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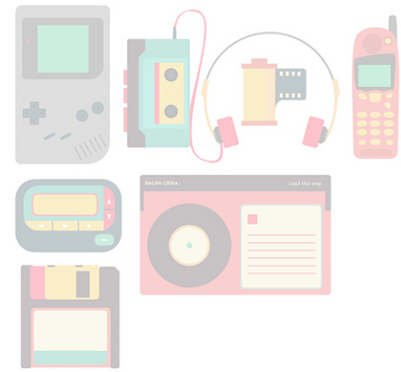
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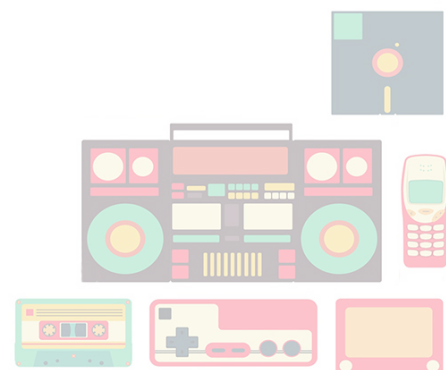
REDUX

RETRO TECH

Editor's Desk

- Padmaja Borwankar

Beginnings are a very important part of life: be it the start of a new life or a new discovery, we always love to know where we started from. This year's theme is Retro tech, which involves all those technologies from the 70s to the 90s which took world by the storm. The handheld 8 by 8 mm camera, Laser disc players, phonograph, radios and cassette tape recorders will be cherished by us forever.

You may say that retro tech is primitive but why it is important is because every once in a while it is good to look back where you came from and not be fixated on the past but learn from it. Retro tech is not only a throwback to the good old days of listening to radio or playing 'snake' on your retro mobile on a hot summer day, but it is a lesson about how we have advanced scientifically from yesterday to the present hence giving us a nudge to strive towards a brighter future.

The editors of CSI-VESIT present to you the latest edition of REDUX: Retro Tech. Right from the first method of storage, to today's unfathomable methods, we have a glimpse of the history of all the storage devices there ever were. Space research has been in talks lately. Hence we have NASA's New Horizon to India's Gaganyaan for you. We have a video game review and a gadget review as well. Talking about growth, we have the details of how the growth graphs of Microsoft as well as online shopping are eternally going through the roof. When it comes to the future, there is a vast ocean of unknown and not-yet-invented technologies that will shape the future. Some of the current baby steps for it include Blockchain, IoT, Augmented Reality and many more. Lastly, we pay tribute to the victims of the horrifying Pulwama attack.

Happy reading!

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The 'Satya' behind Microsoft's Revival

- Atharva Gupte

"If you don't jump on the new, you don't survive"

This quote by the fifty one year old CEO of Microsoft, Satya Nadella aptly describes his tenure so far as the chief executive. Satya was handed over the reigns to this huge technology empire when it faced problems like stagnant stock prices and lack of innovation in products. To put it in simpler words, Microsoft was in a tough position when Satya took over from Steve Ballmer. One of the major steps that Nadella took was shifting the entire focus to cloud computing services. They were not given much attention in the Ballmer Era. Under Steve Ballmer, Satya Nadella's predecessor, the company had put all their efforts and attentions to old products like Bing and Lumia which weren't receiving an affirmative response from the public. The 'Nadella Effect' was when Satya focused on Office 365 and Azure. Giving cloud computing a priority was a bold as well as a calculated move by Nadella. Another major change which Satya Nadella brought to Microsoft was that he replaced the competitive spirit between departments to a spirit of teamwork among all the employees. He revamped the culture of competition into a culture of learning and coexisting as colleagues. This let to people bonding rather than competing against each other, hence resulting in more productivity.

Statistics show that when Nadella took over from Ballmer, Microsoft's market cap was $302.2 billion. In January 2018, forty seven months later, the market cap increased to $681.6 billion, which is more than twice the initial market cap value. The stocks are at an all time high having risen more than 130% since 2014. From 2014 to 2018 under his leadership, Microsoft has successfully acquired Mojank in 2014 for $2.5 billion, Xamarin in 2016 for $400 to $500 million, then the biggest acquisition ever, LinkedIn in 2016 for a whooping $26.2 billion and recently in 2018, they acquired Github for $7.5 billion. Although Microsoft is doing pretty well in almost all the sectors, they are yet to create a discreet and definitive mark in the mobile phone and tablet industry. They have started taking baby steps like making Android and iOS apps available for the Windows phone. Looking at the way in which Satya is going about, the day when Microsoft will be ruling the mobile phone industry isn't too far.

A still from Satya Nadella's talk at the Microsoft News Conference at New York in 2017

Satya is not only a man having a hard-core engineering background and business acumen but also a very kind and humble person. It can be said that just when it seemed like the night was starting to close in on Microsoft's hopes of innovative products and improving sales, Satya Nadella was their knight in a shining armour who revived them on a global scale with his bold sense of judgement and calm attitude.

Growth of Online Shopping

- Padmaja Borwankar

Over the last decade, internet has changed the way people buy and sell goods and services. Online retail or e-commerce is transforming the shopping experience of customers. The sector has seen unprecedented growth especially in the last five years in India. The adoption of technology is enabling the e-commerce sector to be more reachable and efficient. Devices like smart phones, tablets and technologies like 3G, 4G, Wi-Fi and high speed broadband is helping to increase the number of online customers. Banks and other players in e-commerce ecosystem are providing a secured online platform to pay effortlessly via payment gateways.

The entry of global companies like Amazon and Alibaba has taken the competition to a new level. E-tailers are differentiating themselves by providing innovative service offerings like one-day delivery, 30-day replacement warranty, cash on delivery, cash back offers, mobile wallets, etc. Faster delivery, easier return policies, and many sites offering free shipping have all increased the desirability of online buying. Growth of online shopping has been characterized by strong consumer demands and the increasing number and type of goods available. Physical stores are moving at least part of their companies online in order to cut costs.

Throughout the world, online buying has grown exponentially. Consumers may still be concerned about the security of online shopping, but more and more of them are prepared to buy on the web. Faster delivery, easier return policies, and many sites offering free shipping have all increased the desirability of online buying. Growth of online shopping has been characterized by strong consumer demands and the increasing number and type of goods available. Physical stores are moving at least part of their companies online in order to cut costs.

In South Africa, 51 per cent of individuals with internet access shop online. In Kenya, 18-24 per cent makes online purchases. In Nigeria, approximately 28 per cent of the population has internet access. In recent years, mobile shopping has been on the rise, with customers increasingly using their mobile devices for various online shopping activities. According to a 2015 study regarding mobile shopping penetration worldwide, 46 per cent of internet users in the Asia Pacific region and 20 per cent of those in North

Top Shopping Apps in India

America had purchased products via a mobile device, whether smart phone or tablet computer.

Amazon.com is one of the most popular and well-known examples of an online shopping platform. Founded in 1995, the Seattle-based site started out as an online bookstore, but soon began expanding its product range towards other retail goods and consumer electronics. As of 2015, Amazon is the worldwide leading e-retailer, as well as the number one m-retailer globally. Some of the most popular product categories to be shopped online are electronics, fashion and apparel or home appliances.

The acceptance of the ecommerce on a large scale by the Indian people influenced other business players also to try this technique for their ebusinesses. Though online shopping has been present since 2000, it gained popularity only with deep discount model of Flipkart. In a way, it re-launched online shopping in India. Soon other portals like Amazon, Jabong, Snapdeal, Myntra etc. started hunting India for their businesses.

Several players have established their place in e-commerce market just in few years. With the rising demand of digital commerce, innovative start-ups are emerging in all segments. Home grown players are trying to compete with global players who have the advantage of scale, technology and more capital. Flipkart is the largest e-tailer in India with a valuation of about $11 billion and trying to raise funds to compete with global companies like Amazon and Alibaba. Snapdeal is another home grown player with a valuation of $5 billion.

As per an ASSOCHAM-Resurgent joint study, online shopping is expected to clock annualised growth of 115 percent this year, aided by fast-increasing data consumption and improvement in logistics, along with a number of offers presented by e-commerce platforms. In the previous year, the study noted that as many as 108 million consumers did online shopping, with mobile phones becoming the preferred choice of device for e-commerce sales.

Online shopping has its own perks. Few of them are:
Price: Price tends to be an advantage of shopping online. Because of hectic competition, prices online are lower and there are more deals and promotions available online. Retailers and online sellers know that customers have other options just a click away, and in order to stay in the game, they need to keep their prices competitive. Prices are also lower because no state tax applies in online shopping.

Convenience: Online shopping is better when it comes to convenience. One can do the shopping from home, or anywhere, and there is no need to get dressed, drive to a store, search for the item, wait in line, and then return home. By shopping online, one can remove all such additional tasks that take up time and energy. It is also more convenient because one can do it anytime of the day or night, and are not restricted

by store opening and closing hours.

