CATALYSE

Episode 4
WRITINGS ON THE WALL

2020
FRAGMAG

English

Literature

English Literature

FOUR PILLARS OF HUMAN LIFE (THE CATALYSTS)

LIFE is a fusion of happiness and sadness, success and failure, comfort and pain, opportunities and frustrations, love and hatred, relief and sorrow. Yes, life is not perfect, but it is beautiful. To be happy and satisfied, to reveal our potential and to accomplish what we want to, there must be a process of change we go through. That change is either effected simply by ourselves or by some people who push us in a direction that forces us to change. Life is all about a card game. Choosing the right cards is not in our hands. But playing well with the selected cards in hand decides our success.

I dedicate this article to the four significant people in my life who have been the catalysts in transforming my life.

Sitting on my bed, rolling my eyes and shaking my head, I asked myself, "What have I learnt from these people?". Only tears rolled down my eyes. I could not find words to express the powerful bond they have created with me. The reason for whatever I am today is mainly because of their selfless and unconditional sacrifice that they have done physically and emotionally. At the outset, let me thank God for sending them into my life at the right time when it was needed.

The first and the most crucial catalyst in our life is our parents. I would like to classify the different roles they play at various stages of our life as mentioned below:

From the moment they enter the stage of husband and wife, their journey of sacrifice begins. Even before we come to this world, they start striving to make our life better than their life.

1)Me Time: Once a couple transforms into a father and mother, their whole life is centred around their little bundle of joy. The 'Me Time' is out of their schedule. Everything that was before "US" becomes "OUR KIDs". Relaxing after a busy schedule at work becomes just IMPOSSIBLE for them.

2): Material support: They are ready to spend any amount to fulfill the child. Providing the best education and getting them the best opportunity to settle down happily in life, take away a significant toll on their financial planning.

3): Freedom: They curb all the freedom of their choices for the sake of the child. Social life always takes a back seat in life. As the child grows, parents change their role as a catalyst and forever spread the fragrance of love and joy.

Next in the order is Guru (Teachers). They serve as the ladder to success in every students' life. In the current world, teachers play the role of a catalyst by supporting and motivating the students and also in accomplishing their responsibilities. Catalytic role of a teacher influences the students' participation in the classroom and increases her/his motivation level as a lifelong learner. In this light, teachers have an awesome responsibility of planting the seeds of hope, success, happiness, faith, self-confidence and enthusiasm; watering and fertilizing these seeds ; protecting them from insects (ego, jealousy, negative attitude and hatred and finally harvesting the crop in such a stage when they become beneficial to the society. This is the power of the teacher catalyst for converting positive thinking and attitude into positive action.

English Literature

Next is, I, myself am the catalyst.

It is high time that we understand our life first with the help of the above catalysts. Live our life based on the lessons we have learnt from them and then make others understand their life by bringing in necessary changes. Remember: You are your inspiration, motivation and solution to your problems.

It does not matter how many people are present in your life. The only thing that matters is how many need your presence in their life. Never be upset and get caught up with things or people that cannot be changed. Instead, Move On. Let go and focus on what you can change, the things that enhance your life. One of the greatest pleasures of life is doing the things that others say you cannot do. A bird sitting on a tree is never afraid of the branch breaking because her trust is on her wings. Always believe in yourself and try to be a catalyst for yourself and also try to catalyze others.

There is no better exercise for our heart than reaching down and helping to lift someone. But the execution is essential. An average plan with excellent execution will always supersede an ordinary execution with a great plan. Quality life does not mean having wealth, power or superintelligence. It is a matter of how much kindness, love, concern you show on others and the joy you get out of it. Every little smile can touch somebody's heart. No one is born happy, but all of us are born with the ability to create happiness. For it is in Giving that we receive.

A person in pursuit of excellence raises the standards of everyone around him/her. It also brings out the greatness in others. Try to be that person. Great leaders do not succeed because they are great, but because they bring out the greatness in others. No candle loses its light while lighting another candle. So never stop sharing and helping others because it makes our life more meaningful.

GOD, grant me the serenity to accept the things I cannot change, the courage to change the things I can and the wisdom to know the difference.

Say Make a Nice Day instead of saying Have a Nice Day. Make today so awesome that yesterday gets jealous. Inhale your Blessings and exhale Gratitude. Carry a heart that never hates. Carry a smile that never fades. Carry a touch that never hurts.

