It is quite fun to do the impossible!” It is clear that innovative work and solutions bring out the best in the world and change the trajectory of our life and jobs, making things more efficient.
In this section, we will get to know about the latest technological trends in depth.

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LANGUAGES: A REVOLUTION

HOW PROGRAMMING LANGUAGES CAME INTO EXISTENCE?

VARIOUS LANGUAGES FOR DIFFERENT PURPOSES

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EVOLUTION OF PROGRAMMING LANGUAGES

-Elisha Cherian

A Programming Language is a set of instructions to perform specific tasks. They are used to communicate with machines to make them work in our way.

Ada Lovelace's Algorithm to calculate the Bernoulli numbers on the Analytical Engine, is considered the world's first computer program, invented in 1843. While translating a French paper written by an Italian mathematician, Ada added thousands of words of her own notes to it, realizing that the Analytical Engine could carry out an extensive sequence of mathematical operations.

However, the first human-readable programming language was the Assembly Language which was developed by David Wheeler for the EDSAC (Electronic Delay Storage Automatic Calculator). It was a low-level programming language to simplify the machine code language.

But assembly language was too time-consuming and error-prone, and thus, the world's first modern programming language was born – FORTRAN in the 1950s. FORTRAN, which stands for FORmula TRANslation, was developed for high-level scientific, mathematical and statistical computing. It is a compiled language (code must be compiled before running) and is the oldest programming language, still in use today.

The following years paved the way for ALGOL (Algorithmic Language), LISP (List Processor) and COBOL (Common Business Oriented Language). ALGOL was designed for publishing algorithms and doing computations. It introduced block structure (program consists of blocks containing both data and instructions). LISP is the second oldest high-level programming language where a function is applied to data. It quickly became one of the most favored programming languages for Artificial Intelligence research. COBOL is an object oriented programming language used in business, finance and administrative systems for companies and governments. It introduced the 'record data structure' for organization and manipulation of large quantities of data.

A while later, BASIC (Beginner's All Purpose Symbolic Instruction Code) was invented enabling non-scientific fields to use computers. It was easier to program and had a user-friendly syntax. It is the foundation for languages like Microsoft Visual Basic and Visual Basic .NET which are widely used.

Recent studies show that around 70% of coding jobs are in fields that are not connected with technology.

Then came C, a procedural programming language which is considered to be a middle-level programming language as it supports the features of both low-level and high-level programming languages. Most compilers JVM, kernel, etc. are written in C, and most programming languages are C syntax compliant, so C is considered the mother of all modern programming languages. C allowed Unix to be used on a wide variety of computers with impacts seen even today.

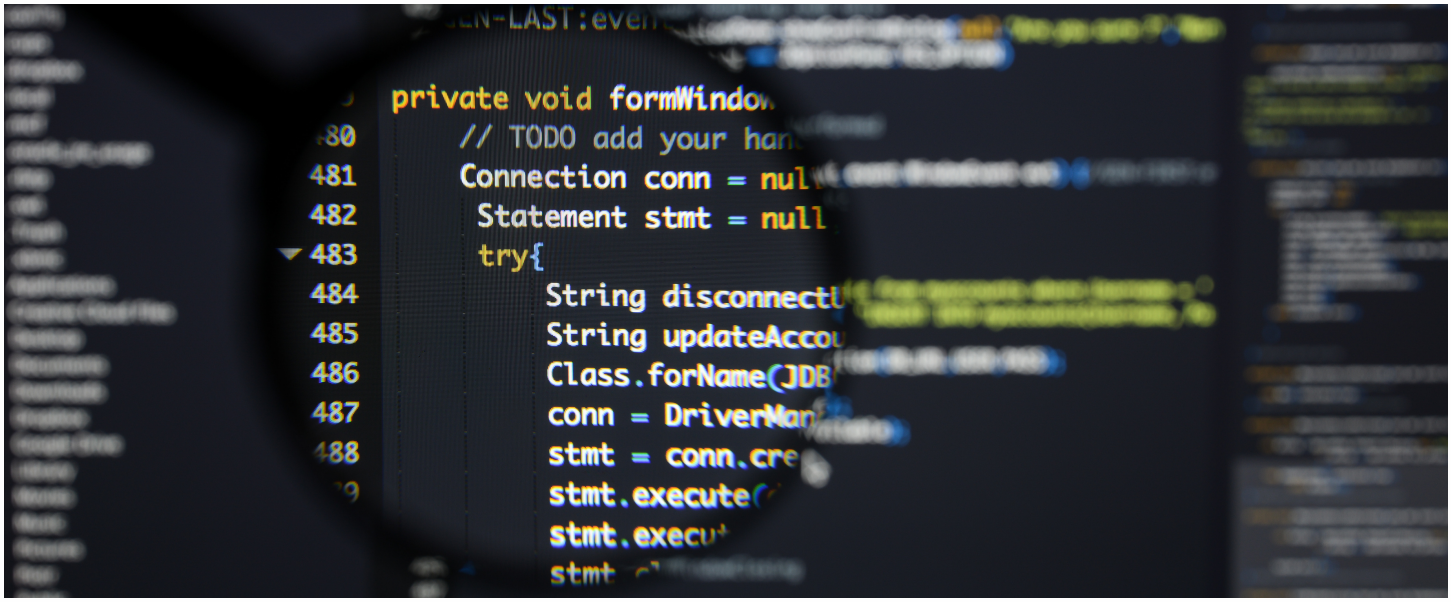
In the same year that the C programming language was created SQL was developed. It was used for viewing and changing data stored in databases. SQL became one of the standard programming languages after it emerged in the 1970s. All the Relational Database Management Systems like MS Access, Oracle, Sybase, Informix, etc. use SQL as their standard database language.

C language was modified to create C++. It is an extension of C with enhancements like classes, virtual functions and templates. As it runs on almost all platforms such as Windows, Linux, Mac, C++ is one of the most widely used software in the world. In the same year, Objective-C was developed which was used as the main programming language to write softwares for macOS and iOS. It is an object-oriented programming language that adds Smalltalk-style messaging to the C programming language

In 1991, Python was developed, a high-level programming language that is easy to understand, used among data scientists and analysts. Python codes are generally smaller comparatively and indentations make it always easier to read. Almost all tech-giant companies like Google, Amazon, Facebook, Instagram use Python.

JAVA, PHP and JavaScript were developed in the same year. JAVA was created to simplify C++ and due to the rise of the web. It can be used to develop mobile apps, web apps, desktop apps, games and much more. PHP, which stands for Hypertext Preprocessor, is a general-purpose scripting language used in web programming for connecting databases. This was one of the first server-side languages that could be embedded in HTML, making it easy to add functionality to web pages without invoking external files for the data. JavaScript is known as the scripting language for web pages and it helps make web pages dynamic. It can be used for Client-side as well as Server-side developments.

In 2000, Microsoft developed C# as a combination of C++ and Visual Basic. It is a programming language of .Net framework. It can be used to create a variety of programs and applications, including mobile apps, desktop apps, cloud-based services, websites, business software, and games.



Go was developed by Google in 2009 with simple and modern architecture to solve problems encountered in large software systems. It is popular among the world's largest tech companies such as Uber, Twitch and Dropbox.

In 2014, Apple developed Swift as a replacement for C, C++ and Objective-C. It was designed to be simpler and less error-prone comparatively. It is easy to learn and implement, safe, fast and expressive. Popular apps including LinkedIn, Lyft, and WordPress are written in Swift.

Furthermore, there are several programming languages like Rust, Perl, Dart and Scala that are not very well-known but are extremely user friendly and powerful. Rust is an open-source programming language with an emphasis on speed, memory safety, and concurrency helping create a variety of new software applications such as game engines, operating systems, file systems, browser components, virtual reality simulation engines. Perl is a general-purpose programming language originally designed for text editing but now performs tasks such as systems administration, web development, network programming, and GUI development. It is a stable cross-platform programming language. Dart is a programming language developed by Google for client development, used to develop both server and desktop applications. Syntactically, it is very similar to Java, C, and JavaScript. Scala is a combination of object-oriented programming and functional programming in a compact high-level language. Its static types help avoid bugs in complex applications. Its JVM and JavaScript runtimes help to build high-performance systems with easy access to a vast number of libraries.

It is impracticable for all programming languages to last forever as technology is constantly developing. With that being said, there are some old programming languages that continue to be used even today. The programming languages used today have evolved from concepts developed in earlier languages aiming to simplify the work of programmers. The constant advancement of technology ensures that programming languages will remain an integral part of modern life for years to come.

INCOME IN IT

SPECIALISATION AND PROGRESSION OF THE IT INDUSTRY IN INDIA.

REVIEWING THE ECONOMIC CONTRIBUTIONS OF THE INDIAN IT INDUSTRY

COMMENDABLE IT PROJECTS BY SOME RENOWNED COMPANIES.

INDIAN IT INDUSTRY

-Vrinda Chandra

'Tata Group's biggest company', 'A sector contributing to almost 10% of our GDP', 'Bangalore', 'Developers and programmers' – all these terms have something in common. What? The answer is the Indian IT sector! If you are a stock market investor in India, you may have traded the shares of Indian IT companies like TCS, Infosys, or any other IT company. Have you ever wondered what happens in these companies, why they earn so much revenue and why is the IT Industry considered one of the biggest employers in the Indian private sector? Let's dig deeper into the background of this industry!

On trifurcating the Indian IT sector, we get the following domains –

Semiconductor and semiconductor equipment manufacturing companies:
They manufacture semiconductors that are used in almost all electronic gadgets. ASM Technologies, Chiplogic Technologies, and Tata Elxsi (all headquartered in Bangalore) are some of the most notable companies in this domain. Recently, the Government planned incentives worth INR 76000 Cr to set up 20+ new semiconductor design, computer manufacturing, and display fabrication units in India.

Tech hardware and equipment manufacturing companies:
Notable companies in this sector are Compuage Infocom Ltd, HCL Infosystems Ltd, Intex Technologies India Ltd, and Redington India Ltd, which are some of India's leading manufacturers of mobile phones, computers, and other peripherals.