Variety: People have to visit many stores, which could take days, or even weeks, to find the same variety that they can find online within an hour or two. On the internet, they can find almost anything they are looking for. The amount of items available for sale on the internet is astounding, and many of those items are not even available in traditional stores.

Discrete shopping: People may want to buy something personal or private, and they do not want anyone to know, or at least they do not want to have to come face to face with a salesperson when they purchase this particular item. They might want to buy some diet products, or a self-help book, or under garments. By ordering these types of items online, they can have them delivered to their home discreetly and need not worry about others' views and opinions.

Reviews: Another advantage of shopping online is the opportunity to read reviews from other customers who have purchased the same item or product that they consider buying. By reading reviews, they can make a more informed decision about the purchase, or save themselves from making a mistake by buying something that will most likely to be a disappointment.

Cash on Delivery: In online shopping, people might be reluctant to pay for their purchases before receiving them as such. They might worry that either the delivery might get delayed or might not get delivered at all. In order to overcome such problem, e-tailers give buyers the option of paying for the product at the time of delivering it, which is termed as 'cash on delivery'.

It goes without saying that after reading these perks, you will think twice before going to a store for buying things which require choosing from an eclectic range of products.

How to really become FIT?

- Aishwarya Sahoo

No, this isn't about our take on the weird, toxic shame where we talk about "good" food, detox and the "ideal" way to become fit. FIT, in fact, is an abbreviation used here for the three biggest social media giants — Facebook, Instagram and Twitter which have become so fundamental in today's youth culture. So, we bring to you a list of all the features that these three social media giants could add to make our journey on them smoother and smarter.

Facebook: Obviously we can get into Facebook's myriad problems here, but the biggest one is the problem of getting way too many notifications which keeps us busy and off things which might be more important in life.

Batched Notifications: Facebook sends way too many notifications. Some are downright useless. "18 friends responded to events happening tomorrow." or "Someone commented on some-page-you-follow." "I-so-don't-care!"

There are other notifications we want to see but that are neither urgent nor crucial to know about individually. Facebook should let us decide to batch notifications so we'd only get one of a certain type every 12 or 24 hours, or only when a certain number of similar ones are triggered. We would love a digest of posts to my Groups or Events from the past day rather than every time someone opens their mouth somewhere.

Notifications In The "Time Well Spent" Feature: Facebook tells us how many minutes we spent on it each day over the past week and on average, but the total time on Facebook matters less to people than how often it interrupts their life with push notifications. The "Your Time On Facebook" feature should show how many notifications of each type one has received, which ones they actually opened, and let them turn off or batch the ones they want fewer of, so that they can also enjoy our time off Facebook.

Instagram: We have seen several new Instagram features in 2018, be it the launch of nametags, using of GIFs in messaging, video chats in direct messaging, welcoming the new IGTV, emoji scale or meter, etcetera. This year's list of updates seem never ending. Here's a list of all the features that are like gold dust but haven't been fulfilled by the Instagram developers.

Web DMs: Instagram has become the new Whatsapp when it comes to sharing memes and trash-talk

about people's photos, but the biggest inconvenience is that it is all stuck in our mobile phones. For all the college students and office workers out there, this means no fun-time while being stuck in projects and presentations and algorithms on their personal computers and laptops.

Suggestions: The best feature of Pinterest is its 'See More Like This' suggestion which was eventually let go. Instagram similarly, could definitely do with such a button on our feed post which when tapped would get us a rapid influx of similar posts before the rest of the timeline continues. Imagine being in the mood of food porn, and yet what you get is a homogenous mix of fashion, selfies, pets, sunsets and boomerangs. It's easy for Instagram through its machine vision algorithm to produce a set of posts which you want to see so you don't have to work through the search, hashtags or people. This also saves your feed from getting disrupted by following new people in search of similar posts.

Quality indicator for stories and boomerangs: If we try to post a story in an awfully crummy internet connection, it turns out to be a blurred mess. Instagram should warn us, in case, we have a low signal strength against what we usually have at our homes and offices, and either recommend us to wait for a strong Wi-Fi connection, or post a lower resolution copy that is eventually replaced by high resolution copy eventually.

Twitter: The biggest update Twitter had this 2018 was increasing the word count of a tweet — doubling it from 140 to 280 for which all the Twitteratis would be forever grateful. But here's a list of things they must do to make the experience of tweeting and messaging more pleasant.

Unfollow Suggestions: All the social networks are obsessed with getting people more follows by giving us a hefty list of people we can follow. But what Twitter must have is an option of cleaning your lengthy timeline by giving us unfollow suggestions. Imagine scrolling up your timeline for two hours to only find a couple of tweets which seem needful to you. This feature can be based on the list of people whose tweets you don't like, retweet, quote or even bother to slow down to read (thus not awarding it impressions).

DM search: The absurdity of lack of this feature compels people to not use Twitter for messaging at all! Twitter doesn't even have a feature to search DMs by person, let alone keyword like Whatsapp does which is a bummer.

Analytics Benchmarks: If Twitter wants to improve conversation quality, it should teach us what exactly works. Twitter offers analytics about each of your tweets, but not in context of your other posts. Did this drive more or fewer impressions or follows than my typical tweet? That kind of information could guide users to create more compelling content.

The biggest feature all the three social networking giants can add to their kitty is by cutting off people who bring shame into the plethora of arenas they're exposed to, by not allowing them to financially profit through it – be it spreading rumors, or propagating any unhealthy or unethical practice. And that is the most ideal way to become "FIT" on any social networking!

The Future is Now

-- Atharva Gupte

An episode of Black Mirror, 'The Entire History of you' was based on interdependency between society and technology. It takes us into the future where almost every person has a GRAIN: a memory chip embedded beneath your ear which records everything you experience. The episode explores how humans are entirely dependent on technology. It will surely take us a long time to make our technology precise to a level of fiction. But innovators and designers have come up with some of the technologies that we would never even have dreamt of.

Mind to Mind Communication: If it is fiction that we are talking about, mind communication is one of the things we have only seen in a motion picture or read about in a book. But the idea of a trick that was only used by witches and wizards, to be used by humans in their busy lifestyles, is sure tempting. But there might be a hope that we might achieve something very near to it. Intensive research in the fields of neuroscience and communication fields are being carried out. As much problems as you think this would create, it will help in eradicating an individual mind. It will be a mass of minds with similar beliefs and ideals.

A team of international researchers teamed up in 2014 to demonstrate a completely non-evasive and direct way of mind to mind communication. The two subjects shared words conjured in their minds to each other when they were hundreds of miles away from each other. Other such demonstration was when minds of two subjects were to control the internet and engage in a computer game. Looking at the success of these experiments the fact that mind to mind communication without involving a third party would be possible is fascinating. Also we might also be introduced to mind controlling or as it is popularly called 'telekinesis.'

Weather control: Don't you get upset when your cricket match gets cancelled because of the rain or your plan of a perfect weekend picnic is ruined because of unpredicted showers? The idea of controlling the weather seems way too dreamy but we might be able to get a small crack into the nature's unpredictable mood. Although controlling the weather is very difficult, we are close to making it convenient for our need.

For instance, during the 2008 Summer Olympics in Beijing, Chinese authorities fired 1,100 rockets into the clouds to trigger downpours before the storms reached the capital city. There are even efforts to fire laser pulses into thunderclouds in hopes of drawing out lightning in a controlled manner.

California State however has been doing an excellent job at controlling the weather. They seed the clouds

with a certain substance to induce precipitation. We haven't perfected the art of controlling nature and nor will we come close to perfecting it but bending it slightly to our will is also very commendable.

Mind uploading: By the next eight decades we humans won't have a physical existence at large. It will be a full digital existence. Although researches haven't started yet there are talks of how we can copy our brain in a digital form. A brain is a mass of nerve tissues consisting of billions of neurons. Now, copying such a complex system into a digital form is going to be cumbersome. Imagine every single piece of information you have in your brain in the form of digital data. There are ways to handle copying of brains. One of them is destructive copying involving slicing of a brain and extracting the information. Alternatively, there are the ideas of a brain scanner where a snapshot of the brain will be taken and the information will be encoded and decoded in the form of digital data.

A scan of a person resulting in his information right from the day he was born to the present day, from his name to his weird personality quirks. This idea is a long way ahead of execution or demonstration but the day we achieve this it will be one of the greatest milestones of humanity.

Fusion Power: Earlier this year, physicists in Germany used a 2-megawatt microwave pulse to warm low density hydrogen plasma to 80 million degrees. The experiment didn't produce any energy, and it only lasted for a quarter of a second, but it was an important step forward in the effort to harness an extremely promising form of energy production known as nuclear fusion.