Prof. Sundary Prabavathy

Associate Professor

Department of Science and Humanities

English Literature

A LETTER TO THE LOST

Dear brother,

   The day I realized I needed you the most was, on a quiet night at 12:15 am while I was walking in the lonely streets. The aura of the night was as terrifying as the darkness of your pitch black eyes. There was no one with me. Although I was warned by mum and dad of the dangers lurking in the night, and advising me to be home early, I was late. You know how rebellious I can be.
   There were four or five guys getting drunk and wandering along the streets and all I could think about was all the horrendous acts they could do to me, and in that moment I froze. The night lights were getting dimmer and as I started walking along in the direction of our home, I could hear the footsteps echo throughout the neighbourhood, and as I started running I could hear the terrifying drunkards chase me.
   I arrived near our building and took the most deep and calming breath, without realising the consequences of what I had done. Dad was there standing near the gate with a veil of disappointment over his face.That's when I thought of you, my dear brother. I wished you could be here to help me at this moment. I wish you'd somehow get my message and you'd come here running to my rescue, to save me from dad's anger and mom's disappointment, to make me realize that there is someone who's always there to support me. That was the exact moment when I craved your presence. I wished I had someone who I could talk to all night and not have a single care about what my parents said.
   Alas! You left too soon. You left me before I could have the chance to see you, before I was even born. You left me with nothing but an image of how, we would always fight each other over the silliest matters, protect me from the terrors of the world, be strict in front of my boyfriend, keep me happy despite being the most annoying person in the world, and always bring me my favourite gifts.
   My dear, sweet brother, I wish you stayed after you were born. Mum says that you had pitch black eyes and a shiny little nose. In the last 20 years, all I wished was for you to somehow come back, but I know you would have told me to keep my head held high and battle with all the hurdles I come across. So here I am doing all the things that you would do. Here I am pushing myself to achieve all my goals and making something out of myself. Although I wish you were here motivating me, nevertheless, I will help myself. Our parents have raised me to face all the challenges and I'm so glad that they did.

   You would have turned 21 today. So here I am, wishing you a very happy birthday my angel. I love you and so do mum and dad. I miss you a lot.
   Your little sister.

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Dhwani Rajgaur
TE Production

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English Literature

COLOURS

When I learnt that colours are a creation of the brain because light is mere photon waves, my world collapsed a little.

Not only could I see colours, I could feel them. I could feel them like a radio that never left the sides of my ears, like lyrics rolling off the tongue. I could feel them in the warm touch of elbows, knees, fingers; in the brush of cheeks against palms and hair against shoulders. I could feel them lingering under my teeth, the aftertaste of orange, or sky blue on my fingertips after they danced on rusted metal strings. I could invite them into my head like a stray dog following me home and paint my memories - gold, crimson, pale blue. I could spot them in wide, strained smiles, in between clamorous laughter that echoes to fill the room, within the black night sky that is so empty, that it absorbs every colour, every wavelength.

Maybe that is why I have always been drawn to voids, because I never saw them as holes. I saw them as every shade to ever exist, co-existing in one. Maybe that is why I found myself looking for them, in my home, in the eyes of my lovers, and in the way they chose to love me.
Every morning, I look in the mirror and see every shade to ever exist, co-existing in one.
I look and I look away into the red behind my eyelids and paint it yellow.

What a miracle it is to see with my eyes both, open and closed! What a curse it is to prefer the latter!

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Gautami Thakur
SE Electronics

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MOON AND THE STAR

After several nights, longing for a glimpse of the moon, I lay on my bed late at night as usual and I decided to listen to some songs that my dear friend had suggested to me.When I was about to press the play button, I saw some light from my bedroom's window falling on my hand. I kept my phone aside and followed that light which led me to the window, where I saw the moon glow the brightest that night with a small little star as a companion with it.
That was the day when I thought of listening to those songs that were her choice and were all saved in a playlist called, Moon.

That was the same day when I told my dear friend that I wanted to see her in the sky that day and I did.Because, to me she was always the moon and I was the little star to her.

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Sujoy Sawant
TE Electronics

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English Literature

HERE'S TO YOU

Here's to the ones who made it and to those who were brave enough to at least try. Here's to the rebels who wanted to be left free but don't know what to do when the responsibility of freedom is thrust upon them. Here's to the quiet ones who dare to get out of their comfort zones and to the outspoken ones who like to succumb to the solace of silence once in a while. Here's to the ones who are armed to break stereotypes and the ones who find comfort in knowing that there are at least some criteria that proves they fit into society's standards. Here's to the confident fashionistas and the baggy-clothes lovers. Here's to the ones jamming to rock and pop and to the ones having their moments with old school Hindi, or better, vibing to all genres. Here's to the ones partying all night and the ones enjoying the only time of silence they get during the night. Here's to the studious ones with their head deep into books and the ones who rush to them a day prior to exams for help. Here's to the ardent class bunkers and the consistent lecture attendees. Here's to the innumerable groups formed for projects and praying you get someone who is ready to work out the entire project on their own. Here's to the unfortunate first few roll numbers who are pushed first for everything. Here's to late night conversations and being each other's early morning alarm. Here's to the numerous breakfasts, lunches and the special Maggi dates. Here's to everyone we've come across and those who might cross our paths, to the people we've influenced and the people who have touched our lives. Here's to those of you who have planned your entire future to the T and those who live life a day at a time, or in today's lingo, carpe diem. Here's to the ones who dare to chase their dreams and to those who fall back to attain peace and solitude within themselves first. Here's to all of you set out to grow for yourselves and set an inspiration for others. So raise your glasses and hold your head up high, because here's to all of you.