Software and IT services:
This is the most well-known part of the Indian IT industry, where India boasts multinational giants like TCS, Infosys, Wipro, and HCL Technologies. Larsen and Toubro Infotech Ltd, Mindtree Ltd, L&T technology, Happiest Minds Technologies Ltd, Persistent Systems, Birlasoft, Sasken Tech, and Mastek Ltd are some of the most reputed midcap and small-cap names. Many software companies are also well established in the BPM (Business Process Management) space.

Contracts and partnerships in over 100 countries, the upscaling of Indian public and private infrastructure through automation, and the worldwide export of IT services has contributed to the increasing size and revenue of our IT industry. It employs approximately 4.5 million people and its revenue stands at a ballpark figure of 194 billion USD, as of 2021. Indian IT services are considered to be one of the best in the world and many of our systems have been globally accredited. An example of this would be when CoWIN was made open source, after which

142 countries showed interest in using it to manage the pandemic in their nations! Our companies have performed the best in the areas of digital and cloud services. Concurrently, due to a surge in the provision of these services in recent years, there have been several deals for investments in new data center units across the country.

Talking about something rather interesting, the Indian gaming industry is also booming, with a whopping revenue of 1.5 billion USD, which is set to increase in the future. Companies like TCS, Infosys, Hyperlink Infosystem, Zensar Tech, and others, are spearheading a revolution in the Indian Gaming space, especially in mobile gaming. A testament to this fact is the game 'Ludo King', developed by Gametion Technologies Pvt Ltd, which witnessed around 500 million downloads worldwide and kept people hooked throughout the pandemic.

The Indian Government has partnered with companies from time to time to keep their systems fine-tuned to handle oodles of data and processes. TCS has aided the Government in the creation and maintenance of the passport system we see today. L&T Infotech has worked with the Government to create a non-intrusive information-driven social media tracking and analysis system to catch potential tax evaders. The Indian Railways uses AI and satellite networks to create smart coaches that would enhance passenger safety and security. They are capable of using sensors to detect any faults in tracks and use surveillance networks for maintaining decorum on board.

Many top notch digital natives like HP, Microsoft, Google and Apple started their business venture from a garage.

Coming to the private sector, there has been a rise in MSMEs and startups providing web development services, graphic design, video creation, and IT consultancy for small and large companies alike. This area has potential for expansion, with India becoming a hub for many Unicorn startups and new ventures that need a good virtual presence to expand. Prominent companies have undertaken major CSR programs that are aimed at enhancing technical education and helping potential talent develop, through research collaborations with Indian Universities in the areas of AI, IoT (Internet of Things), Data Science and more. Many have offered sponsorship programs for PhD students and internships for M.Tech and MSc students.

Finally, let's look at some recent projects undertaken by IT companies.

TCS undertook projects in RPA (Robotic Process Automation), one of which was to help reduce response time to anomalies in semiconductor production. In blockchain development, it tested a rapid trade settlement system for a Canadian depository. The MCX commodity exchange has also sought TCS' help for a technological transformation.

Infosys has created a system using Machine Learning, Big Data analysis, and AI to map the learning abilities of employees to suggest training programs that will be best suited to them. It is also delivering the Income Tax portal for the Indian Government.

Midcap companies have done commendable work in recent years. An example would be Happiest Minds which took up a project for the Coca-Cola Bottling Company United, where it will use RPA and SAP (Systems Applications and Products in data processing) to build a bot-based system to streamline the order management system, right from order placement to reconciliation. The Indian IT industry is set to reach a valuation of US$ 19.93 billion by 2025. The major IT hubs of India – Bangalore (The Indian Silicon Valley), Hyderabad (Hitech city), Mumbai, Chennai, Gurugram, Pune, and Kolkata, are gearing up to accelerate this growth in the coming years!

INCOGNTO BROWSING

HOW INCOGNITO MODE REALLY WORKS.

USING INCOGNITO WITH TOOLS LIKE VPN'S TO ENHANCE SECURITY.

ENHANCEMENT OF BROWSING EXPERIENCE BY USE OF EXTENSIONS.

BROWSER LAND

-Matthew D'Souza

Incognito mode works by keeping your history, browser cache, cookies and form data only temporarily. The idea is that once you're done with your session, all this information gets deleted making it invisible to the next person who uses the browser. This makes it not only useful for keeping your browsing habits away from prying eyes but also getting around website cookies that might make using such websites less irritating. Because it doesn't use cookies from your main browsing session, you can use incognito mode to log into a website under a different account, stop advertisers from spying on what you're looking at and even get around paywalls on sites that use cookies to track how many articles you've viewed before they start charging you (news sites like Wall Street Journal are notorious for this).

However, you may have seen the warnings that pop up in incognito mode telling you "Your employer or ISP might still be able to keep tabs on your online activity". How do they do that? Well because incognito mode only affects what's being stored locally on your computer, all of that traffic is still being routed by the servers at your ISP and also perhaps your school/office. So it can still be intercepted and tracked.

So, that means if you really want to anonymize your web traffic, you'll have to use a VPN and possibly over a network like TOR to further conceal your identity. Also remember that just because a browser deletes the information about your session, doesn't mean it will keep your data safe from prying eyes. For example, features that can run in incognito mode such as browser extensions can still leave visible traces on your computer unless you make sure that those are disabled as well. And, browsers also don't necessarily delete any data that you built up during an incognito session securely, so some of it could still easily be found with a software-recovery program or inside your PC's DNS cache.

The first computer virus was created in 1986.

Now I'm not trying to scare you or make you think that private browsing is useless, it's still a powerful tool and a quick layer of security. But just like any tool, it only works if you take necessary precautions. So make sure that your professor isn't standing over your shoulder while you use incognito mode to send out memes to your friends.

Now let's talk about extensions, a browser extension is basically just any piece of software that adds functionality to your web browser in some way. There are huge libraries of these extensions available for chrome and firefox.

So where do these extensions come from? Well, there are usually a few that come directly from the publisher of your web browser but a vast majority of them are written by 3rd-party programmers, checked for bugs and then published in some sort of official store by Mozilla or Google, either for free or with a usually small cost associated with them.

The first computer 'bug' was an actual real-life bug.

But there are some considerations. Although most extensions are small files that download quickly, they can still tie up your computer's resources especially if you try to run too many of them at the same time. Secondly and more importantly, poorly secured and even nefarious browser extensions are still out there even after the "official" stores have vetted them, so be sure to read the reviews along with the fine prints before you install anything. But as long as you're careful about what you install, extensions can enhance your browsing experience making it worthwhile.

Okay so now we know what they are, where they come from, but why would we want them? Well to put it simply, extensions are limited only by some basic publication rules and the creativity of developers, hence there are plenty of reasons to love them. Here are some cool things extensions can do - automatically apply discount codes without having you search for them, reveal who's tracking your online activity through cookies, customize the look of popular websites and so much more.

WEB DATABASES

OVERVIEW OF THE WEB AND A WEB BROWSER.

EXPLAINING THE COLLOQUIAL USE OF THE INTERNET AND THE WEB.

HOW ONE'S BROWSER AND WEB WORK TO RESOLVE ONE'S QUERIES

HOW THE WEB WORKS

BEHIND THE SCENES

-Matthew D'Souza

Today, connecting to the internet and browsing the internet is not the same thing. You might get your internet access from a cable/phone company but you might browse the web (which is a subset of the internet) using a web browser like Google Chrome, Safari, etc.

So what is a web browser?

To give you a short answer, it's a piece of software you use to browse web pages. The terms internet and web are not interchangeable. That's because you can use your internet connection for more than just looking at websites- make video calls, stream online movies, etc. which require internet access but they don't necessarily need a web browser.

So then how does a browser allow us to look at websites?

You can enjoy memes on Reddit, like tweets on Twitter, and watch videos on Youtube, all of this is possible on your browser because there are standards and protocols put into place. Standards - that means that they're all the same across every website that allows your browser to view so many different types of content because they're all in the same languages. But by making you read all this in so short I'm kind of getting ahead of myself. Let me illustrate what a browser does by explaining what happens when you visit a website.

1. In every web browser, there's an address bar where you type the site you want to visit. Say you type 'youtube.com' and when you hit Enter, a chain reaction of so many events takes place in a matter of milliseconds that it's kind of amazing that it works at all.

2. First, the web browser finds a location on a server where the website is stored. Generally speaking, a domain like 'youtube.com' represents an IP address. You can sort of think of this like typing in an address into your GPS before travelling somewhere.

3. The browser then uses a worldwide database called the Domain Name System (DNS) to match the domain name that you typed in with the corresponding IP address. The browser will check its cache storage first and a few other places before it queries DNS which helps speed up the request.

4. Next, the client (computer) and the server (where the website is stored) establish a connection over the Transmission Control Protocol (TCP). The client sends a request to the server asking if it's open for new connections and if the server has open ports it will acknowledge the request and then finally, the client sends a last message acknowledging the server.

5. On establishing a connection, the client can request web pages over HTTP (Hypertext Transfer Protocol). So now the browser sends an HTTP request to the server asking for the website.
[This is a very simplified example to explain the basics of the process. We're assuming that a website is stored in a single place on one server. In reality, a major website like Youtube has huge buildings all over the world called data centers that are filled with servers. So when Youtube receives a request for its IP address, lots of internal routing occurs. In cases of a small personal website with less traffic, it may indeed be just one server.]

6. After the server has received the HTTP request, it analyzes the request, digs into databases & storage drives to access the information, and then builds a response in the form of HTML (Hypertext Markup Language, the basic building block of every website) or other languages like JSON and XML.
[In this example, we will stick with HTML]

Email was invented earlier than the World Wide Web

7. The server software may be written in any language ultimately trying to achieve the same result i.e. taking in an HTML template, filling in some blanks with data from a database, and then sending all of that to the client. In the case of YouTube, you get a video page, the video, comments on that video, other recommended videos, their thumbnails, and so forth.

8. After the page is built, it's sent back to the client. Note that these 2 steps are the ones that take the longest. The server takes time to process the information & build a page & then your browser takes time to download the information into your system. But the browser's job still remains. It might be HTML, Javascript, CSS along with other media like videos and images. We see a visually rendered webpage in our browser, but the server is not sending back that rendered result (in that case it takes even longer to download). Instead, these small text files like HTML and CSS are fast to download and the browser interprets them to build a webpage that you see.

9. The browser starts with HTML, drops in things like images and video. It builds the layout of the information using CSS and adds styling like fonts & colors.