Unlike nuclear fission, where the nucleus of an atom is divided into smaller parts, nuclear fusion creates a single heavy nucleus from two lighter nuclei. The resulting change in mass generates a tremendous amount of energy that scientists believe can be harnessed into a viable source of clean energy. Eventually, fusion power could replace fossil fuels and conventional nuclear reactors.

But to get there, scientists will have to figure out how to reliably and safely manage conditions typically found on the sun. The problem is that fusion plasmas do not like to be contained; these free-flowing streams of protons and electrons are tough to wrangle. Our sun holds on to its plasma with its intense gravity, but here on Earth, we'd have to rely on magnets or lasers to perform the same trick. Should a tiny fraction of the plasma escape, it would scar the wall of the machine, causing the fusion reactor to shut down.

These aren't the only technologies that can be expected in the future. There are countless possibilities of inventions and innovations. Man has reached the peak of human advancement .We are making machines understand and feel emotions, building things with the help of technology that we didn't even dream about hundred years ago and we shall continue doing so because 'the future is now, old man'.

An Algorithm which rules the world

-Anupreet Bhuyar

Seismograms, Eigenmodes of Earth, the pseudo-spectral method for acoustic wave propagation… well, these are some applications of the very fundamental and inexpensive method popularly known as 'Fourier Transform'. Sounds uninteresting? What could a way to change a signal from one domain to another possibly do? Our very own Internet is born through it. Cellular phone calls and WiFi signals are primarily based on it.

When we talk about signals, right from our own hand gestures i.e. gesture, action, or sound that is used to convey information or instructions, Physics of vibrations states that force traveling from one medium to another predominantly an electromagnetic wave is how we understand signal. How significant is it to know very basic mechanism in which our most complicated and ingenious systems work? Here's a gist of an algorithm which literally rules the world!

What is it after all?
A fast Fourier transform is an algorithm that computes the discrete Fourier transform of a sequence, or its inverse. Fourier analysis converts a signal from its original domain to a representation in the frequency domain and vice versa. The key terms used here and aspects to focus on i.e. signal from original domain (time and space) to frequency domain signifies the change of representation method in which we can digitize the analog vibrations! Yes, your hand gestures can write emails for you.

What's in it for computer science?
Fast Fourier transforms are widely used for applications in engineering, science, and mathematics. The basic ideas were popularized in 1965, but some algorithms had been derived as early as 1805. In 1994, Gilbert Strang described the FFT as "the most important numerical algorithm of our lifetime", and it was included in Top 10 Algorithms of 20th Century by the IEEE journal of Computing in Science & Engineering.

The FFT is a fast, O[NlogN] algorithm to compute the Discrete Fourier Transform (DFT), which naively is an O[N2] computation. The DFT, like the more familiar continuous version of the Fourier transform, has a forward and inverse form which is defined as follows:

Forward Discrete Fourier Transform (DFT):
Xk=∑n=0N−1xn.e−i 2π k n / N

Inverse Discrete Fourier Transform (IDFT):
xn=1N∑k=0N−1Xkei 2π k n / N

Complicated? That's right!
Basically, the transformation from xn→Xk is a translation from configuration space to frequency space, and can be very useful in both exploring the power spectrum of a signal, and also transforming certain

problems for more efficient computation.

Let's dive in!

The Fourier Transform is one of deepest insights ever made. Unfortunately, the meaning is buried within
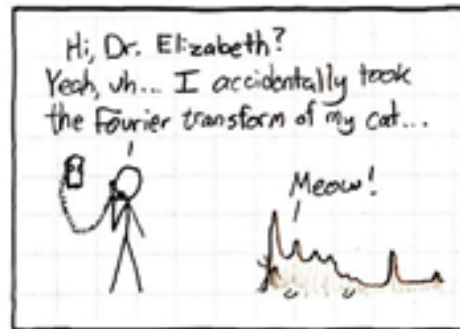
dense equations. Rather than jumping into the symbols, let's experience the key idea firsthand. Here's a plain-English metaphor:

What does the Fourier Transform do? Given a smoothie, it finds the recipe.

How? Run the smoothie through filters to extract each ingredient.

Why? Recipes are easier to analyse, compare, and modify than the smoothie itself.

How do we get the smoothie back? Blend the ingredients.

Here's the "math English" version of the above:

The Fourier Transform takes a time-based pattern, measures every possible cycle, and returns the overall "cycle recipe" (the amplitude, offset, & rotation speed for every cycle that was found).

Time for the equations? No! Let's get our hands dirty and experience how any pattern can be built with cycles, with live simulations. If all goes well, we'll have a Eureka moment and intuitively realize why the Fourier Transform is possible.

From Smoothie To Recipe

A math transformation is a change of perspective. We change our notion of quantity from "single items" (lines in the sand, tally system) to "groups of 10" (decimal) depending on what we're counting. Scoring a game? Tally it up. Multiplying? Decimals, please.

The Fourier Transform changes our perspective from consumer to producer, turning 'What do I have?' into 'How was it made?' In other words: given a smoothie, let's find the recipe. Why? Well, recipes are great descriptions of drinks. You would not share a drop-by-drop analysis, you would say "I had an orange/banana smoothie". A recipe is more easily categorized, compared, and modified than the object itself. So, given a smoothie, how do we find the recipe?

Fourier transform analogy smoothie to recipe

Well, imagine you had a few filters lying around:

- Pour through the "banana" filter. 1 oz of bananas are extracted.
- Pour through the "orange" filter. 2 oz of oranges.
- Pour through the "milk" filter. 3 oz of milk.
- Pour through the "water" filter. 3 oz of water.

We can reverse-engineer the recipe by filtering each ingredient. The catch?
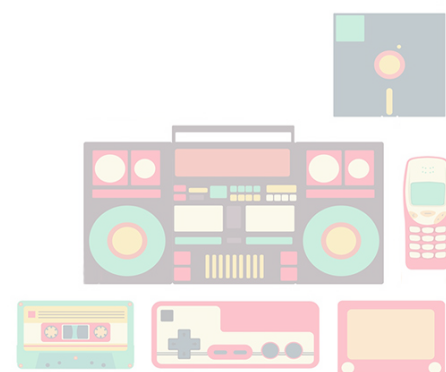
Filters must be independent. The banana filter needs to capture bananas, and nothing else. Adding more oranges should never affect the banana reading.

Filters must be complete. We won't get the real recipe if we leave out a filter (for example: "There were mangoes too!"). Our collection of filters must catch every possible ingredient.

Ingredients must be combine-able. Smoothies can be separated and re-combined without issue (A cookie? Not so much. Who wants crumbs?). The ingredients, when separated and combined in any order, must make the same result.

See The World As Cycles

The Fourier Transform takes a specific viewpoint: What if any signal could be filtered into a bunch of circular paths? This concept is mind-blowing and despite decades of debate in the math community, we expect students to internalize the idea without issue. Let's walk through the intuition. The Fourier Transform finds the recipe for a signal, like our smoothie process:

Start with a time-based signal

Apply filters to measure each possible "circular ingredient"

Collect the full recipe, listing the amount of each "circular ingredient"

Stop. Here's where most tutorials excitedly throw engineering applications at your face. Don't get scared. Think of the examples like "Wow, we're finally seeing the source code (DNA) behind previously confusing ideas".

- If earthquake vibrations can be separated into "ingredients" (vibrations of different speeds & amplitudes), buildings can be designed to avoid interacting with the strongest ones.

- If sound waves can be separated into ingredients (bass and treble frequencies), we can boost the parts we care about, and hide the ones we don't. The crackle of random noise can be removed. Maybe similar "sound recipes" can be compared (music recognition services compare recipes, not the raw audio clips).

- If computer data can be represented with oscillating patterns, perhaps the least-important ones can be ignored. This "lossy compression" can drastically shrink file sizes (and why JPEG and MP3 files are much smaller than raw .bmp or .wav files).

- If a radio wave is our signal, we can use filters to listen to a particular channel. In the smoothie world, imagine each person paid attention to a different ingredient: Adam looks for apples, Bob looks for bananas, and Charlie gets mangoes and so on.

The Fourier Transform is useful in engineering, sure, but it's a metaphor about the finding the root causes behind an observed effect.

Happy understanding the algorithm!

Marvel's Spiderman: Game Review

- Atharva Gupte

What started as an 11 page comic book, grew to be a worldwide phenomenon. The web shooting superhero has come a long way. Adding to the joy of Spiderman fans it has now become a part of the PS4 franchise as well. Marvel's Spider-Man is an action-adventure game developed by Insomniac Games and published by Sony Interactive Entertainment for the PlayStation 4, based on the Marvel Comics superhero Spider-Man. Released worldwide on September 7, 2018, it was the first licensed game developed by Insomniac and it has taken the worldwide comic book fans and gamers by storm. The article has mild spoilers about the game, hence this is a fair warning to all!

One of the many things which I liked about this game is that it doesn't start from square one, in this game the story developers have cut out the Aunt May and orphaned Peter Parker arc completely hence it gives a more fresh look to the game. This particular element is delightful as the world has already been introduced to the young Peter Parker in many films and animated series and the storylines involving his teenage years would have been repetitive and mundane.