Sachi Verma
FE Batch C

FREEDOM

My dad always shouted at me saying,
"You know what you are studying in college; you should get your grades up!"
The line 'you know what you are studying' is the key to everything in your life. It's right in front of you. Now, maybe your dad believes that his child is capable of handling his/her own problems in life, or maybe your dad doesn't believe in that, but you need to. Someone else is already giving you a chance by saying 'you know what you are doing'.

That's what you want right? Freedom!

Sujoy Sawant
TE Electronics

English Literature

ORIGIN STORY

Bitten by a radioactive spider? Parents' shot dead in a lone alley? Injected with super soldier serum? Crash landed on Earth because your planet was destroyed? Forced to create weapons after being kidnapped? Well, I'm pretty sure you know every one of these people without me having to take their names. People who achieve greatness, whom we all idolize, almost, always have an origin story that compelled them to follow a certain path and make themselves memorable. We all deserve origin stories but we can't wait for the universe or destiny to send something extraordinary our way. Paving our way to creating our own origin story is like another tale in itself. Go chase that object that you're passionate about even if it's something that's in a completely different ballpark than where your aspirations lie; you might just find your true calling. Keep collecting things that mean something to you even if it's irrelevant to everyone else; you'll have multiple eventful incidents that will give you tons of perspective. Pursue that interest you ardently follow and it might just become your life's purpose. Your story is a catalyst for your aim and mission in life. It will accelerate your self-belief and purpose and can also influence and pave a path for others. Let it be an epiphany of passion, perseverance and heroism. Every superhero deserves an origin story, so, what's yours?

Sachi Verma
FE Batch C

STATUS UPDATE

From 'woke up like this' to 'outfit of the day'; 'single' to 'in a relationship' to 'it's complicated'; 'wanderlust' to 'foodie'. Everything we do in life has to be recorded on social media. Our status updates are like a new gen personal diary that needs to be updated every day to satisfy your daily dose of validation. Take a moment and look around you, by keeping your socials updated have you forgotten to amend our actual lives? Our life deserves a status update and there's no excuse to delay it. Yes, you may be known as a 'drama queen' or 'meme lord' online, but what you've also got to make sure is that you develop a personality that you can exhibit to the real world. The social media world, although powerful, is a very small world with a limited array of functions, whereas, the real world is huge and it's filled with obstacles which can only be overcome if you equip yourselves well enough to know what you're going to face and how you're going to face it. I do concur that the online world creates a comfortable bubble for us, a safe space, and it's not a bad thing to have something to fall back on, but the only way to break out of your shell and grow is to get out of your comfort zone and acquire skills to help you fight your battles and conquer your demons. So let's not focus only on 'status updates', but rather shift our attention towards life updates, growth updates and progress updates as well. Let's accelerate our lives to grow and glow, inside and out in all aspects.

Sachi Verma
FE Batch C

English Literature

SMOKE, FOG AND HAZE

"Smoke never rises without fire." The adrenaline rush, the pull towards acting out, being rebellious, an average college student's life would be empty without all of this. There's a fire burning and it's waiting for an outlet. But what happens when you let out a fire that's uncontrollable and raging, and which you clearly don't completely understand the purpose of? Well, it lays waste to everything coming in contact with it, but that's not even the crux of it. The real tragedy begins when the fire dies down and the smoke begins to appear. It is bad enough that things are in a mess, but now you've got to deal with the aftermath as well. The smoke blinds you and you can't think straight. You can see things falling apart, but no matter how hard you try there's nothing you can do about it because your thoughts are hazy and the path towards restoration is all fogged up. You try and make efforts but they don't seem to work and the progress seems dead. When you feel like the walls are crumbling around you and can't seem to find a way out, that's when you need a ray of hope, something that will restore the ruins that will eliminate the smoke and clear out the haze. It can be anything – a person, an inanimate object or even a song. This will be your support system that will pull you out of your hole, and your catalyst that will accelerate the process of getting yourself back on track. Life isn't all rainbows and butterflies, so find your safe place and keep it close because it's the only thing that is going to clear out the smoke, fog and haze and bring you back home.

Sachi Verma
FE Batch C

TWO UNSHAKEABLE PILLARS OF INDIAN CRICKET

Let me ask you a very simple question, which is the most successful cricketing team of all time? Within a fraction of seconds, most of the people will answer 'Australia', especially the Australian team in the 2000s. A team that had players like Hayden, Gilchrist, Langer, Steve Waugh, Ponting, McGrath, Warne, Brett Lee, and the list continues.....But there was one more team who was equally dangerous and talented but didn't have any big titles and champions in front of their name. Today we are going to talk about that team, Team India under the captaincy of Sourav Ganguly and Rahul Dravid.