Browsers have become so fast at doing this that it's a "blink and you miss" kind of situation, isn't that cool? Browsers also do other things like keeping your information secure & checking sites for viruses. It also remembers the sites you visited and keeps a copy of them in the data cache, so the next time you request those same websites they load up faster because there is less data to download.

ACCESSIBILITY

A GLIMPSE INTO THE AUTHOR'S UNIQUE EXPERIENCES WITH TECHNOLOGY DUE TO THEIR VISUAL IMPAIRMENT

AI INNOVATIONS FOR ACCESSIBILITY

INCLUSIVE DESIGNING PRACTICES

VOICE ASSISTANTS AND TEXT TO SPEECH/VICE VERSA

AN INCREASE IN INCLUSIVITY INITIATIVES BY COMPANIES AND CAREERS FOR THOSE WITH DISABILITIES

ALL INCLUSIVE(AI)

- Varun Manoj Kumar

I am a VIP! - Yes, a “Very Important Person” for my family and friends and a “Visually Impaired Person” for the rest of the world!
Technological advancement has been a game changer in my life. During my school days computers were not common, I used handheld magnifiers to see small letters in textbooks and mini telescopes to see blackboards.
Life is much easier now. With the help of my computer, I can easily zoom in and out to navigate information more efficiently. I use applications that confirm my spellings. I run my devices in dark mode to make it easier for my eyes to read.

Artificial Intelligence (AI) for Accessibility

Artificial Intelligence is ever increasing in popularity in today’s day and age. AI revolutionizes accessibility by making inclusive experiences that can improve the lives of People with Disabilities (PwD).
Today technology rules our everyday lives but people with different disabilities mostly cannot use them properly (estimated 15% of the population). Accessible technology is designed to meet the needs of all different users.

The Advancements in AI have contributed heavily to the advancements in Accessibility and Assistive technology. Tools like Voice Assistants, Text to Speech (TTS), Speech to Text (STT), Text translation, Computer Vision have opened newer and easier ways for People with Disabilities to manage their daily activities.

Inclusive Design - Design for 3% ~ Solve for 97% at the same time

When we design user-experiences with accessibility in mind, it often leads to a better user experience not just for PwD but all users.
For example,

- Providing ALT text to images on the web, makes images accessible to a broader audience, and benefits search engine optimizers as websites with Informative ALT text are ranked higher in search results.
- Videos with closed captions help people who are deaf or hard of hearing enjoy the same content as others, and assist other users enjoy the same content in a noisy environment like a restaurant or a pub.
- When an application has sufficient contrast between the foreground and the background, it not only makes it easier for people who have low vision to use the app, but it also makes the application useful in a sunny environment.

Voice Assistance

AI has also empowered Voice Assistants like the Google Assistant, Amazon Alexa which help in automating various repeated tasks like turning on the Lights, opening the door, etc when arriving at the residence. People with various forms of disabilities can just talk

in natural language to the assistants to perform the desired task. I have an Amazon Echo at my home, and I use it to ask frequent questions like the time, date, listen to news etc. I have set up my college timetable and use it to manage my daily routine. I also use it for asking the spelling of new words. Since I cannot read story books, I prefer to listen to audiobooks. I really enjoy the convenience of asking my Echo to automate and perform various daily functions by just using my voice.

Text to Speech (TTS) and Speech to Text (STT)

A combination of Text to Speech Services (TTS) and Speech to text (STT) has made my daily tasks easier.

With the help of Speech to Text, I can dictate text, issue commands freely by just using my voice to control my phone. Rather than typing messages, I prefer to use the dictation feature present on all my devices to draft my documents and emails.

On the other hand, Text to Speech helps me listen to the text read aloud. Tools like Screen Readers such as Talkback on android, NVDA (Non Visual Desktop Access), JAWS (Job Access With Speech) on Windows, Voice Over on Apple Products make it easier for a 'VIP' to operate smartphones and computers independently.

Cloud Computing

Tech Giants have invested heavily in making user experiences inclusive for all. Apps like the Seeing AI (Microsoft), Lookout Assisted vision (Google) aim to convert the Visual world into an Audible world for people with Low Vision or Blind. These apps bring together the power of cloud computing and AI.

Careers & Employment Opportunities

Today, technological advances have improved accessibility and usability, and this has helped PwDs enter and thrive in the workplace.

Based on a study persons with disabilities in the workplace, Artificial Intelligence helped tap talent of people with disabilities and reach their potential. The report included that inclusive companies outperformed others and reported 28% higher revenue, double the net income and 30% higher profit margins. So, for companies that hire and support employees with disabilities, it is not just a matter of corporate social responsibility, it is also good business.

All major technology companies are now accelerating disability inclusion and are seeing both tangible and intangible benefits of hiring disabled people. And it is heartening to see that many people from the PwD community can achieve their goals and are placed in their dream jobs.

AI powered technology has opened new opportunities for People with Disabilities and as AI continues to grow, it will give rise to innovative solutions making the world more inclusive.

So, both 'AI's are equally important for the PWD community.

We need "Artificial Intelligence(AI)" to help become "All Inclusive(AI) !"

Braille is also important for digital accessibility — people who can read Braille may use a refreshable Braille display to read and navigate the web.

WHAT IS BLOCKCHAIN TECHNOLOGY?

EXPLORING THE MEANING OF BLOCKCHAIN USING ANALOGIES

WAYS IN WHICH BLOCKCHAIN CAN BE USED FOR FINANCIAL SERVICE AUTOMATION AND IN VOTING SYSTEMS

SMART CONTRACTS AND DE-FI

BLOCKCHAIN DEVELOPMENT LANGUAGES

AUTONOMY WITH BLOCKCHAIN

- Sarthak Mirji

Blockchain is a rare gem, a treasure that lies in plain sight. Being a relatively new technology, there are still several misconceptions about it, especially with regards to its efficiency. In simple words, blockchain is a system of recording information in a way that makes it difficult or impossible to change, hack, or cheat the system. Even though there are billions of people on the internet, only about 0.5% of them use blockchain in some form or the other. So what makes blockchain special and why is it crucial in contemporary society?

Blockchain is essentially a digital ledger of transactions that are duplicated and shared across various computer systems connected to the blockchain. Think of it like a permanent browser history where you can see a record of all your browser actions. Imagine each action in the browser history as a block with a unique serial number, where each new block is made to link up to an older one, thus forming a chain. The link is only possible because the new block contains the old block's serial number.

Let's say that you wanted to alter the recorded action in a certain block with some other website URL. Making the change (very difficult) would also result in a change in the serial number of that block. The next block connected to the altered block would not link up to it anymore, as it contains the old serial number of the now altered block.

Although making changes is tedious as it takes at least 10 minutes to change the linking serial number of a cube.

A peer-to-peer, real-time network is blockchain's underlying principle. Using Google docs as an analogy, when we create a document that has other people as editors, the document is shared among all in real-time (changes are visible to everyone as they occur). This concept creates a decentralized chain where everyone has live access to it, facilitating transparency.

Blockchain can be used to protect data in many ways. For example, voting systems can be made secure because governments/ running parties will not be able to cheat the system easily, unless they decide to exhaust tons of money and time (in altering the content, timestamps and hash codes in each block they want to change) into obtaining control of at least 51% copies of the network to get their tampered copy approved as the

new majority copy, thus changing the approved chain. Blockchain, along with smart contracts, finds use in the financial and insurance services sectors to streamline and automate systems such as international exchange, clearing and repayment, customer banking, loaning, settlement, and more. Blockchain's faster and undeniable information transactions help to reduce deception and misuse. Smart contracts are a trending application of blockchain technology, as mentioned earlier. It is a self-executing contract with the terms of the arrangement between the parties being directly composed into lines of code. The code and the arrangements contained in the contract exist across a dispersed, decentralized blockchain network. The code controls the execution, and exchanges are identifiable and irreversible.

Another application is DeFi (decentralized money), whose aim is to reduce transaction time and eliminate middlemen (e.g. banks). Here people hold their money (cryptocurrency) in secure digital wallets and can transact as long as they have an internet connection. A DeFi user can be a lender and borrower and can earn/pay interest directly from/to the other party, though there are several other things that users can do.

For those who may be interested in blockchain development, if you're one of the people who use programming languages like C++, Java, Python, or Solidity, then blockchain will easily fit into your forte. If Blockchain development piques your interest, these coding languages will be worth learning. If you're not familiar with the ones above or do not prefer them, but are still interested, you will find various other options in online courses, blogs, etc.

Starting out as something that was confused with bitcoin, blockchain has come a long way in the tech market. Blockchain technology is becoming the foundation of various innovations that aim to replace centralized processes and things (e.g. money, web browsing) with communities that allow each person to solely control what is rightfully theirs.

A blockchain can be hacked, that is one misconception I thought wasn't true. Hackable? yes, but a blockchain is most vulnerable to a breach when it first comes online. So be careful.

WHAT IS METAVERSE?

DISCUSSING THE USE OF AUGMENTED, EXTENDED, VIRTUAL AND MIXED REALITY IN THE CREATION AND EXPERIENCE OF METAVERSE

CONTEMPLATING HOW THE GLOBAL ECONOMY WILL WORK IN THE METAVERSE

HOW AI AND IOE WILL BE USED TO CREATE USER AVATARS AND SHAPE USER EXPERIENCE IN THE METAVERSE

PRESENT DAY CHALLENGES THAT METAVERSE CREATORS WILL HAVE TO OVERCOME

CAN WE REALLY CREATE THE METAVERSE?

- Mohd. Arsalan Ghogari

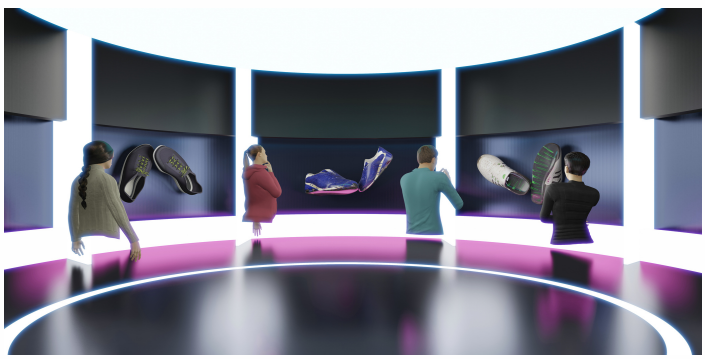
Metaverse. It is a concept some of us tech-savvy Twitter users have grown to love and some to despise. But what is the "Metaverse"? How is it being created? What technologies will it use? How will different present-day technologies be interwoven to bring us the Metaverse? Does the Metaverse mean the end for "human life"? Read on to find out.