The game starts eight years after Spiderman became a superhero so he is no more a high school going chap, but instead, is a proper established superhero taking out superheroes with gained mastery over his combat and tactical skills. Another highlight of this game is nothing other than good old New York City. As Spiderman we have to get our way to defeating villains and bosses and stopping heists, robberies and assaults by swinging our way through Manhattan buildings. It is a very apt adaptation of the comics showing that Peter Parker and New York City come as a pair. There are many side achievements or goals like going to the back of various New York City alleys to retrieve his high school backpacks, clicking pictures with fellow citizens, listening to the radio, people forming their opinion by reading the 'The Daily Bugle' which puts the players into Spiderman's shoes and lets them actually feel the New York City spirit and heroic feeling of being Spiderman.

The game starts off as a solid action packed combat with the Kingpin's thugs and the final fight comes down to the Kingpin (Wilson Fisk) and Spiderman. The fall of Wilson Fisk leads to the rise of many other gangs of New York. One of the main villains of the 'Marvel's Spiderman' is Mister Negative who has his own gang of mask-wearing henchmen called Demons. The game takes us deep into the Spiderman universe with characters like Black Cat , Aunt May, Yuri Watanabe and Mary Jane. On the other hand the villains include Kingpin (Wilson Fisk), Mister Negative, Norman Osborn, Silver Sable and Sinister Six (Rhino ,Electro ,Scorpion ,Vulture ,Doctor Octopus and Black Cat)

The game is well balanced, it is not only a series of mere action and combat sequences but there are also key characters who add a personal and real touch to the story line.

Combat in the game is not just limited to knocking out the opponent thug or boss but it also includes dodging the attacks with the help of his spider sense. All incoming attacks and spider sense detecting them

is shown by a web on Spidey's head which gives a warning about attacks. If you are thinking that Marvel's Spiderman is only about pressing the square button and knocking out opponents by counter attacks, well you are partially right but the real fun lies in improvising your combat skills by using web grenades, tying up enemies and many such moves which get unlocked as you make progress in the game. One of the other side activities is doing the hard-core technical stuff. Peter is now a scientist hence we also get to be a part of his "other job" which is researching with Dr. Octavius and trying to make the world a better place.

The game is not at all a waste of money or time. It does not involve any micro purchases which is yet another of the many pros. It's a classic blockbuster cinema type game where a superhero tries to balance his life obligations and heroic duties at the same time.

For ISRO, sky's the limit

- Aishwarya Sahoo

For India's space programme, 2018 has been a remarkably challenging, yet ultimately a successful year. Indian Space Research Organization (ISRO) completed its Fourth Orbit-Raising Manoeuvre of GSAT-7A, and also announced Gaganyaan project. So, when we say sky's the limit for ISRO, we literally mean it!

The ISRO has completed the fourth manoeuvre to position the GSAT-7A military communication satellite closer to its final position on 19th December, 2018. The satellite is now very close to its final position in the geostationary orbit, which is located at an altitude of 35,786 km from Earth. The satellite is currently between 35,800 and 36,092 kilometres away, and will be moved in a final orbital manoeuvre to its final position, ISRO said in a statement.

ISRO has built and used the propulsion system, or thrusters, on GSAT-7A to perform four such manoeuvres so far. GSAT-7A is ISRO's 35th communication satellite built exclusively for the Indian Air Force (IAF) and the Indian Army. ISRO's 2.25-ton GSAT-7A is designed to work in the Ku-band frequency and houses a powerful 'I-2K' bus, which functions as the satellite's communication hub or service module. The satellite will expand the communication capabilities of the IAF in different ways.

First, GSAT-7A will allow cross-connectivity between different ground radar stations, airbases and airborne early warning and control (AWACS) aircraft like the Beriev A-50 Phalcon. It is also expected to give a big push to drone operations in the Indian military by helping the Navy reduce its reliance on ground-based control stations and switch to satellite-controlled unmanned aerial vehicles (UAVs), that offer better range and endurance. It will also boost the air force's network-dependent warfare capabilities, enhancing its abilities to operate globally.
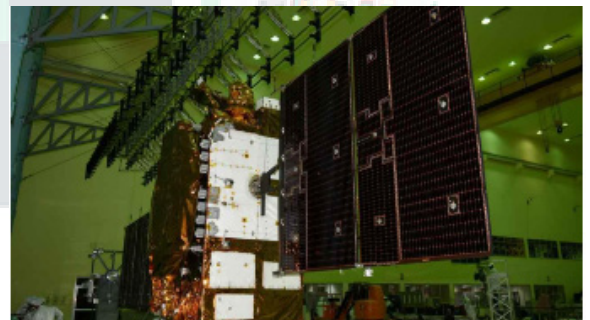
The military communications satellite GSAT-7A with its solar panel opened up. Image courtesy: ISRO

Gaganyaan Project

Perhaps, the most strategically significant event this year was the Independence Day announcement by Prime Minister Narendra Modi about the Gaganyaan Project. In a boost to India's aerospace missions, the Cabinet approved the indigenous spacecraft project called Gaganyaan under which a three-member crew will be sent to space for at least seven days, Union Minister Ravi Shankar Prasad said. The testing phase is expected to begin from December 2020 and the mission will be undertaken from 2022, he added.

The historic mission is expected to have a crew capacity of three astronauts and is supposed to operate for at least a week. The total cost of the project is reported to be Rs. 10,000 crores and the mission, if successful, will ensure India's addition to the club of three countries that have sent a manned mission to the outer space.

"The astronauts will be inside a crew module which will be attached to a services module to maintain services for them, and then onto an orbital module. The orbital module will be placed on the launch vehicle for the launch," ISRO chairman K Sivan had earlier said. "The launch will take place within 16 minutes, the crew will be transported from Sriharikota to a low earth orbit of 400 km. They will stay in orbit for 5-7 days."

The rocket will take the modules to the low-earth orbit (300-400 km) where they will perform micro-gravity and other scientific experiments for a week. The orbital module will reorient itself. The crew and service module will get separated at 120 km altitude. The crew module will reduce the speed by applying aero brake and parachutes will open just before the splashdown in the Arabian Sea. The return journey will take approximately 36 minutes. The module can also land in the Bay of Bengal as a backup. The crew members will be jointly selected by the IAF and ISRO. The crew members would be trained for two-three years. ISRO had started preparations for the project way back in 2004. Gaganyaan will also reportedly provide employment to around 15,000 people.

To conclude, it is safe to say that ISRO's technical capability is unquestionable. All it needs is to increase engagement with the private sector and expand its launch capacity. It must incorporate innovations of 3D printing in building rocket engines, electric propulsion, reusable launch technology, in-orbit refueling, exploit cloud computing, software designed networks and artificial intelligence when processing, storing and distributing Earth observation data. With the fulfillment of all its goals, we all can say proudly say that the limit of sky is reached, and the goal's horizon can be broadened even further.

GSLV Mk III Lift Off.

Interstellar Speedboats – the Farthest Probes in Space

- Abhiruchi Bhattacharya

As NASA's New Horizons probe kick-starts an exciting year for space exploration by completing a successful fly-by of distant Kuiper belt object 'Ultima Thule', it is worth remembering that New Horizons will be only the fifth space probe leaving the solar system.

The Pioneer program was a series of American unmanned missions designed for planetary exploration. The mission consisted of a total of seventeen probes launched throughout the late twentieth century, the most notable out of which were Pioneer 10 and Pioneer 11 – the first two artificial objects that gained enough speed to exit the solar system. In the 1960s, NASA's Jet Propulsion Laboratory decided to launch two probes to the outer Solar System as practice for their 'Planetary Grand Tour' – these eventually became Pioneer 10 and 11. Pioneer 10 completed the first mission to the planet Jupiter, studying its environment, solar wind, cosmic rays as well as the boundary of the solar system in its extended mission. Pioneer 11 followed up on its older sister's research with studying the asteroid belt and Jupiter, and became the first probe to encounter Saturn. Both probes became derelict, however, as they lost power and now travel through space alone (at an estimated 120 and 100 astronomical units respectively), each bearing a golden plaque depicting information about us humans, the creators of the probe and its origin, should any aliens find them someday and wonder where these came from.