In the year 2000, after the match-fixing scandals in Indian cricket, Sachin Tendulkar gave up his captaincy and Sourav Ganguly was given the command of the Indian team. Sourav Ganguly (Dada) was a fearless and aggressive captain who always believed that the Indian team has the potential to win matches outside India and dominate world cricket. He focused on building a culture of promoting youngsters and playing aggressive cricket. Dada's best quality was his attitude towards the youngsters of the team, he always believed that, 'If you want to develop players, then you have to put them under pressure and keep supporting them irrespective of their performance in one or two games'. This work culture developed by Dada worked wonders for Indian cricket; youngsters like Virender Sehwag, Harbhajan Singh, Zaheer Khan, Yuvraj Singh, Mohammad Kaif and M S Dhoni became match winners and won matches single-handedly for India.

English Literature

The world was witnessing the transition of the Indian team; the team went from defeat- to drawing a match- to winning it. The test match at Kolkata in the year 2001 proved the potential of the Indian team. Young Harbhajan Singh left the Kangaroos in awe and took the test match away from them, Border-Gavaskar cup in 2001 was a statement for the rest of the world that the Indian team is going to create a global impact. In the year 2002, India was playing a 7-match ODI series against England, the series was leveled 3-3 and India snatched the victory from the hosts which sealed the series for India, kudos to the brilliant performance from Yuvraj Singh and Mhd. Kaif. These performances were not only the result of talent but also of the support and belief of the Indian Captain. India was outperforming every team in ODI and Tests. This team was creating wonders and was on a dream campaign in the 2003 World Cup. India performed brilliantly in the 2003 World Cup and became the runner-up. This was the second time after 1983 when India reached the finals of a World Cup. In 2003, India won a tough test match chasing almost 525 runs in the first innings and 230 runs in the second. Rahul Dravid with 233 off 446 balls and VVS Laxman with 148 runs proved that Indian Batsmen can play at any pitch against any bowling line-up. India kept winning matches in Australia, England, South Africa, and New Zealand. But a series victory away from home was remaining.

Sourav Ganguly was injured for the test series against the arch-rivals Pakistan, handing over the captaincy to Rahul Dravid. Rahul Dravid was a very silent, peaceful, and humble person. He carried the same attributes in his captaincy and always played with responsibility. In the 2004 series against Pakistan, Indian players were at the peak of their form. Virender Sehwag scored a brilliant triple century at Multan and Sachin Tendulkar scored 194 runs. Pakistan failed to deliver a match-winning performance and India won the first test match in the series. Pakistan fought back in the following match, taking the series up another level. Captain Rahul Dravid took the responsibility of victory on his shoulder and scored his career-best 270 runs, to ensure victory for India. India won the series 2-1 and this was India's first series win outside India since 1993. Rahul Dravid was not a full-time captain for the Indian team, but he ensured that throughout his captaincy, the team will never face any difficulty and disappointment.

Rahul Dravid and Sourav Ganguly are the catalysts of Indian cricket. Today the success and respect we enjoy is the result of their selfless efforts and hard work. They always did the right thing for the team and accepted any duty that came their way, and catalyzed India's process to become World Champions. Despite being a batsman, Rahul Dravid played as a wicketkeeper-batsman for many because the team didn't have any better options. Such selfless contributions go unnoticed which draws the curtain on the greatness of the player. Sourav Ganguly fought against the dirty political practices of the former coach Greg Chappell, and took a stand for his team and his fellow teammates. The success we enjoy today was not handed on a platter, these two gentlemen paid huge costs for it.

For anyone who is leading a team, Sourav Ganguly is a perfect example of aggressive leadership. What we can learn from him is, Always support your team and give them confidence in their abilities, learn to put faith in them, and try to build more leaders around you. Learn humility, responsibility, selfless attitude from Rahul Dravid's captaincy. The world of cricket teaches us a lot, but only we have a learning attitude towards it.

Nachiket Nissal

TE IT

A DANGEROUS COINCIDENCE

Allen was a 45-yr old, middle aged man, who lived the typical life of a corporate manager, one of those white-collar jobs, where much of the work was boring and repetitive. He was at times disappointed but never complained, how could he... this was the life he chose, the life of a nameless faceless cog in the machine. The Idea of confinement within an office cubicle was perhaps never appealing to him, but it was his old man's dying wish. If only he had pursued his lifelong dream of becoming a film-maker, and joined a film School, his life would have been much more exciting.

Allen never married and had no family; he lived in a 1-BHK apartment in Santacruz, an accommodation provided by the company he worked for. Apart from the fact that he was ambidextrous, nothing was mildly fascinating about him.

Despite having worked at the same place for nearly a decade. He didn't have many friends. Mishra Ji, an elderly colleague, who sat in the cubicle which was right next to Allen's, had retired a month ago. Mishra Ji along with Allen's neighbour Ravi, were the only two people, whom he could call friends.