The Metaverse is a largely abstract concept, that is, it hasn't been completely defined yet, because it hasn't been so widely developed and used in the physical world yet. In complex terms, the Metaverse refers to a massively scaled, interactive, and interoperable real-time platform comprising an interlinked network of three-dimensional virtual worlds where people can interact, work, socialize and transact. In simpler terms, the Metaverse can be said to be an exact 3D replica of the internet. The Metaverse is neither Virtual Reality nor Augmented Reality nor Mixed Reality, but rather a fusion of all three, interspersed with Blockchain Technology, Cryptocurrency, Artificial Intelligence (AI), Internet of Things (IoT), and much more.

Extended Reality, a concept so foundational to the Metaverse, essentially refers to the reality beyond our current one. It is an umbrella term that encapsulates the 'immersive technologies' of Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR), and everything else that comes in between.

Augmented Reality (AR) is a multi-reality-merging concept that morphs digital elements and virtual objects into the real physical world. To understand the extent of AR development in the present day, we can consider the game Pokémon GO. Pokémon GO is a wildly popular mobile game that involves players catching Pokémons running loose in the real-world environment. The game makes use of AR technology to virtually place the Pokémons into our real world, by toying with the complex cameras present in our cellular devices. While the Pokémons in the game are solely digital beings, the use of AR allows us, in a sense, to bring them into our physical realm.

Virtual Reality (VR) is an entirely fictitious, fully immersive, simulated learning environment that transports users into a three-dimensional virtual world. VR uses 3D computer modeling to immerse its users into an entirely virtual world, allowing user-user interactions and user-virtual object interactions. VR is presently being used to develop video games such as Minecraft, Fortnite, Roblox, World of Warcraft, etc.



However, its role in the Metaverse is estimated to be much more inclusive, with VR essentially being quoted as the "power source" of the entire Metaverse.

Mixed Reality (MR) blends both – the physical and digital worlds – using advanced computer technology, graphics, and input systems. While MR is still in its initial stages of development, recent studies have predicted its growth will be exponential with the advent of the fully-functioning Metaverse.

Blockchain Technology is estimated to become a critical component of the full-fledged Metaverse in the future.
Blockchain has already been making waves with Non-Fungible Tokens (NFTs) and Cryptocurrencies becoming an online means for trade and investment. As the further development of the Metaverse takes place, Blockchain will become the official backbone for the virtual global economy.

Artificial Intelligence (AI), the ability of a computer or a computerized robot to perform tasks generally characteristic to "intelligent" beings, would be fundamentally essential for enhancing several metaverse experiences. AI's current use is in language processing and translation, GPS enhancement, and mapping technology improvement; combined with potential avatar creation and NPC Automation would make the Metaverse much more inclusive for everyone. Not only will AI be used to personalize a user's games, experiences, entertainment, and education, but also be used to create enhanced smart contracts when used in collaboration with blockchain.
Internet of Everything (IoE) is a system that serves as an intelligent communication between people, processes, data, and objects by creating a 'web of things. The Internet of Things (IoT), a subset of IoE, is a system that connects everything in our physical world to the Internet through sensors and devices, allowing a smooth exchange of information between them.

Today, IoT is widely used in voice-activated speakers like Alexa and Google Home with household appliances and family members, medical devices with health practitioners and patients, and more. However, in the future, IoT could play a much more instrumental role in the development of Metaverse, where it could be used to create "digital twins" of users and allow both, the user, and their digital twin, to "move" around in the physical and virtual spaces simultaneously. By allowing users a greater degree of immersion in the Metaverse, IoT could be used to enhance the user experience and increase the scope of user interactions.

The metaverse's release date is not yet decided.

While all of this seems exciting, it is safe to say that it will take years, if not decades, to "mainstream" the Metaverse. The reason? Well, it’s not that simple. The Metaverse depends on an array of expensive and cumbersome-to-use technologies which have profoundly limited its development and large-scale adoption; and unless something is done to improve customer access to the

FINTECH IN METAVERSE

DEFINING THE METAVERSE IN ITS ENTIRETY

EXPLORING THE USE OF BLOCKCHAIN TECHNOLOGY AND CRYPTOCURRENCY IN THE METAVERSE

HOW TECH GIANTS COULD USE THE METAVERSE AS A CASH COW

REVENUE GENERATION OPPORTUNITIES IN THE METAVERSE

OWNERSHIP & BUSINESS IN METAVERSE

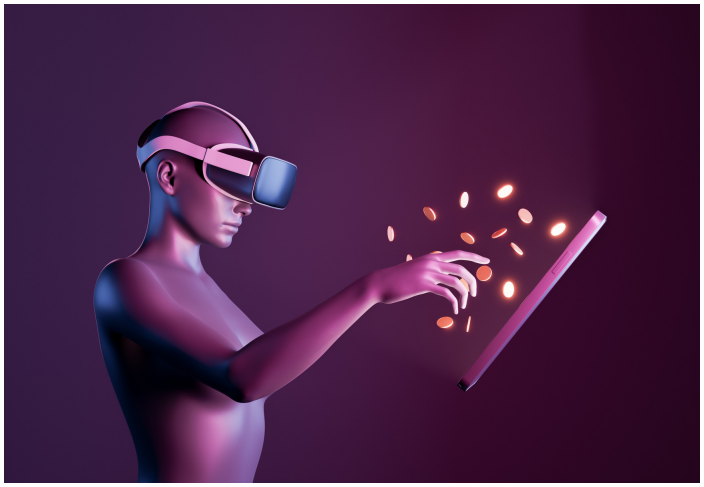
-Leonardo D'Souza

We had just about started to wrap our heads around cryptocurrency and its trade and then suddenly we are faced with a new concept yet again! The Metaverse. It is said that the metaverse is on its way to disrupting our current ways of living. And once a prototype is in place, we'll find ourselves face-to-face with the future — one we could only imagine just a few years ago.

So, what is the metaverse? The name itself is said to have been coined by sci-fi author Neal Stephenson in his 1992 novel Snow Crash, but for an executive summary, look no further than the succinct words of venture capitalist Matthew Ball from his blog series Metaverse Primer:
"The Metaverse is an expansive network of persistent, real-time rendered 3D worlds and simulations that support continuity of identity, objects, history, payments, and entitlements, and can be experienced synchronously by an effectively unlimited number of users, each with an individual sense of presence. A set of virtual spaces where you can create and explore with other people who aren't in the same physical space as you. "

You can think of the metaverse as a fanciful alternative to our physical world. Donning a virtual reality (VR) headset will give you access to virtual relationships, virtual commerce, virtual construction, and what not — all freed from the bonds of earthly physics.

Blockchain technology is one of the major elements of the metaverse. For instance, the Sandbox metaverse (a gaming project) allows users to buy and sell entities on the sandbox marketplace which are NFTs(Non-fungible tokens) exclusive to this project. One can also buy virtual lands on this metaverse and customize them according to their whims and fancies. Transactions are done using cryptocurrency. The main crypto used on this platform is one created by the creators of the Sandbox, inheriting the name SAND. It is all maintained on the eth 2.0 blockchain. Micro SAND (cheaper) is maintained on the Polygon blockchain. This is just one of the many projects where the metaverse is being implemented. The metaverse has found its use in the gaming niche as people have already played games like ROBLOX. Games like these have already instilled in one, a sense of community building virtually and it would seem natural to adopt this lifestyle as a habitat online.

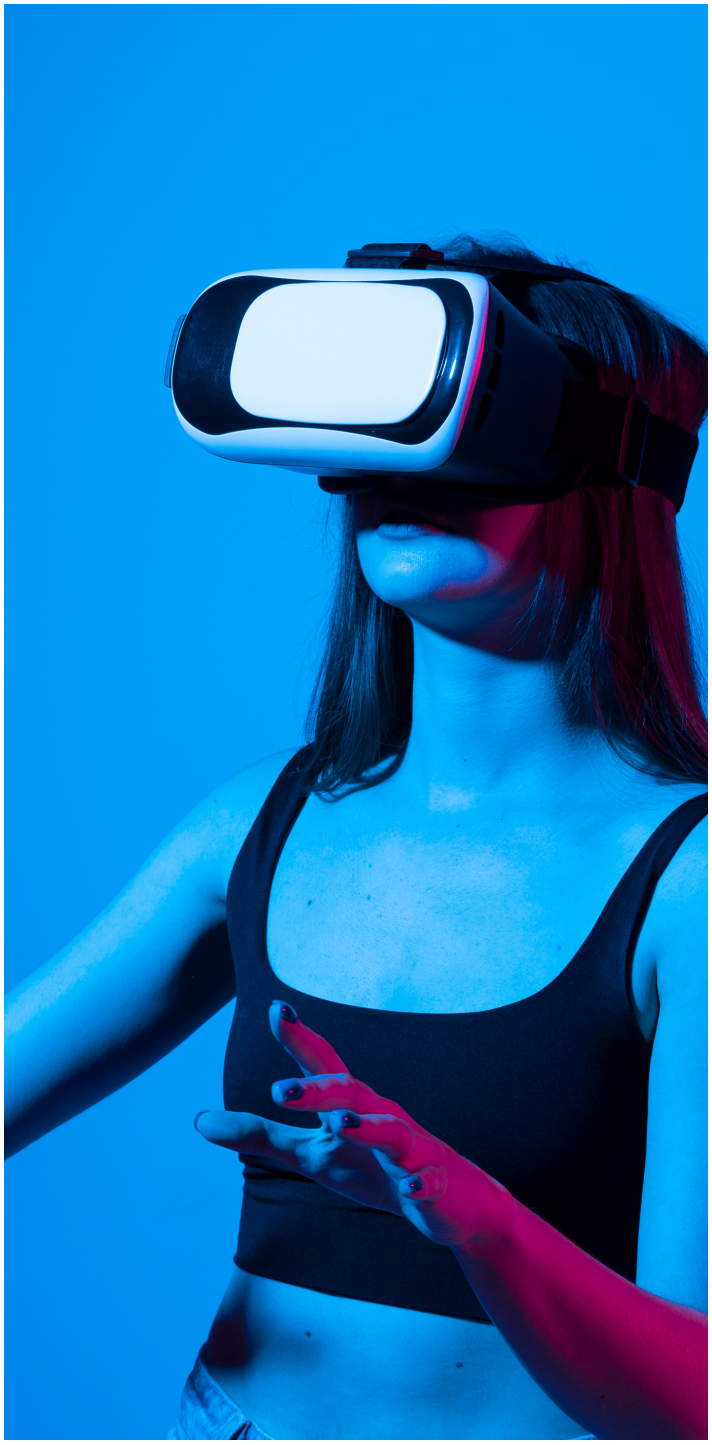


An Indian couple is getting married on Metaverse, where guests can choose outfits there itself. Gifts are accepted in the form of bitcoins!