In contrast to these, the Voyager mission tells a fascinating story of robust design and efficient programming – the best proof of which lies in the fact that both probes (Voyager 1 and 2) are still active today, over forty-one years since launch, and are regularly contacted by the Deep Space Network to receive commands and transmit data. Voyager 1 became the first man-made object to enter interstellar space on August 25, 2012, and Voyager 2 followed suit on November 5, 2018. Voyager 1 has gained a distance of about 145 astronomical units between itself and the Earth as of

January 2019 – just to put that number in scale, one AU is roughly the distance between the Sun and the Earth, which is 150 million kilometres or roughly 1.3 billion football fields.
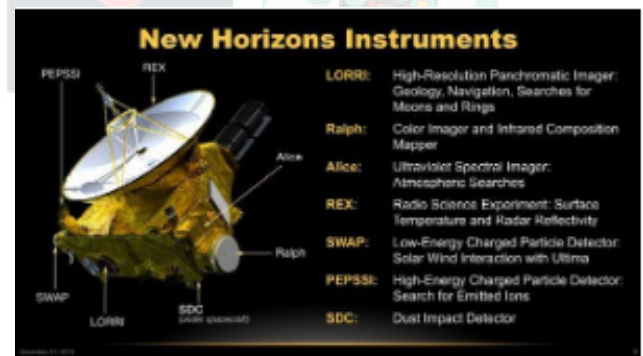
Voyager 1's objectives included flybys of Jupiter, Saturn, and Saturn's largest moon, Titan. Voyager 2 continued on to Uranus and Neptune. The Voyagers now explore the outer boundary of the heliosphere in interstellar space and they continue to transmit useful scientific data as part of their extended mission. Out of the eleven scientific modules on-board Voyager 1, four systems are still active, whereas two are defective and the rest have been disabled to conserve power. The Voyager 1 probe boasts a lavish 64 kilobyte

digital tape recorder, whose memory has to be overwritten when transferring fresh commands from Earth (yeah, how much was your phone's memory again?). The Voyager machines are capable of executing about 81,000 instructions per second. Just for context, the Intel 8086, released in 1978, has a general performance of 0.33 million instructions per second. The Voyagers transmit their data back to Earth at 160 bits per second. Radio wave signals from Voyager 1 take over 19 hours to reach Earth. Remember that, the next time you find yourself complaining about your internet connection!

The longevity of the Voyager mission can be attributed to a neat concept in robust design known as redundancy – the good old-fashioned notion of "if it's important, carry two of 'em". There are three different computer types on the Voyager spacecraft, two of each kind, to act as back-up if any one of them fails. The Computer Command System (CCS), the central controller of the spacecraft, contains fixed computer programs such as command decoding, fault-detection and correction routines, antenna pointing routines etc. The two CCS modules are often used both at the same time to increase the processing capability of the spacecraft. The Flight Data System (FDS) handles telemetry data formatting and transmission, and the Attitude and Articulation Control System (AACS) handles the orientation of the spacecraft and attitude control (something we all should have a little more of in our lives). The spacecrafts' original software was written in Fortran 5 (later ported to Fortran 77 and some parts to C).

A fascinating anecdote comes from the engineers' testimonials, from when the probe was built – apparently, as engineer Suzanne Dodd explained in a WIRED article, the original designers were told not to worry about reaching interstellar space and focus on making sure the Voyagers could observe Jupiter and Saturn. Instead, they ignored those directions (as true-blooded engineers!) and did what they wanted to make it capable of getting to interstellar space. In a further testament to the robustness of Voyager 1, the Voyager team completed a successful test of the spacecraft's thrusters in late 2017. It still works, people!
The Voyagers are expected to continue to transmit data till around 2025, when their generators are finally expected to give out. Both probes also carry plaques from humanity, like the Pioneers, for potential little-green-men colonies in space – the famed Golden Records contain a range of scientific information along with photos and sounds of Earth, music and spoken greetings from its people. These records are expected to be playable forever, unless the probe is smashed by debris or gets close enough to a star so as to melt them. Both probes received several speed-boosts due to gravity assists during their mission and zoom along at 17 km/s and 15 km/s respectively. The New Horizons probe, though launched faster than any other probe on Earth, now chugs along at 14 km/s – and so will never overtake the Voyagers as long as their paths continue as planned.

New Horizons definitely has major hardware and software upgrades, as compared to its predecessors. The spacecraft carries two dual-redundant computer systems: the Command and Data Handling system and the Guidance and Control processor (hence a total of four computers, two of each kind). The processor used for its flight computers is the Mongoose-V, a radiation-hardened version of the MIPS R3000 CPU executing up to a much faster 10 Million RISC Instructions per Second (MIPS). The software of the probe runs on Nucleus RTOS operating system, written in C by Mentor Graphics, a Siemens business. Data storage is done on two low-power solid-state recorders (one primary, one backup) holding up to 8 gigabytes each. The science payload contains seven instruments adorably named Ralph, Alice, REX, LORRI, SWAP, PEPSSI and the Student Dust Counter. Unlike the Pioneer and Voyager probes, New Horizons has no

plaque or record indicating its origins for extra-terrestrial life to find; Principal Investigator Alan Stern rejected the idea as they wanted to focus more on realising the project's lofty goals instead.

The New Horizons probe's primary mission is to perform a flyby study of the Pluto system which it completed in early 2015. A secondary mission is to fly by and study one or more other Kuiper belt objects (KBOs) in the decade to follow – which it completed as well, beaming back the first images of 'Ultima Thule' on January 1. Over the next two years at about 1,000 bits per second, the probe will send all of its data back to Earth. After this, it will continue to study the Kuiper Belt, the band of ice and rocks that makes up the third zone of the solar system, until at least April 2021 when its current mission funding ends. Another fly-by of a KBO may also be on the cards. The New Horizons mission is expected to last till the mid-2030s. If the spacecraft is still functional after 2038, it will follow in the Voyagers' footsteps into interstellar space and explore the outer heliosphere.

There's definitely something inspiring about these interstellar speedboats – the results of the very pinnacle of engineering and human effort, that act as messages in bottles flung out into the sea of stars from inhabitants on the surface of a pale blue dot.

Cryptocurrency and Blockchain

- Padmaja Borwankar

Today cryptocurrencies have become a global phenomenon known to most people. While still somehow geeky and not understood by most people, banks, governments and many companies are aware of its importance.

Few people know, but cryptocurrencies emerged as a side product of another invention. Satoshi Nakamoto, the inventor of Bitcoin, the first and still the most important cryptocurrency, never intended to invent a currency. In his announcement of Bitcoin in late 2008, Satoshi said he developed "A Peer-to-Peer Electronic Cash System." His goal was to invent something; many people failed to create before digital cash. The single most important part of Satoshi's invention was that he found a way to build a decentralized digital cash system. In the nineties, there have been many attempts to create digital money, but they all failed. "… after more than a decade of failed Trusted Third Party based systems (Digicash, etc), they see it as a lost cause. I hope they can make the distinction, that this is the first time I know of that we're trying a non-trust based system." – Satoshi Nakamoto in an E-Mail to Dustin Trammell.

The blockchain is a decentralized ledger of all transactions across a peer-to-peer network. Using this technology, participants can confirm transactions without a need for a central clearing authority. Potential applications can include fund transfers, settling trades, voting and many other issues.

The blockchain is a simple yet ingenious way of passing information from A to B in a fully automated and safe manner. One party to a transaction initiates the process by creating a block. This block is verified by thousands, perhaps millions of computers distributed around the net. The verified block is added to a chain, which is stored across the net, creating not just a unique record, but a unique record with a unique history. Falsifying a single record would mean falsifying the entire chain in millions of instances. That is virtually impossible. Bitcoin uses this model for monetary transactions, but it can be deployed in many others ways.
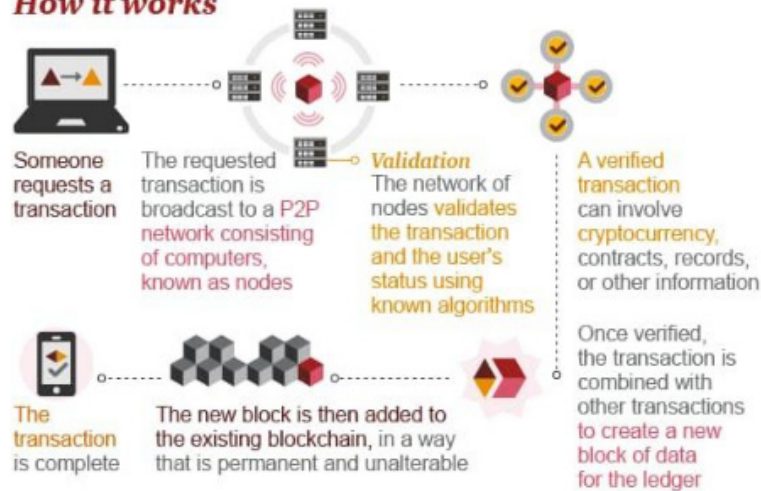
Blockchain is, quite simply, a digital, decentralized ledger that keeps a record of all transactions that take place across a peer-to-peer network. The major innovation is that the technology allows market participants to transfer assets across the internet without the need for a centralized third party.

From a business perspective, it's helpful to think of blockchain technology as a type of next-generation business process improvement software. Collaborative technology, such as blockchain, promises the ability to improve the business processes that occur between companies, radically lowering the "cost of trust." For this reason, it may offer significantly higher returns for each investment dollar spent than most traditional internal investments.