Allen was usually the first person to arrive at his office in the morning, and the last person to leave in the evening. One such evening, as he was returning from work, just outside the local railway station, he saw a new lottery booth, and decided to try his luck, "now a little excitement in life wouldn't kill me...", he thought to himself. He bought a ticket, and was on his way back home.

It was very quiet that night. A stiff wind blew in from the west making the heat slightly less oppressive than on other days. The next morning, Allen found an envelope at his door, the contents of which made his sleepy eyes go wide. He had won. The prize was a fully paid 5-day stay at a 3 star hotel located at Panchgani.

He decided to leave on Friday, which happened to be a public holiday, that way; he would only be required to take a leave for 2 days. It seemed like a good plan. The only issue, however, was that the prize included accommodation for 2 individuals. Naturally, Allen asked Ravi to accompany him, but he declined as he had to visit his brother-in-law during that weekend. Fair enough, it had to be old Allen and his leather briefcase, all alone on this journey.

As he stepped out of the train at Panchgani Station, he sighed with relief, the place had an inviting tone to it, a pleasant earthy smell was floating in the air. He only had 1 leather briefcase, so he didn't need a coolie. He hired a taxi and went straight to the Regal Hotel.

The Hotel was a decent little place, situated at just 700 metres from the Parsi Point, overlooking the Krishna Valley. The servant allotted to him was also of amiable sort. Allen ate dinner, and dozed off to sleep immediately.

The 1st morning, Allen told his servant to make him a cup of tea when he returns after his day-long adventure, and so he began his day, walking for a few kilometres in the west direction, he was soon in open grounds near a lake. He spent the afternoon there, read some thrilling detective novels and tried filming the cranes in the lake. When he returned that evening, a cup of hot tea was waiting

for him. It was a day well spent.

The next day, he decided to visit the renowned Parsi Point. Just like it was mentioned in the map, a walk of 700 meters took him to the famous point. It was off-season; hence there was no one there apart from him. He carried out his routine activities, sitting on a bench. In the evening, in hopes of filming the sunset, he took out his camera. He was perhaps too busy in getting the perfect shot of the dying sun, he didn't notice that a person had come and stood behind him.

He realised and quickly turned back to find a middle aged man, with a face which seemed very familiar, standing behind him. Just when he began to think where he had seen this face before, he realised, he had seen that face every day for the last 30 years – in the mirror. The resemblance was uncanny, the curly hair, neatly trimmed moustache, the glasses...only the man was a shade darker than him. It almost sent a chill down his spine.

The man smiled and nodded in greeting. Allen returned the greeting. The man spoke, "My name is Valen".

"Allen-Valen, even the names are similar" Allen thought to himself.

"I saw you yesterday at the lake, you were pretty much on your own like me..." said Valen.

"You were there too?" asked Allen in surprise. "yes.", replied Valen.

Valen further added, "I came here on Friday... actually, I won a 5-day holiday to this place in a lottery... you see... I don't have many friends hence I couldn't bring anyone here with me and there aren't many people around here as well, I saw you and thought I could use your fine company".

Allen couldn't believe his ears, he just kept on listening. The more the man spoke, the more similarities between him and Allen were highlighted. In the next half an hour, Allen learnt that Valen was also from Mumbai, he too, was a manager in a corporate company, was unmarried and was born in the same year as Allen, just a couple of months apart. Of course, Allen only listened and didn't let Valen know about these similarities.

"I need to go now... I am staying at Grant Hotel... where are you staying?"

"The Regal Hotel" replied Allen.

"Alright, have a great night Sir. I hope to see you tomorrow, same place, same time, we could enjoy the sunset together." said Valen.

Allen nodded in agreement.

That night, Allen refused his tea, didn't eat dinner and stayed up all night, thinking about this strange coincidence. Could this have been some kind of joke? Was it possible for someone to follow him all the way from Mumbai to this hill station and pull a prank at him? It seemed highly unlikely.

The next morning Allen found Valen waiting for him, outside his hotel. "Good morning...The food at my hotel isn't very good and I have heard that a restaurant nearby serves a delicious meal for Breakfast, do you care to join me?" Allen thought it was rude to say no, so he went along.

English Literature

While having breakfast, he could notice how everyone, including the restaurant staff were just staring at them, probably marveling at their resemblance. After the meal, their conversation continued...

"I saw you making films with your camera yesterday... I liked Film-making as a student too, but my father wasn't quite pleased with It.", said Valen.

That was it. Allen had grown to hate Valen more and more, all the similarities and the fact that there was practically another "him", existing in this world made him mad. Allen was now avoiding the conversation and trying to get rid of him, without much success though.