These projects require one to use an online crypto wallet to log onto these metaverses. The practice of logging onto sites by handing out your Gmail account will become obsolete, simply put down it's giving the agency back to the user. We control our data and not MNC's. A popular wallet that can be used would be Metamask as it is instantaneous in it following its protocol and is end to end encrypted.

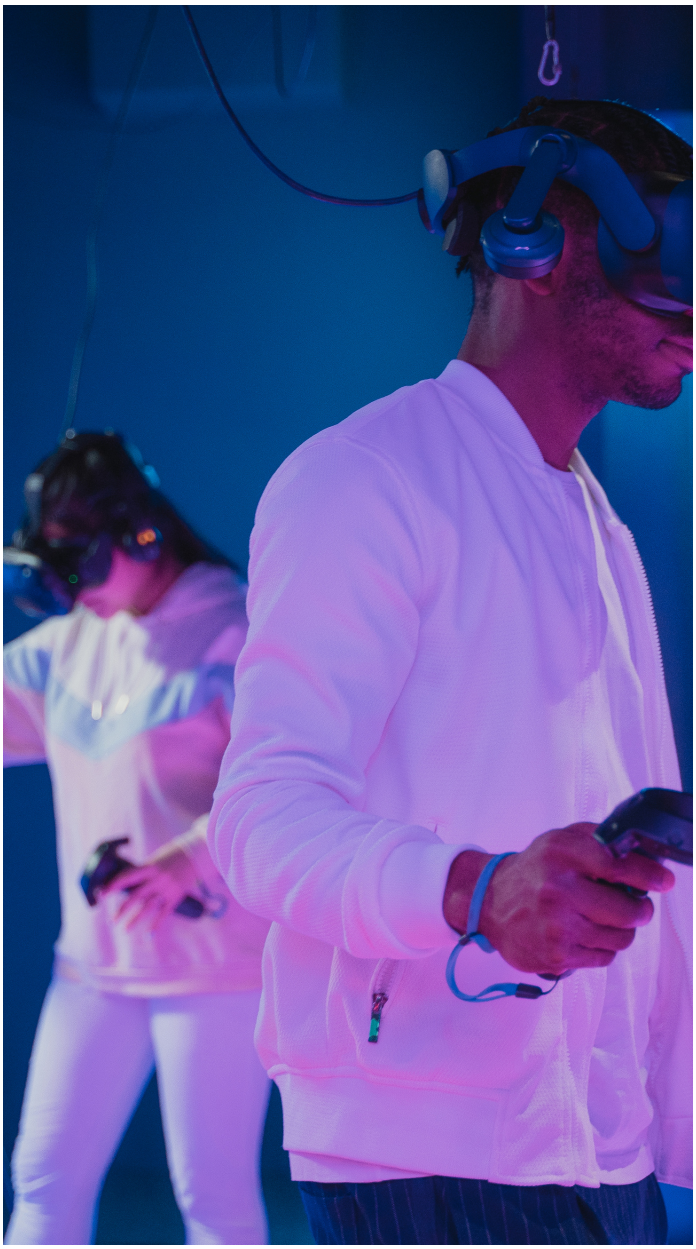
People sometimes refer to the metaverse as Web 3.0. That moniker brings the lofty promises of the metaverse back down to reality. And rightly so. For all its fanciful promises of a digital utopia, the metaverse will be powered by the same servers and networks that deliver the internet to us today. Just like the internet, you are reading this on right now, access to the metaverse will be a function of the commerce that exists between providers and consumers. Tech titans like Microsoft and Comcast can find opportunities to provide us with the services of the metaverse for a hefty fee.

The metaverse will no doubt create myriad money-making opportunities. Some of these, depending on what kind of tech provider you are, will make more sense than others. One primary market will revolve around hardware. VR goggles and high-speed data centers are just the start. Once the metaverse goes mainstream, we'll need all kinds of gear to create, consume and distribute its content. There would also be revenue-making opportunities. Tech providers will be able to open virtual shops in the metaverse where customers can purchase NFTs to pay for services, support, and other virtual goods.



The possibilities may be limitless, various technologies used, the Metaverse would be no more than a textbook concept. In addition to improving accessibility to technologies, the Metaverse would also have to work on ensuring the interoperability of digital items to secure users' rights over purchased products and enable the products' usage throughout the virtual ecosystem. The Metaverse would also require real-time data synchronization and considering how vastly complex and costly it would be to synchronize data at such a large scale, companies providing such services would have to figure out a way to withstand large volumes of load while broadcasting quality data to meet the specific needs of their users. These difficulties are just the "tip of the iceberg", and as the Metaverse develops further, more and more shall come to light.

The challenges faced by the creators and developers of the Metaverse are numerous; and until conducive conditions of its establishment are met, the Metaverse may remain much more so a dream than a reality.



CAMPUS DIARIES

"The object of education is to prepare the young to educate themselves throughout their lives"
At Xavier's, that is exactly what happens via projects, fests, exchange programs and a host of internship opportunities - all of which leads up to amazing placements and alumni!
Come explore the academic journeys of the tech geeks of our college outside of their classrooms and labs.

Contents

FOREIGN EXCHANGE PROGRAM

-Raj Mehta

My batch mate Gaurav from TYBSc.IT and I, St. Xavier's College (Autonomous), Mumbai, have completed 11 months into our year abroad at The University of Notre Dame in Ireland. Here, I take you on a whistle-stop tour of how to truly maximize your time overseas. Also, why studying abroad is a privilege that can prove to be lucrative. I've now reached that point in the semester where a little bout of reflection would serve as a well-deserved hiatus – besides the 200+ pages of reading, 2 papers, presentation, and exhibition of consulting deliverables I have due by the end of the week. Now that might sound scary, but stick with me till the end of this article.

Scholarly recognised as a 'Hidden Ivy League School:' nestled in America's Midwest, Notre Dame is a University in Disneyland. For many decades, the institution has been responsible for the fruition of some of the world's greatest ideas, establishments, and people. I've only been here 11 months; but the friendships I've made here will inevitably last a lifetime. I've never felt more inspired to become the best version of myself; to broaden my own definition of 'success' beyond the classroom, in my endeavor to personally grow and make a lasting difference to society. Notre Dame radiates excellence, as well as compassion..

Anyone that decides to study abroad will almost immediately become accustomed to this phenomenon. Initial anxiety will evolve into profuse satisfaction, once you realize that you're capable of more than what you know. I'd like to first share about an involuntary reality of studying abroad, a personal favorite of mine. India's ever-evolving COVID-19 situation was a real thorn in the flesh when it came to departure for me. Traversing the bureaucratic maze and ensuring I carefully adhered to changing guidelines felt scarily momentous. But upon reflection, the whole process unlocked a new level of independence.Trust your ability to adapt, overcome and succeed in an environment that is new to you. Don't forget, many of these skills you learn are also transferable to other walks of life that you will eventually face.

The prospect of being an outsider for the first couple of weeks was a notion I really had to wrestle with, initially. Despite this, EVERYONE I have met so far has been welcoming, all-inclusive and understanding of the difficulties faced by international students who study here.People have been nothing short of altruistic and caring. Here, I'd like to recognise the embrace I received upon arrival, and extend my love & appreciation towards my brothers at Fisher. Same goes for my friends here, who have at times, become the shoulder I have depended upon.

Studying abroad is an advantageous experience that can of course be leveraged upon to serve benefit, in future interviews for internships and graduate schemes. During your time here, choosing to engage with

A recent trip I took to Utah with some friends. Pictured is my view
at the summit of one of the USA's most dangerous climbs, Angel's Landing

a platter of endless opportunity serves you with the chance to seriously level up. Aiming to explore an academic perspective afresh, and study at a prestigious institution; nonetheless, within a few months, I was working with the Drone Response team. Overseeing the startup, funded by NASA, NSF and many other organizations, was a huge learning opportunity for me. There was one week where I had to consolidate all my research into a paper for ICCPS 2022 (Milan, Italy) and the NASA paper, I guess it is a dividend that I acquired by putting myself out there. If I can do it, you can too! Network with like- minded individuals, apply to that vacancy, expose yourself to new ideas and opportunities. Leverage yourself, aim to level up! Aside from that, the curriculum was

excellent; after only a few months, I was immersed in a world of Machine Learning, Privacy & Security, and Programming Paradigms. I found myself pushing myself to thrive in classes other than my major, Computer Science, such as Business Technology, Digital Marketing, German, and Russian.

Expect academic rigor, frequent assessment, and seemingly endless readings. You'll meet lifelong friends (Brazil, China, UK, Chile, Syria, Lebanon, South Africa and many other countries), learn about new cultures, see new places, and create timeless memories. The trying of new foods and appreciation of differing traditions and customs really makes you appreciate the intrinsic benefit of studying abroad. Honestly, it was a cultural explosion, a feeling I would never forget.

Orientation Week - Second Semester

University of Notre Dame's renowned Golden Dome, in all its glory.

MALHAR WEBSITE ACCESSIBILITY

-Varun Kumar & Chanjot Nanda

Malhar '21, our very own college festival, was held online last year for the first time. With it being held online, it was clear that a great website had to be built to facilitate all users and provide them with all information.

The Computer Department team was responsible for building and managing the Malhar 2021 Website and to make sure that we cater to all the users, we as part of the Computer team, jointly took on the responsibility of making the Website Accessible.