The blockchain public ledger technology (which underlies cryptocurrency) has the potential to disrupt a wide variety of transactions, in addition to the traditional payments system. These include stocks, bonds

and other financial assets for which records are stored digitally and for which currently there is a need for a trusted third party to provide verification of the transaction.

How it works

Someone requests a transaction

The requested transaction is broadcast to a P2P network consisting of computers, known as nodes

Validation The network of nodes validates the transaction and the user's status using known algorithms

A verified transaction can involve cryptocurrency, contracts, records, or other information

Once verified, the transaction is combined with other transactions to create a new block of data for the ledger

The transaction is complete

The new block is then added to the existing blockchain, in a way that is permanent and unalterable

The transaction is known almost immediately by the whole network. But only after a specific amount of time it gets confirmed. Confirmation is a critical concept in cryptocurrencies. As long as a transaction is unconfirmed, it is pending and can be forged. When a transaction is confirmed, it is set in stone. It is no longer forgeable, it can't be reversed, it is part of an immutable record of historical transactions: of the so-called blockchain.

Only miners can confirm transactions. This is their job in a cryptocurrency-network. They take transactions, stamp them as legit and spread them in the network. After a transaction is confirmed by a miner, every node has to add it to its database. It has become part of the blockchain. For this job, the miners get rewarded with a token of the cryptocurrency, for example with Bitcoins.

Even recent entrants like Uber and AirBnB are threatened by blockchain technology. All you need to do is encode the transactional information for a car ride or an overnight stay, and again you have a perfectly safe way that disrupts the business model of the companies which have just begun to challenge the traditional economy. We are not just cutting out the fee-processing middle man, we are also eliminating the need for the match-making platform.

The three main properties of the Blockchain Technology which has helped it gain widespread acclaim are as follows:

Pillar #1: Decentralization

You have a centralized entity which stored all the data and you have to interact solely with this entity to get whatever information you required. Another example of a centralized system is banks. They store all your money, and the only way that you can pay someone is by going through the bank.

Now, centralized systems have several vulnerabilities:

- Firstly, because they are centralized, all the data is stored in one spot. This makes them easy target spots for potential hackers.

- If the centralized system were to go through a software upgrade, it would halt the entire system

In a decentralized system, the information is not stored by one single entity. In fact, everyone in the network owns the information. In a decentralized network, if you wanted to interact with your friend then you can do so directly without going through a third party.

Pillar #2: Transparency
One of the most interesting and misunderstood concepts in the blockchain technology is "transparency." Some people say that blockchain gives you privacy while some say that it is transparent. Why do you think that happens? A person's identity is hidden via complex cryptography and represented only by their public address. So, if you were to look up a person's transaction history, you will not see "Bob sent 1 BTC" instead you will see "1MF1bhsFLkBzzz9vpFYEmvwT2TbyCt7NZJ sent 1 BTC".
So, while the person's real identity is secure, you will still see all the transactions that were done by their public address. This level of transparency has never existed before within a financial system.

Pillar #3: Immutability
Immutability, in the context of the blockchain, means that once something has been entered into the blockchain, it cannot be tampered with. The reason why the blockchain gets this property is that of cryptographic hash function. The transactions are taken as an input and run through a hashing algorithm (bitcoin uses SHA-256) which gives an output of a fixed length.

Right from asset management, insurance, payments to your cars, smartphones and even passports, blockchain has a variety of applications. The more you explore, the more you understand its complex nature. It is indeed the mother of all chains!

Nearly Perfect: Samsung Galaxy S10+

- Atharva Gupte

With the tenth anniversary of the world famous S series by Samsung which started in June 2010 the expectations for something different were very high. Fortunately, Samsung did not disappoint us, well, not completely. Samsung Galaxy S10+ is powered by the latest Qualcomm Snapdragon 855 chipset ripping on eight blades, Infinity-O display, and ultrasonic display scanner.

The display on the Galaxy S10+ is a 6.4-inch Super Dynamic AMOLED and is also the biggest screen on an S-flagship till date, also bigger than the 5.8-inch Galaxy S9+. The Galaxy Note 9 gets a 6.4-inch display. The display on the Galaxy S10+ is also better than the Galaxy S9+, more colour, and more blackness in the display of the Galaxy S10+. The display is a design marvel considering Samsung has found a way to pack in more pixels then last time and has managed to keep the bezels on the top and bottom, smaller than before as well. The rest of the design is pretty much the conventional Galaxy S8 which is a slab of glass with a curved display, similar to the Galaxy S10+.

Battery
Samsung has put in a beefy 4,100 mAh battery on the S10+ which is a new high. The last flagship smartphone to come with this type of battery capacity from Samsung was the Galaxy Note 9 which came with a 4,000 mAh battery. The Galaxy S9+ featured a 3,500mAh unit.

Camera
The Samsung Galaxy S10+ gets a triple-camera setup on the rear which comprises of a 12-megapixel unit, a 12-megapixel optical zoom telephoto lens, and an all-new 16-megapixel ultra-wide lens.

Samsung has put in this Screen Optimizer option which we saw in the Galaxy Note 9. This time Samsung has placed in 10 new categories which now tell the AI the difference between as simple as a cat and a dog or the difference between an apple and an orange to sharpen up the settings.

Performance
The Samsung Galaxy S10+ operates on the latest version of the Google operating system, Android 9.0 Pie with Samsung's One UI on top. Looking at the One UI, we are absolutely not missing the TouchWiz UI. The One UI is much sorted with very less bloat ware except Samsung's suite of apps which are system level apps and apps like the Galaxy Wearable, Smart Things, Voice Recorder and such. These are not bloat ware, but apps we need daily. Samsung also pre-installed Microsoft apps. Three of them are Office Mobile, OneDrive, and LinkedIn. You can disable these apps according to your requirement.

Coming to the display, the Galaxy S10+ gets the world's first HDR10+ display, which means watching those 4K HDR movies are a treat. The notification bar is another cool feature which is a blacked out stripe which comes on while playing videos. It looks a little weird initially, but then it just does not distract any-more. The videos play a little off-centre, but we got past it.

The gaming performance is decent on the Galaxy S10+. Of course the Galaxy S10+ packs in the best hard-ware - Exynos 9820 8nm octa-core chipset which comprises of - two cores of 2.73 GHz Mongoose M4, two cores of 2.31 GHz Cortex-A75 and four cores of 1.95 GHz Cortex-A55. The chipset is paired to a Mali-G76 MP12 GPU. The setup is paired to 8GB of RAM and 128GB of internal storage. The storage is expandable up to 512GB via microSD.

To sum up the review, here are the pros and the cons:

Pros:
- Super AMO-LED screen
- In display fingerprint sensor
- Wireless Powershare
- Long lasting battery

Cons:
- Huge Price Hike
- Bixby Button
- The huge screen combined with all glass back makes it slippery

The Galaxy S10+ in India starts at a hefty Rs. 73,900 which is more expensive than the Galaxy Note 9 which launched at Rs. 67,900. But those who buy the S10+, they are in for a whole world of gizmo trickery and wizardry. If you are one of them, get ready to blaze!

Internet of Things or Internet of Threats?

- Aishwarya Sahoo

"Alexa, tell the truth . . ."

The Internet of Things is the amalgamation of computing devices and automated systems with everyday objects, consequently, allowing communication between them. By combining these connected devices with automated systems, it is possible to gather information, analyze it and create an action, to help someone with a particular task, or learn from a process. The vast array of products range from smart mirrors to digital agriculture system to smart toasters!

Sidelining the extraneous and bizarre IoT products like a smart toaster and talking mirrors, let us shift our focus to devices involved in the home automation system. Security was one of the major reasons why IoT stemmed up to be a complete game changer in the technology field. Burglar alarms managed to revolutionize the entire home security system as any unusual activity could be caught with your mobile and a simple IoT device. A simple Passive Infrared Sensor fit in the home security system worked by measuring the IR light radiated by the objects. The device turned out to be a major breakthrough in the IoT zone, which was soon followed by a cluster of innovative devices making life easier for this slothful modern era.
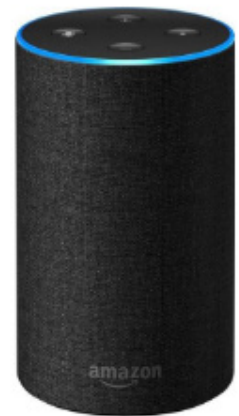
Although popular among elites and techno-savvies, the quantum leap in the direction of the popularity of IoT was in November 2014 with the advent of a dominating voice of a female (of course) — Alexa. Amazon Alexa is a virtual assistant, designed and heavily marketed by the Amazon developers. It was first used in the Amazon Echo, and later on used in several smart devices, created especially for the lazy youth. She became very popular throughout these three years span, making 'Alexa' common in all the millions of funny and sarcastic posts on Twitter.