The duo walked up to the Parsi Point in the evening and Valen asked if he could use Allen's camera to film the sunset, Allen gave him his camera. It was the time for sunset, Valen, while filming, advanced towards the edge of the mountain...while Allen was watching from behind; for once Valen had stopped making his life miserable, that's when he understood that he was better off without any friends- alone. Something trapped inside him had unleashed in the form of an idea, the idea was the end of this misery, the end of Valen. There wasn't anyone around either, if he was to push Valen off the mountain, he wouldn't have to bear him anymore and could live without the displeasure of the existence of another "him".

He looked around, gathered all his strength and gave him a push. Valen's body went flying off the mountain, into the valley deep down. Allen went running back to his hotel.

In the hotel, the manager saw him and said, "Mr. Valen, is that you?" as he came closer to Allen, he said "sorry, I mistook you for Mr. Valen, a guest, staying at this hotel...".

It was then when Allen realised that he had accidently entered the Grant Hotel, the one in which Valen was staying. He said, "Don't mind me, I've made a stupid mistake, I am staying at The Regal Hotel, both the hotels look very similar...I'll be on my way now."

Alen returned to his hotel. After completing dinner Allen went back to his room. He had just killed a man, but he didn't feel bad at all...worse, he had liked it. He read some of his other detective novels and wondered if he had committed the- perfect murder.

It was late at night, around 2 a.m. when he began analysing the whole incident. "The Camera! oh lord!", he had left the camera at the crime scene. He knew he had to get the camera back this night itself, while still, not many, know of Valen's fate. He left the hotel without making any sudden noises. He ran as fast as he could and got to the Parsi Point, and there it was, the Camera!

He went forward, lifted the camera, and sighed with relief...

Just then, out of blue, a pair of hands appeared from behind and gave him a savage push...

Nikhil Sharma

SE Electronics

English Literature

ALL THAT SEEKS GLORY

All that seeks glory is not only yours truly
All that seeks glory could not be yours truly,
When you have the glory is it only yours truly
Efforts put in frugally? Do you seek it truly?
Relict to be an epitome? It took 1000 years to build Rome,
And that's the zeal which none shall steal
Fighting till the triumph, all that time and glory doesn't toss a dime
Concur and it's a blunder or conquers till six feet under
All that seeks glory is now all yours truly.

Omkar Parab
FE Batch E

LESSONS FROM THE HIMALAYAS

It's been a year since I took a trip to Ladakh for a trek, a very cold and demanding expedition. I remember getting out of the aircraft and letting out a small scream as the -17° wind pricked   my body through the four layers of thermals and jackets like needles. It was partly a welcome, partly a warning that this was not going to be easy. Right from the first moment, I longed to get back home in Mumbai where the temperature didn't go below 20° C. The trek began three days later and the temperatures kept dropping each day. We were staying at the guest house and our trek leader did not provide us with heaters because in three days we would be walking in a place without electricity and cellphone reception. We slept in tents and on ice cold rocks. One night the temperatures dropped to -27°C. We had walked for more than 10 hours that day and were exhausted, but couldn't sleep because of the severe cold.

Sure, it was difficult but now, a year later, when I look back, I regret not being at that moment, not enjoying the cold, or the Maggie and chai we had sitting on ice. Each day there, I was counting down the days to be back, and I realised this was my everyday situation. I was so eager about the future that I forgot to live in the moment. It was a very sad reality that hit me.

I learned a lot during that trek. I learned that nature can be very cruel, but also forgiving at the same time. I saw the effects of climate change happen when we could see the ice melt in front of our eyes, but the biggest lesson came to me after months when I kept going back to that time and felt something was amiss but couldn't figure out what. I realised that I kept going back because when I was there, I wasn't actually present at that moment; my mind was in Bombay, in comfortable weather. The trek ended months ago, but the learning continued. I learned to live in the moment. If you're busy, enjoy it because there will be days when you're in your room the whole day and question what you're doing with your life. Enjoy your time in college. Sure, you hate it, but you're going to miss it really bad after you've left and when you understand that you didn't make the most of it. If you're going to a college abroad, be excited, but do not forget to make each day count, because in the end, these bitter-sweet memories will never cease to bring a smile on your face when nothing else can. These bitter-sweet memories will catalyze your way to happiness!

Rozebud Gonsalves
T. E. IT

English Literature

KAAFI BORED

The wind and the trees are talking today,
About how lonely the roads feel.
It reminds them of the time when
These roads didn't exist-
A time when humans weren't supreme
A time when nature was natural
But today isn't any different
From how 10000 years ago was,
For humans are sheltered back in their caves
Fearing the nature
And the retaliation it brings.
These roads aren't lonely, however
Sharing its solitude with the birds and the dogs
The only one feeling truly lonely
Are the humans, watching them go out.

Pranavnath Tiwari
TE Production

JOY

The wind at night feels so surreal.

I mean, after all the stale, hot days, we finally feel the pleasant air; and on top of that, it's dark-
it's night time.