What is Web Accessibility?

The foundation and the basic keystone of any website is to make every information accessible to all the users irrespective of any disabilities. By making the website accessible, we ensure that all users, including people with disabilities, are easily able to access all the information on the website. For example, blind users and people with low vision use assistive technologies like Screen Readers to browse the website and we need to design the website with all these challenges in mind.

Making Our Website Accessible

Planning -

We started meeting regularly in the evenings to discuss the several tasks that were required to be undertaken so as to ensure that the website complied with the **W3C** (World Wide Web Consortium) **WCAG** (Web Content Accessibility Guidelines) accessibility standards. In the brainstorming sessions, we discussed the steps to be taken to improve the user experience for people with disabilities. We used Git (A Distributed Version Control System) along with GitHub as our medium of collaboration, hosting the code, sharing ideas and issue tracking.

Steps Taken-

- **HTML5 & ARIA :** Most web content can be made accessible by just using the correct HTML elements for the correct purpose always. Accessible Rich Internet Applications **(ARIA)** is a set of attributes added to HTML elements to improve accessibility. Semantic HTML along with ARIA is considered the building blocks of web accessibility. So, we implemented basic HTML5 tags and ARIA attributes in our website to ensure maximum accessibility.

- **Semantic Landmarks :** Semantic landmarks improve the navigation experience for people who use assistive technologies. Clear landmarks must be present to inform the users about the structure and layout of the website. Semantic landmarks and labels were added to the various regions on the pages so that the user can quickly navigate and jump around the website. Along with this, we made use of skip links which made it easier to navigate the website.

- **Alternative Text:** ALT text or Alternative Text is an invisible description of images which are read aloud to people who use screen readers to access online content. We added Alt Text to all the images on our website. For example, the events, workforce etc.

- **Interactive Elements:** The website used various interactive elements for navigation. We provided descriptive text to those interactive elements so as to provide a better and meaningful user experience.

- **Visual Indicator:** Another issue was that the interactive elements did not have a visual indicator when focused upon by the user. This made it difficult for keyboard users to navigate through the website. We tackled this issue by adding visual indicators to the focusable items so that it is easier for keyboard users to navigate and understand the various clickable elements on the website.

Accessibility Testing

We performed a series of both automated and manual tests of the website so that the final output complied with the **W3C WCAG Guidelines** for digital accessibility.

- **Lighthouse:** We used Google Chrome's Developer tool, **Lighthouse** to inspect the accessibility issues in our website. It provided a list of best practices to improve the overall user experience.

- **SortSite:** We also used SortSite, an online Website Usability and Accessibility Checker to retrieve a comprehensive list of issues and violations for the website as a whole.

- **User Testing:** Finally, the website was also tested practically with the user. We used screen readers to navigate through the website to make sure that all the information was clear and accessible.

PROJECT:
SPOTIFY DATA ANALYSIS

Have you ever considered that the user first interacts with the UI/Application and not the algorithm?

In this article, we talk about our data analysis & prediction project and in depth technologies used to deploy the same.

Data Analysis & Visualization

We used Spotify song data from 1920 to 2020 as our dataset, which included the title of the song, the artist, some song attributes, popularity, and more. Instead of delving into the processes for cleaning and processing the data, we concentrated on how to best present the results to the end-user.

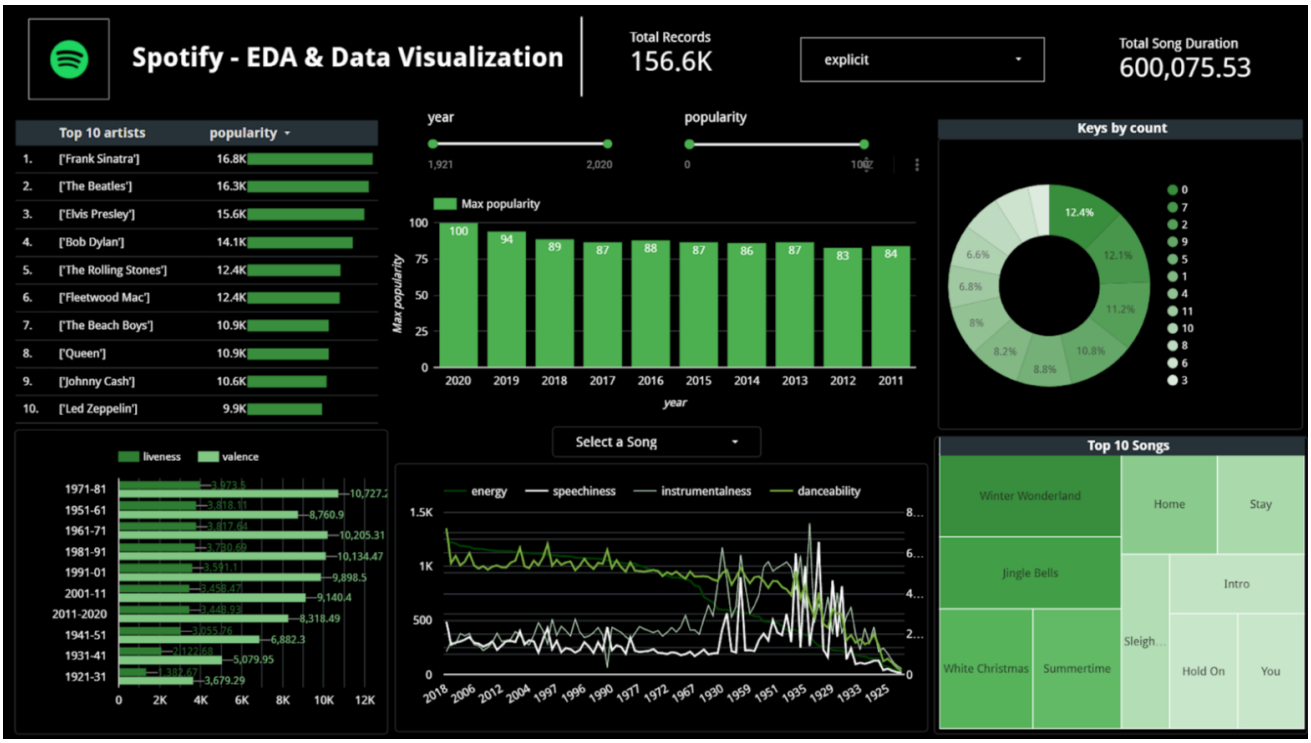
The snippet of the dashboard we created is shown which allows the most amount of information to be shared in a single view.

Insights from the visualization in the dashboard help us further in the instance of ML Prediction, which is also known as Exploratory Data Analysis (EDA).

Popularity Prediction

We require two sorts of variables to do prediction: a variable whose value we wish to predict (Target Variable) and variables utilized to predict the Target Variable's value (Predictor Variables). The popularity of the song was our target variable in this situation. We want to emphasize the necessity of deployment once more. It doesn't matter how high the accuracy of your algorithm is if the end-user finds it difficult to use.

We moved on to the deployment framework and the UI of our application when we finished our final model. Streamlit (Python framework for creating data apps quickly and with little UI design experience) was our framework of choice for developing our app.



Deployment

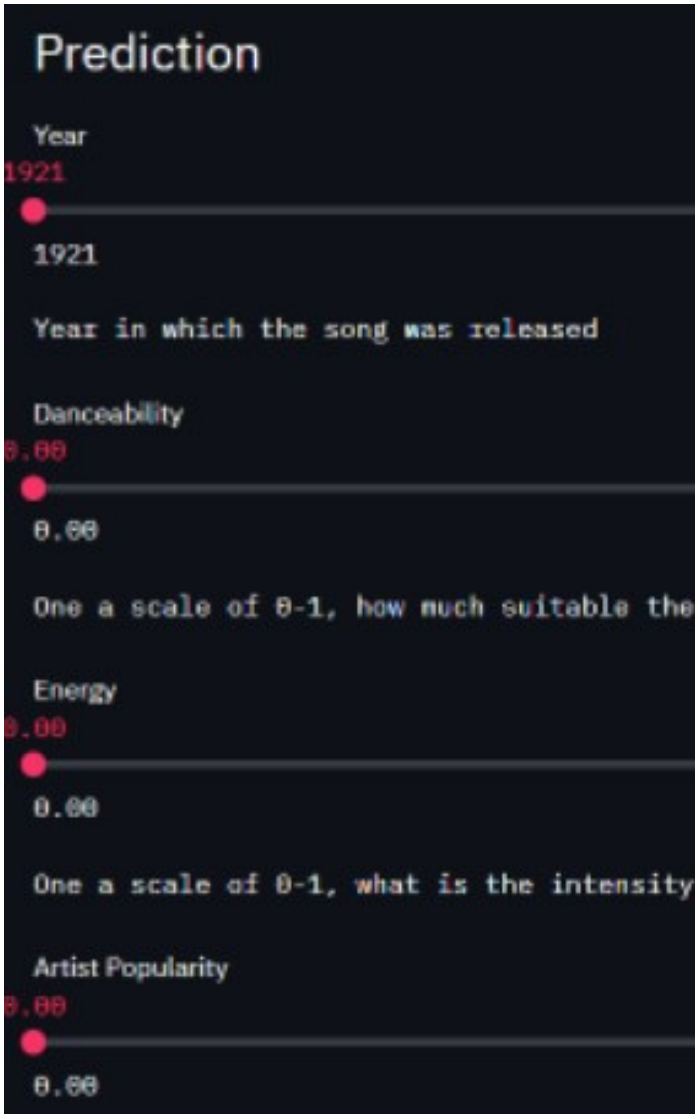
With application's model and design being completed, we can move on to the project's deployment. We have a variety of alternatives, including the following:

1. Streamlit Sharing
2. Heroku
3. AWS EC2
4. Azure VM

Services were compared based on computational speed, pricing, accessibility, storage, and error handling.

We discovered some intriguing results- the steps required to deploy the project on Heroku and Streamlit Sharing are quite straightforward, but services such as AWS and Azure require us to set up Virtual machines before we can host our applications, which is quite expensive if we host the project for a long time.

So it is important to first understand the use-case for which we are deploying the project and choose a service accordingly.