Until recently, of course.
Alexa went on to become many people's worst nightmare from an enchanting daydream. A recent case involved a woman in Portland, Oregon finding out that her Amazon's Alexa, had recorded a conversation between her and her husband without their permission or awareness, and sent the audio recording to a random person on their contacts list. Since then, there have been numerous cases which not only included common users, but also big companies who run on these devices.

It is now clear that Internet of Things devices (like the router) are often vulnerable to attacks and hacking, the industry-wide lack of investment in security leaving the door open to a host of abuses. A big issue that causes this problem is that the user doesn't know what codes the device is running actually — it's all proprietary to an unknown black box.

One of the biggest reasons why 'Internet of Things' is transitioning to 'Internet of Threats' is because of the malicious UPnP proxy schemes. A UPnP basically helps a device on a network to find another device, and essentially helps the devices to introduce to each other. Chad Seaman describes the UPnP problem, "When IoT devices expose too many of these mechanisms to the open internet without requiring authentication—or when credential checks are easily guessable or can be brute forced—attackers can then scan for devices that have implemented a few of these protocols badly all in one device, and then exploit this series of manufacturer missteps to launch an attack." Some attacks are simply crafted by the attackers because of the poor implementation by the developers of the devices. Dave Aitel addressing this problem correctly criticised that "It falls under the 'WTF were they thinking' category."

It is important to face these problems posed by the Internet of Things devices before it's too late. First of all, awareness should be raised to ultimately reduce the number of vulnerable devices in the market. After that, the manufacturers' priority should shift to security to reduce the vulnerability.

All the tech developers must enhance their set of standards and protocols. It may include the development of more advanced asymmetric cryptography techniques to add an additional security layer to the information which might go public since open data transmission is magnetic to these opportunistic hackers. Lastly, all the technophiles should come together to prevent this harrowing transition of IoT to 'Internet of Threats' instead of waiting for a major IoT crisis to come up or else a time will come very soon when we all would have to say, "Goodbye, Alexa."

A History of Computation's Greatest Limiter – Storage Media

- Ashutosh Matai

Since the very beginning of mankind's consciousness, there has existed a need to store information. What the primitive man saw, he needed to store down on walls of caves. That gave birth to the first form of physical storage. As mankind's understanding and intellect grew, the need to store information more effectively also grew. After all, there were only so many caves we could paint upon. With evolution, advancement in understanding and a better grasp of awareness of his surroundings, man developed skills and tools. (Note: skills and tools are the basic requirements to achieving new technology) The caveman no longer existed. Humans started carving into rock, started making hieroglyphs and statues and different symbolic languages like Mayan text and Runes. That was the birth of the first written language.

A few thousand years later, through better understanding of processing of plants and natural dyes, mankind stumbled upon a new form of data storage: Papyrus and ink. The world as we knew changed- this was perhaps the biggest invention of all time, perhaps even bigger than that of the wheel! Raw papyrus evolved into scrolls, scrolls evolved into sheets and upon binding those sheets together with a thread- lo and behold! We now had books. After over tens of thousands of years of achieving sentience, maybe even hundreds of thousand years, we finally had a definite physical method of storing large amounts of information. Ever since then, we sort of stagnated.

There wasn't any medium to replace our primary information storage until the 1920's, when significant advancement in science and technology gave birth to the Magnetic Tape. The 1930's saw the use of the Magnetic Drum, 1940's saw the Cathode Ray Tube and 1950's saw the first hard disk. Since the primary storage medium of information was now changing, the resource that we would now need was no longer trees, but magnetic materials. All that we saw in the next few decades- Floppies, cassettes, CDs and DVDs, all of them would require magnetic material. The floppies were a flat, asymmetrical object that contained

a thin circular magnetic disk within and would usually be written only once. Cassettes were troublesome to rewrite on, but were hugely popular as an alternative to the vinyl records. CDs and DVDs were by far, the peak of this technology and their relatives, the magnetic hard disk, are still used quite commonly in this day and age.

Magnetic strip-based storage was not only a more space-saving method, but also a faster one. One could write and retrieve data much faster. Well, faster than carving on a rock or scrubbing your ink-dipped feather on rough papyrus anyway.

We were almost about to stagnate again when we discovered another amazing substance to use as a resource for data storage- Silicon. The use of Silicon and Silicon alloy chips enabled us to store higher amounts of data on the smallest devices we'd ever seen! Look at where we are now- Thousands of books can now rest upon your finger-tip in the form of a microSD card. Computing became much faster! One could now boot up a heavy OS such as Windows 10 in a matter of seconds. What's more, we have also unlocked Theoretical Martian Landing! With the discovery of NAND flash, further improvements in Silicon storage are at the horizon.

Did you know that modern processors can only be developed with a maximum operating frequency of 5GHz. And this frequency has been the maximum limit since the early 2000's! In order to even touch speeds as much as 6GHz, we would need to achieve significant breakthroughs in some other technology. But the big question that arises for us now is what's next? Is that the smallest that we can go? Can you, as a reader, suggest a viable way to store more data on an even smaller object? (Sure, Nanotechnology sounds like a good idea, but we're still at least 20 years away from beginning to implement that for data storage)

The solution that comes to mind is simple- DNA. Since 2012, scientists have been able to store data onto a strand of DNA with minimal error. Since we have many error reduction techniques now, it has also become possible for us to store data onto DNA with 99.99% to 100% accuracy. In fact, it is now possible for us to store upto 215000 Terabytes of data per gram of DNA. The only current drawback is that is costs $7000 to encode 2 megabytes of data and $2000 to retrieve it. What is a good thing for us though, is that so long as life exists on earth, we can store data on DNA. It is the most space-effective and viable form of information storage that we have seen yet, and with enough research and development, we will be able to invent better tools and obtain better skills to turn this method into reality. It is truly a wonder that we can store all this information onto such a common resource.
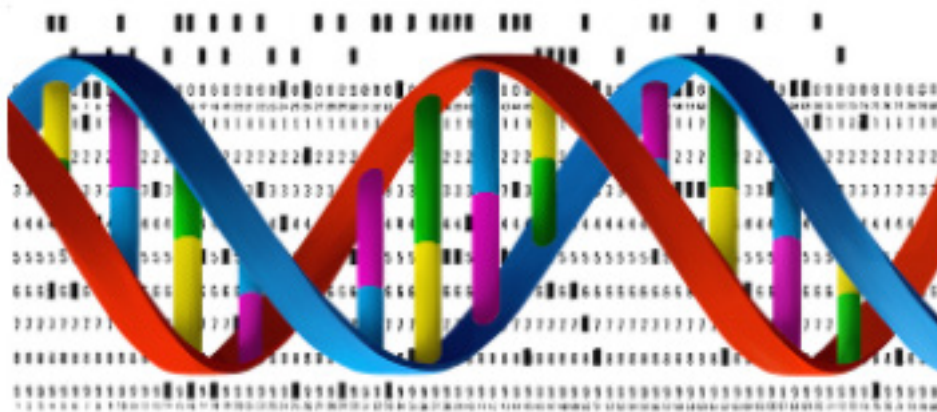
Scientists and tech companies have been working on holographic data storage for at least a decade. In 2011, GE demonstrated its holographic discs storage: DVD-sized disks that could store 500GB thanks to cramming the data onto layers of tiny holograms. These discs also had a relatively long lifespan prediction of 30 or more years. Not much has been said about the Holographic Virtual Disc (HVD) lately, though, and one of the biggest developers of the holographic drives. That doesn't mean the technology won't be a prominent storage technology in the future (what says "future" more than "holographic" anyway?).

Another future trend maybe quantum storage. Scientists are currently investigating ways to store data using quantum physics-e.g., a bit of data attached to the spin of an electron. Right now this technology can only store tiny amounts of data for a very short amount of time (not even a day yet), but if it works and takes off, we could see instant data syncing between two points anywhere, thanks to quantum entanglement.

These are just a few of the data storage methods that have been fathomed. Some have lasted for generations while some are yet to take birth. However, no one will deny that the best form of storage, that has survived all the tests of time, is definitely the human brain. It has a tremendous capacity to store not just to store ordinary data but also intelligence and emotions. After all, all the above mentioned storage methods have come out of this single idiot box i.e. our brain!

Augmented Reality: Already a reality

Tina Chandwani

Science fiction both predicts the future and influences the scientists and technologists who work to bring that future about. To take a common example, mobile phones are essentially real-life versions of the hand-held communicators wielded by Captain Kirk and his crewmates in the original series of "Star Trek". If companies ranging from giants like Microsoft and Google to newcomers like Magic Leap and Meta have their way, the next thing to leap from fiction to fact will be augmented reality (AR).