It's been so long since I've experienced this, that I'm emotional right now. It's such a happy
thing! I think this is how I'll feel when I see the Milky Way for the first time. I know I will cry. It
will be such an overwhelming moment. Just seeing all the stars and the entire galaxy out there- it
just makes me feel so miniscule, so powerless; like a little dot who doesn't even matter compared to
the infinite stars and the scary yet beautiful universe out there.

As I wrote this, it started raining, drizzling, actually. It's not even enough to make the roads wet,
yet it brings tremendous joy.

Pranavnath Tiwari
TE Production

English Literature

APPRECIATING SADNESS

How can you not appreciate sadness?
When you feel sad and done with your life,
And tears roll down from your delicate eyes,
You must realize that you're able to cry!
You are a being that can express sadness,
By weeping from exactly those organs,
That helps you perceive this beautiful world,
That when you are wrecked and your life is stirred,
Crying makes you feel lighter and better,
I see hope right there, and I shall be hopeful forever.

Sujoy Sawant
TE Electronics

HEAVENS REACH

For The Dawn and Deeps of Heaven's Reach
The Balance Is Thought upon
Old Virtues Of Their Preach

For The Dawn and Deeps of Heaven's Reach
The Angel Is Brought upon
To Make a Buoyant Breach

For The Dawn and Deeps of Heaven's Reach
The Devil is called upon
To Harm and Leech

For The Dawn and Deeps of Heaven's Reach
Barter is set upon
To Cry and Beseech

For The Dawn and Deeps of Heaven's Reach
Your Eleventh Hour is upon
No Desire Only a Screech

Anurag Ubhalkar
TE Electronics

English Literature

REVENGE

"That's it", cried Nature, with a sigh,
Mother Earth added, "It's time they cry";
"This means War, World War lll!"
Screamed the choked oceans, polluted skies and the remaining trees.

First seed been sown in Wuhan,
Everyone was careless, 'It could cause no harm!'
Stealthily and rapidly, it spread worldwide;
Across continents, shut the business tide.

School shut, malls closed and countries locked.
'Ha! ', exclaimed Mother Earth, "Where were you when nature knocked?"
The war expanded with almost nothing untouched;
Masks our shield, soaps our weapon, but no cure rushed!

People dying, migrant workers suffering;
To those in agony, no one is helping,
Mutating faster, this deadly virus;
'Will the world be finished?' does it want this.

Those raising voices were quietened;
Good doers were tormented,
The cause of this virus is us and only us;
When will the virus buzz!

Mend your ways, oh mortal man!
Clean your beaches, forget your tan,
Work harder and stay sincere;
Be wise and have some fear!

It's time to give back to Nature, everything we owe her,
Slowly and steadily, we will survive this quintessential terror;
Forget the past, look at the future;
Mother Earth is calling us to nurture us is her gesture and nature!

Nisha Mascarenhas
SE Computer

English Literature

THERE IS WARRIOR IN EVERY SOUL

Grateful to all those, who made us understand the world
And live without the fear of the darkest evolutions
Let us reunite and set the glow in every soul
Because there is a warrior in every soul.

Pray for the well-being and for our motherland,
Life is no less living, be brave and be bold
Time has come to bestow our best
Let us reunite and set the glow in every soul
Because there is a warrior in every soul.

Days are moving though, ages are ripening
Stand on your ground still and let not be shaken apart
By the annoying disasters and disheartening rules,
Let us reunite and set the glow in every soul
Because there is a warrior in every soul.

Prof. M V B Rao
Assistant Professor
Department of Production Engineering

ENLIGHTEN YOURSELF!

Strangely, and confused
Are my tensions,
Revolving like the infinite,
Barely do I have, as the paths get longer and still
I speak with my heart and soul.
O! Lord! Lead us to enlightenment, O!
I delight in the evolutions and all your creations,
Give me the peace feel, I know all around is just an illusion,
You made us connected with stories and thoughts, with ups and falls,
Lifecycle is just as long as it's short enough, though..
Keep us alive with spirits higher,
I speak with my heart and soul
O! Lord! Lead us to enlightenment, O!

Prof. M V B Rao
Assistant Professor
Department of Production Engineering
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English Literature

LIFE

Life is too short than we think,
Life is too fast than we blink.
You need to become a feather,
If you wanna stand in all sorts of weather.

Everyone's born in storm,
No one's weak, no one's strong.
Life has legion tips to give,
It's up to you, what do you wanna perceive,
Get drown in voyage of hardships,
Or row with the courage of hardships.

Look at the waterfall's height,
It's standing stiff to fright,
All ready to win the fight.
It's up to you,
Cry dreading the defeat,
Or die daring to kiss the victory's feet.

Let's become a matchstick sack,
Let them pile up hellish haystack,
By misguiding every single anodizing misery,
We will inscribe a catalyzing history.