Prediction Model

Conclusion

Based on our findings, we concluded that Stremlit Sharing is a service used to deploy a model utilizing the streamlit framework for a personal project. Azure VM is for professional cases because its inexpensive.

Project Team

- Ishpreet Singh
- Rohit Kundargi
- Daniel Barreto

PROJECT:
VENTURING INTO XAVIERS

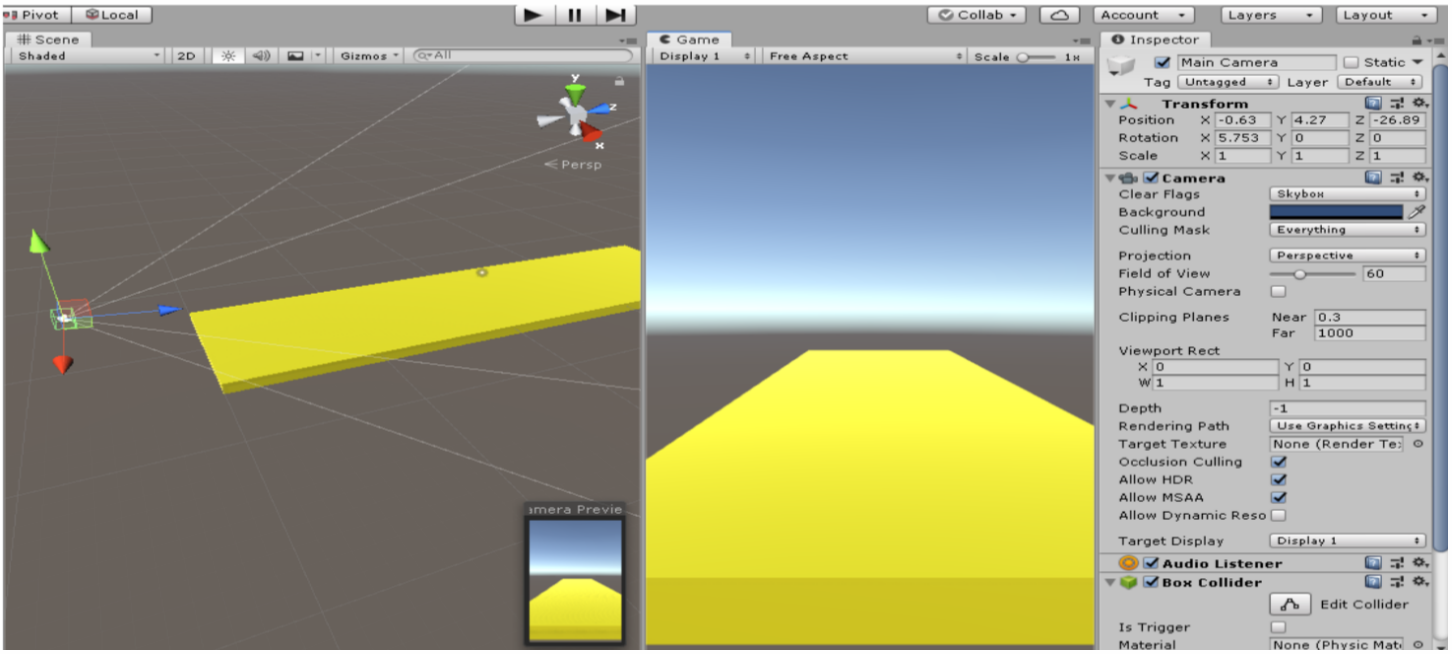
I excitedly picked up my Samsung Guru mobile, launched “Sherlock Holmes” the game and started playing it as though it was the best game ever. It was amazing, we had to go into these various rooms, pick up clues that would come into play later on in the course of the game and complete tasks… Oh! I almost forgot to mention that the game was in 2D. Anyways, that was long ago in 2011. Fast forward 8 years, and now we have “Call of Duty”, “FIFA 2018”, “PES 2018” and many more such games available on a smartphone. This is as exciting as it could get (well, at least for now), being able to play them anytime, anywhere and with anyone is practically a huge advancement in the field of Technology.

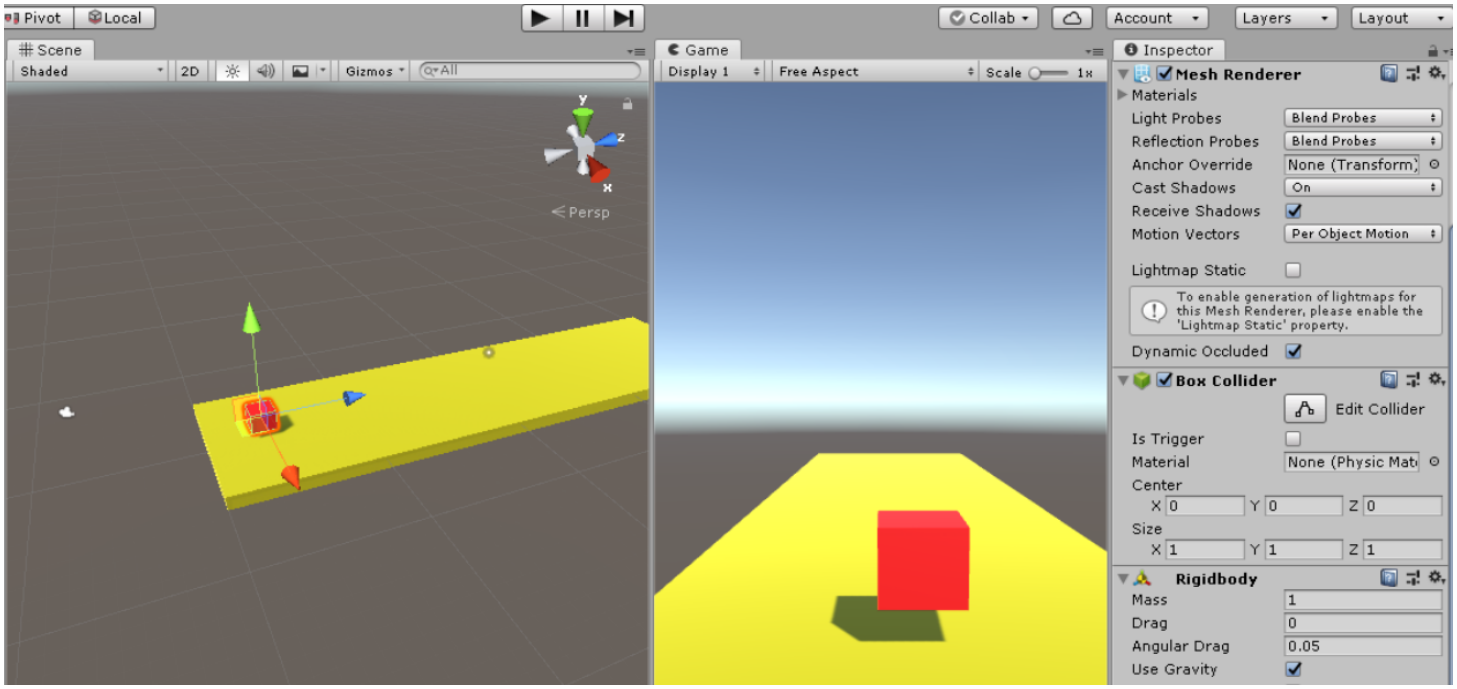
My interest in the field of Game Development emerged when we were asked to make a project for a subject called “Graphic Designing” wherein 2 of my friends (Tanmay, Jigar) and I, Raj came together to make a real-life 3D game. Given that my entire friend circle was into computer and mobile games we pretty much had an idea of what the game should look like. However, we were searching for a great idea and a great storyline for the game (which are the two building blocks of any game). So, after much deliberation and a series of brainstorming sessions we came up with the following idea: ‘What if we created an open world game wherein the map would be our own prestigious college -St. Xaviers College Mumbai’, we would have the student (our player) perform various tasks to get points. In order to acquire these points, the player would have to visit each department and then answer academic questions as per the respective department and receive points, if the answer was correct. On reaching the score limit, that player would then complete the game (yes, it does pretty much sound like a GTA rip off, however the goal was to incorporate a real-life 3D model of our college in the game along with regular college tasks).

Now that we had our idea and storyline in place, we had to start the next phase, which would include determining the software needed for bringing this abstract idea to life. After doing a lot of research and reading various types of software available for game development, we as a whole, decided to settle down on using Unity, Visual Studio (used by Unity) and Blender. Now, what are all these weird names which we have never heard before? Well, Blender is an application wherein we would design the map that was required, all the 3D models would be designed and then “transported” to Unity. What is Unity? Unity is a Game Engine that allows you to make games! It provides various tools to the developer to make their game stunning and exciting. So then, what does Visual Studio do? Visual Studio is a code editor (Integrated Development Environment or IDE) wherein we decide how our character moves, runs, jumps etc. so in essence, the entire functionality of our character or the behavior of our character would go into Visual Studio.

It is important to understand that game development isn't hard to understand nor is it rocket science. It is just "you" telling the game engine how your "player" should behave in the game. Let us take a simple example, now since we are making a 3D game, we have to understand that we will be dealing with 3 dimensions as 3D means 3 Dimensional. These dimensions would be the X, Y and Z planes.

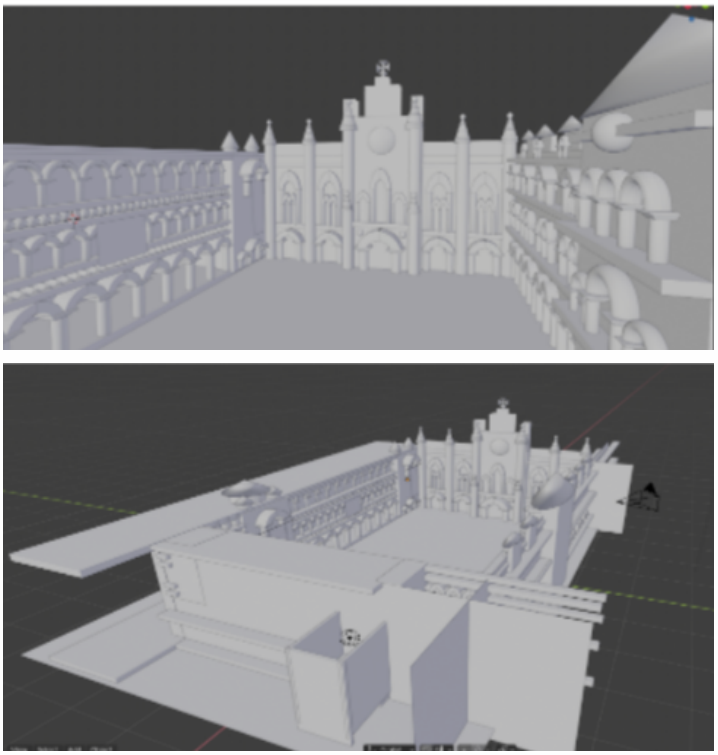
In the window on the left at the top right corner, we see the 3 dimensions in which the green signifies the Y-axis, blue signifies the Z-axis and red signifies the X-axis. At this stage we have made a simple ground for our player to move on. Notice how the camera catches everything that is specified in its given range. We can alter the camera and also change its position to fit our desire. Next, we create our player which will be another cube that should move on this ground.