Augmented reality has been an interesting topic in software development circles for a number of years, but it's getting renewed focus and attention with the release of products like Google Glass. Augmented reality is a technology that works on computer vision based recognition algorithms to augment sound, video, graphics and other sensor based inputs on real world objects using the camera of your device. It is a good way to render real world information and present it in an interactive way so that virtual elements become part of the real world.

Augmented reality is a view of the real, physical world in which elements are enhanced by computer-generated input. These inputs may range from sound to video, to graphics to GPS overlays and more. The first conception of augmented reality occurred in a novel by Frank L Baum written in 1901 in which a set of electronic glasses mapped data onto people; it was called a "character marker". Today, augmented reality is a real thing and not a science-fiction concept.

With each step forward in the digital revolution, "The Matrix" becomes less like fiction and more like reality. That's in part because hardware engineers and software developers continue to refine their augmented reality technologies, making the line between real and virtual life thinner. Augmented reality is the blending of interactive digital elements – like dazzling visual overlays, buzzy haptic feedback, or other sensory projections – into our real-world environments. If you experienced the hubbub of Pokemon Go, you witnessed augmented reality in action. This (once incredibly popular) mobile game allowed users to view the

A person playing the famous Pokemon Go

Google SkyMap giving information about constellations
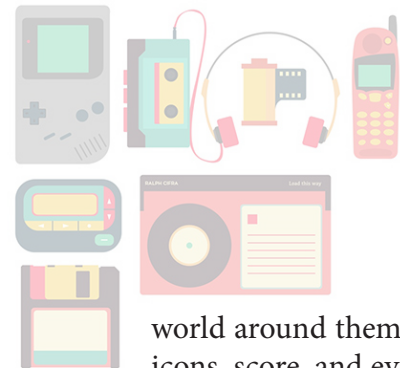
world around them through their smartphone cameras while projecting game items, including onscreen icons, score, and ever-elusive Pokemon creatures, as overlays that made them seem as if those items were right in your real-life neighborhood. The game's design was so immersive that it sent millions of kids and adults walking through their real-world backyards in search of virtual prizes.

Google SkyMap is another well-known AR app. It overlays information about constellations, planets and more as you point the camera of your smartphone or tablet toward the heavens. Wikitude is an app that looks up information about a landmark or object by your simply pointing at it using your smartphone's camera.

The largest impact of AR may land in the retail and omni-commerce space. Innovation in retail is already accelerating and product visualization is the next trend to change the industry forever. In-store, augmented reality can easily display information and other visuals on packaged items with a simple image scan. AR has been used to show what comes with a packaged product so customers know what to expect. Online, AR is helping eCommerce shoppers try products at home before they purchase. Augment is active in allowing customers to try their products in front of them before they make a decision online. In the future, all stores will feature 3D models that can be seen in your very room with a click of a button. See how the lamp you want to buy would look in your living room through AR, or the queen size bed that you don't think will fit in your bedroom.AR is set to have a sudden impact both in-store and online for retail merchants.

There are two major forms of augmented reality, marker- based AR and marker-less AR.
A marker-based AR works on concept of target recognition. The target can be 3D object, text, image, QR Code or human-face called markers. After detection of the target by AR engine, you can embed the virtual object on it and display it on your camera screen. Qualcomm Vuforia SDK is the recommended framework to develop native apps.

Marker-less AR, also known as location-based AR, uses GPS of mobile devices to record the device position and displays information relative to that location. Some of the examples of marker-less AR are apps like Layar and Wikitude that let you view information of nearby restaurants and other establishments.
The Future of Augmented Reality is serious business. Lumus—a maker of optical displays that help make augmented reality (AR) a, well, reality. Everyone obviously has a vested interest in where AR tech is going. AR is poised to become a major factor in a lot more than Pokemon Go or Snapchat filters.

Start with the numbers: By 2025, AR will be big in the video game market, accounting for an estimated $11.6 billion out of what will probably be a trillion-dollar business by that time. (That's a conservative number for AR gaming.) And there are plenty of other industries where AR (and virtual reality) will contribute to revenue by 2025. Healthcare at $5.1 billion (imagine devices that can find veins faster than a phlebotomist), engineering at $4.7 billion, live events at $4.1 billion, the military at $1.6 billion, and the list goes on. Even at the low end, the education market will make $7 million using AR products.

AR or augmented reality has gone from pipe dream to reality in just over a century. There are many AR applications in use or under development today, however – the concept will only take off universally when UX designers think about how they can integrate AR with daily life to improve productivity, efficiency or

quality of experiences. There is an unlimited potential for AR, the big question is - how will it be unlocked?

Most tech experts are considering AR to be the future of design. When it comes to augmented reality app development, it is obvious that AR is providing excellent opportunities to effectively augment user experiences even beyond measure. Everyone already knows the importance of mobile phones in the society today. These devices have risen to become such an integral part of people's lives that they might as well become extensions of their bodies. Even without being intrusive, there is every possibility that technology can even be further integrated into human lives.
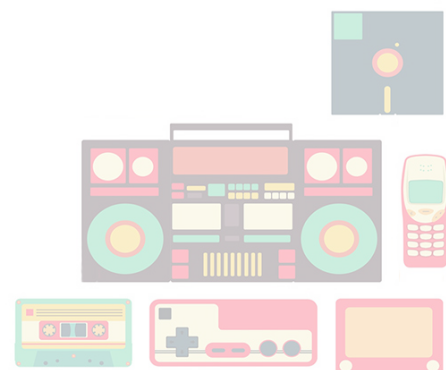
The Unforgivable Pulwama Attack

- Aishwarya Sahoo

The recent killing of more than 40 Indian soldiers in Jammu and Kashmir by a suicide bomber belonging to the Jaish-e-Mohammed (JeM) militant group in Kashmir's Pulwama district, marked a dark beginning to the year on 14th of February, 2019. The atmosphere which was instilled with a feeling of 'josh' suddenly turned hostile which put India and Pakistan into another bitter confrontation.

The site after the attack

The Pulwama attack also happened to be one of the deadliest terror attacks on India's state security personnel in Kashmir since 1989. A convoy of vehicles carrying security personnel on the Jammu Srinagar National Highway was attacked by a vehicle-borne suicide bomber at Lethpora (near Awantipora) in the Pulwama district, Jammu and Kashmir, India. The attack resulted in the deaths of 40 Central Reserve Police Force (CRPF) personnel and the attacker. Although Pakistan denied any involvement, JeM's leader, Masood Azhar, is known to operate in the country.

In retaliation, India has not only withdrawn Most Favored Nation Status (MFN) from Pakistan, but has also announced that it will take important steps to completely isolate Pakistan internationally. The customs duty on all Pakistani goods imported to India were raised to 200%. The government of India urged the Financial Action Task Force (FATF) on Money Laundering to put Pakistan in the blacklist. The FATF decided to keep it on 'grey list' and gave time till October 2019 to comply with 27 conditions laid in June 2018 when it was put on the 'grey list'. Failing to comply, it will be added in the blacklist.

Protests, bandhs and candle light marches were held all over India. There were violent protests in Jammu resulting in a curfew being imposed starting 14th February. The Indian community in the United Kingdom held protests outside the Pakistan High Commission in London. A delegation of Indian doctors cancelled their visit to Pakistan for the 13th Association of Anesthesiologists Congress, organized by the South Asian Association for Regional Cooperation, in Lahore on 7th March. Indian broadcaster DSport

said it would no longer broadcast Pakistan Super League cricket matches. The All Indian Cine Workers Association announced a ban on Pakistani actors and artists in the Indian film industry, and stated that strong action would be taken on any organization violating it. The Indian Film and Television Directors' Association also announced a ban on Pakistani artists in films and music produced in India. The president of the organization threatened to "vandalize" the sets of any Indian film production with Pakistani artists.

Candle light march

One of the major development was the Indian fighter jets crossing into Pakistan to carry out a bombing raid against a militant training camp, causing Islamabad to scramble its own aircraft in response, the Indian government said.

The operation held early on 26th of February, 2019 was the first major military response to the Pulwama attack. Pakistan called the sortie "a grave aggression by India".

Pulwama attack would forever remain a scar on India, and the bereaved families of the martyrs, the families who lost their blood and flesh during the attack. Their agonizing screams of pain will forever keep reverberating through the borders of the country. The despicable act of terrorism by the cowards is dastardly.

Another side of the coin is the response by the keyboard warriors across the social media platforms who suddenly turned into 'military strategists' for the Indian Army right after sharing memes on the sensitive issue on their Facebook handle. Probably with a keen and sudden rush of nationalism and 'josh', some people in agitation demanded a war, not caring how it would impact the nations involved and the world, as both the countries have no dearth of ghastly nuclear weapons.
It is important to understand that while showing our dedication to our motherland, it is also important to not lose control over mind in the 'josh', and maintain our cool. At the same time, it is important to understand that we owe a lifetime of respect, gratitude and deference to our armed forces and their families. We owe them our lives.

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