As we see in the image, we have created our player that will now move on the ground. However, the player won't move automatically as soon as we hit the play button situated at the top of the two windows. Here is where Visual Studio comes into play. We then specified what our player does once the game starts with the help of codes and hence made our game.

Overall, there are loads of stuff that one can figure out and do once you set foot into game development. The game that my friends and I built is called "Xaviers Unleashed" and does contain such pieces of code for our player movement, below are a couple of screenshots of the fully functioning game along with how the entire college quad was designed in Blender. For getting the texture of the buildings of our college while designing, we used a DSLR camera to click pictures of the walls of our college and then applied that to our 3D model.



Plain 3D Modeling of the college
(using Blender)

Final Result
(After adding textures and lighting)

Project Team

- Tanmay Jain
- Jigar Kurani
- Raj Mehta

CAMPUS TO CORPORATE

-Aaron Lazarus Gomes

"Thoughts lead to feelings, Feelings to actions and Actions to RESULTS" – T. Harv Eker.

The simplest thing a human being can do is to think, conversely it is also the "hardest" thing for students to do when they are seated in the examination hall!!!

To think and have thoughts is the basic feature of any human being and they drive, motivate and convince us to achieve something and make a difference in the world today. For me, all I could think about was getting into a very reputable and globally renowned company – be it through off-campus or on-campus recruitment, the mode of how I got into a company didn't matter to me.

My journey from FYBSc.IT to TYBSc.IT was where I learnt topics that were and were not listed on the said curriculum, explored areas within the listed subjects that were not taught in class, participated in college fests and most importantly did internships. All of this hard-work finally paid off when I landed 3 job offers near the fag end of my college life, thus proving the above- mentioned quote true!

Deloitte.

I am currently employed at Deloitte as a Human Capital Analyst, so with that covered let's get into it! There were the small lessons I learnt in college that revealed itself as the base for advancing my career in the corporate world.

Situation 1 – Staffed onto a brand-new project knowing nothing about its requirements/ scope and knew only the name of the client.

Journey – Began researching about the background of the client, the most recent news and updates to their business and in due course of time I knew enough to confidently speak about the project, ask about the project requirements in detail from my Manager to gain a clear understanding of our objective et al. That made a lasting impression on my Manager who was appreciative of it.

Lesson learnt in college – You will never be provided with all the information, neither will you be told what is expected from you. My manager expected me to show up with my homework on the client, however, he wouldn't hold it against me if I didn't do it, given the fact that I am a fresher. He would have mentioned it in passing, expecting me to catch on to it and remember it going forward, but I already knew what was expected. This is due to my experience gained during internships as I had made this mistake.

Situation 2 – My manager asked me to run a point in creating the initial deck (PowerPoint presentation) to float out to various competitor companies for research purposes.

Journey – I was a person who spent a good 2 years designing and creating content through code and not PowerPoint! But I had to do what I was asked and so I learnt everything there is to know about Office 365, as I knew that would be the tool that I was going to use for a very long time.

Lesson learnt in college – One day I was coding in Objective C and learning all the great things that could be built with it. In the next semester I started learning C++ and saw how it was better than Objective C, after that I went on to Python on my own because I wanted to progress even more, then Java, then JavaScript, then ReactJS with NodeJS, then Flutter and so on and so forth. At the end of the day, you realize that the skill you NEED the most, is being a QUICK LEARNER, because today it's something and tomorrow it will be a whole different ball game and you need to adapt.

Situation 3 – I sent out a deliverable without cross checking it.

Journey – After getting done with your tasks it was then standard procedure to create a deliverable and send it out to the client. I got done with mine very quickly and sent it out, trying to make it look as though I worked really fast on it. Well, to no surprise at all, it had a calculation mistake that my manager caught and he brought it to my attention… thankfully!

Lesson learnt in college – We have to understand that we are not infallible. We need to bend a knee and say sorry while accepting our mistake. Thankfully, I got a little practice of this in college too! Whenever I was wrong, I approached the Professor and admitted my mistake and I also got reprimanded because of it. But I realized that just because you apologized and got a scolding for it, doesn't mean that you are an incompetent or a horrible person. In fact, it goes to show that you are capable of taking OWNERSHIP for all of your actions – good ones and bad ones! And that is the most important quality you can try to acquire for yourself!

The above situations are just a few instances that have shown me how my college life prepared me for a life in the corporate world. I might have not understood why the Professor made me take a presentation in class, run an errand or push me to take up an activity that put me out of my comfort zone; but all of those experiences have taught me how to handle situations today and for that I am very grateful.

To conclude, college life is the best time to find yourself and what you are cut out for. Learn and go out of your comfort zone in this phase, to understand what you like and what you dislike. By doing internships you will learn a plethora of business etiquette that you would have not learnt in college with the added realization of you seeing whether or not you can picture yourself working in that line of work for the rest of your life. Doing college fests will help you gain a ton of "soft skills" that you probably thought didn't even exist!

And now I wish you all the very best in all of your future endeavors and God Bless!

CAMPUS TO ENTREPRENEUR

An article was published in the Times of India on 10th April, 2022 titled "How some youngsters with autism work it out in Mumbai". The article mentioned how youngsters, despite their 9-5 jobs, are working as creative and artistic professionals and exhibiting their creativity. One such person is a BSc IT alumnus of our college, Nehal Tiwari.

The article read-
"Autism at the workplace was an unheard-of concept till a decade back, but youngsters in Mumbai are slowly changing this rule. Some have taken up 9-5 jobs, while many have started out as entrepreneurs who bake cookies, or paint stones or T-shirts.
Consider Nehal Tiwari, a Colaba resident with autism, who works with consulting firm E&Y, drawing an overall salary package of Rs 7.5 lakh. Once she gets back home from work, the St. Xavier's alumnus picks up her colors to paint pebbles and transform them into artful desk pieces that have emerged as one of the best-sellers at the exhibitions organized by the Forum For Autism throughout April, observed across the world as autism awareness month."

The article further continued to talk about some other millennials across Maharashtra in regards to how they started their business, what inspired them and how much profit they earn doing the same.

The article then talked about what autism is and how Mumbai celebrated World Autism Day on 2nd April, 2022 where youngsters along with their parents participated in a run, exhibitions to increase awareness etc.

"Autism is a neurodevelopmental disorder characterized by difficulties in communication and interactions. Males are four times more likely than females to suffer from autism, which roughly affects about 1 in every 100 children in India under the age of 10.
On the occasion of World Autism Awareness Day on April 2, many of these youngsters and their parents participated in a run in Kandivali. They have also been holding special exhibitions and sales drives to increase awareness that people with autism can lead meaningful and fulfilling lives. Nehal Tiwari, for instance, travels to work on her own. "On her first day to work, I was excited to hear about the data crunching work she did, and asked her the highlight of the day. She told me she was happiest when she used GPay for the first time to pay for her food ," said her mother Seema."

Placements (2020-21)

Bachelor of Science - IT

L&T Infotech

Shantanu Tripathi

Vatsal Sharma

Benjamin Thomas

Joel Jojo

Aishwarya S.

Vikram Singh Karnot

TCS

Winston Rebello

Axioned

Shirly Devasagayam

Deloitte

Jigar Kurani

Vivek Singh

Zainab Siamwala

Avil Quadras

Anmol Singhal

Infosys

Martha Chacko

MX Player

Ritika Mulani

Tanmay Jain

Montran	Accenture
Mohammed Chaudhary Noor	Ibrahim Husain Parkar

Lynk Global	TresVista Financial Services
Prasoon Anand	Ishita Bhatnagar

Avax Pro	Big Rattle Technologies
Shriya Shetty	Selva Brinda Anthony

PwC
Tejas Powar Shreya Jain

The IT Department has continued its legacy of nurturing and preparing young industry-ready professionals who have made a mark both for themselves as well for their alma mater.
Some prominent roles offered were Analyst, Data Analyst, SAP Consultant, Technology Consultant, Cloud Engineer, Application Software Engineer, Data Engineer, Operations Executive, Associate Analyst among others.

Placements (2020-21)

Master of Science - BDA

TCS

Suraj Adke

Annie Ann

Ashly Johnson

Cindy Baretto

Sean Braggs

Anushri Kale

Harshada Mahadik

Harshini Moorthy

Urmi Narsule

Sarah Stalin

Susan Thomas

Vighnesh Shinde

E&Y

Nimish Sawant

Pranjal Adlankar

Melito Salvi

Jinal Shah

Capgemini

Ishan Singh

Accenture

Bincy Thomas

IDFC First Bank
Arshee Siddiqui

Brandscapes
Harshal Phanselkar

UST GLOBAL
Albin Cherian

Mindrops
Shamine Macwan

Quantiphi
Sanchika Menezes
Sonali Chatterjee

What started as a dream three years ago has now given us some of the most promising data science professionals. Trained by industry leaders and shaped by the Xaviers legacy, we are excited to see their career trajectory!
Some prominent roles offered were Business Analyst, Data Analyst, Technology Consultant, Cloud Infrastructure Associate, Data Scientist, Assistant System Engineer , Application Software Engineer, Data Engineer, Operations Executive among others.

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From left to right: Richmond Aloj, Rovin Dsouza, Rochelle Fernandes, Prof. Lydia Fernandes, Kriti Jain, Vrinda Chandra, Pranav Jain & Malay Acharya

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