Shivam Yadav
TE IT

DARE TO DREAM

All he had with him was a beautiful dream,
It was not as easy as it seemed,
Yet he kept marching towards his goal,
And worked very hard with his heart and soul,
The world tried to bring him down,
Every effort was thrashed to the ground,
Nevertheless, he was a fighter, he wanted to fly,
He succeeded in reaching beyond the sky.

Preet Jain
TE IT

English Literature

FATE VIA FAITH

Can a spark set ablaze
or our wish, get its ways?
 Can a thought turn to deed
or our dreams, be paid heed?
Can we stand together for what's right
and keep evil out of sight?
The answer is YES and it is true!
Hang on, read ahead to get a clue.
Let your confidence stand tall,
your courage not fall
and have patience to endure all.
Let your determination and willpower optimize,
so that all you do will alchemize.
Finally, you will know your life did catalyse!
This is true and everyone it will please!
Now, how about situations like these:
When darkness encompasses the earth
as the night slyly draws near.
When rumors spread like wildfire
and a virus attack snatches someone so dear.
When violence, crime and destruction accelerate;
what can I do, just sit with fear?
The answer is NO and it is clear!
Raise your hope and go on dear.
Be the cause
to spread love because
we can still pause
the malevolent clause
and bring peace across
lighting up our cosmos.

Kaylynn Rodrigues
FE Batch C

TRUE OR FALSE

Silence has stretched arms
In the warzones of grief,
Blood streaming from armours
Speaks legends in brief
O solitude! Where is your charm?
Those sages had on face,
Have you been choked or harassed?
What none wants to face
Just listen to those loud cries
From the fights of MINE,
Some crying out from hunger
Some for royal sparkling wine
O peace! Where is your calmness?
That saints had acquired,
Was it not you giving the noble, Nobles?
Making the world admirable
Women with wrinkles wait
For calls from their son,
So do the lovely wives.
Those dead on borders, with gun
O promise! Where is your trust?
Those lovers do keep boasting of,
Seems as if you are the root of heartache,
None keep you to boast of.
In meadows the banyan sobs,
It misses hide and seek
Of the kids in orangey evenings
Hearing their innocent squeaks
O childhood! Where is your beauty?
That all remember till death,
You seem so loaded with techno
Yet helpless in your last breath

Sojan Chandy
BE IT

English Literature

OH LITTLE SWEETHEART!

Oh! Oh! My little sweetheart!
Don't you forget who you are.

I want to see you smiling,
Even with those little scars.

I am blessed to have you,
In my life throughout.

For you are the one who stood by,
Me, forever strong.

Sujoy Sawant
TE Electronics

THE TRIP

"Everything is created twice, first in the mind, then in reality".

A trip is a mind boggling concept which makes us experience spectacular things. In the beginning of a trip our mind is overjoyed and all excited that our trip is going to commence. Everyone is super thrilled for the trip and gets their mind all prepped for everything coming their way. Even before we reach our destination and while we're towards our destination the trip goes in waves.

After this first stage of pre-trip mind thoughts, we slowly move into our second phase of this journey which is the "Trip", where we're high and we start experiencing everything we thought and imagined in our pre-trip mind process. We all love this phase because that's why we started the trip, we sink in the trip enjoying and taking in everything that's here to be offered, whether it is a joyous trip, adventurous trip, mood adjusting trip, slow trip, relaxation trip or god forbid a bad trip which I hope no one experiences.

Now we move onto our last phase of our journey where we realize that we are coming back to our normal journey of life. Sometimes people don't like their normal life and they find ways to escape in order to always be on a trip. We as humans need to find the perfect balance to be able to responsibly enjoy our trip as well as the journey of life. We carry memories, lessons, moments and all kinds of experiences. Everyone is out there on their journey of life and it's a tough round of life out here for everyone. So spread love, positivity and peace, be kind, loving and be tripping!

Anish Dias
*BE IT*

Technical
Literature

Shivam Yadav
TE IT

GIT , one of the most important parts of the recently hyped domain name 'Devops'.

Learning GIT is a great decision and it will definitely improve you as a programmer and make you more sound in handling files and maintaining them but first let's understand why do we need GIT and what does a GIT actually do?

So we all are familiar with File System and how files are usually handled and what are backup options, etc. But there's a huge disadvantage of relying too much on our traditional file systems as it doesn't give us the credibility of updating our files with versions. With version I mean the different variations of a file wherein let's say you saved a word file, now you do a small edit and once you save it the state will be automatically transferred to the updated one and you lose your previous state. Also sometimes there might be situations of system crashes, or any other abnormalities then file system tend to lose the data. Apart from this, Git is really handy if you are working on a project with your mates and you have to manage code files regularly as per every teammate's version of code files.

So for these reasons, the Git came into picture to provide us different states or so called versions of our file so that if in future there's a need we can roll back to any of our previous commit states and by also giving a remote backup place where our files will be stored safely. (Github, BitBucket, or any other remote platforms)

Basic Flow of a GIT
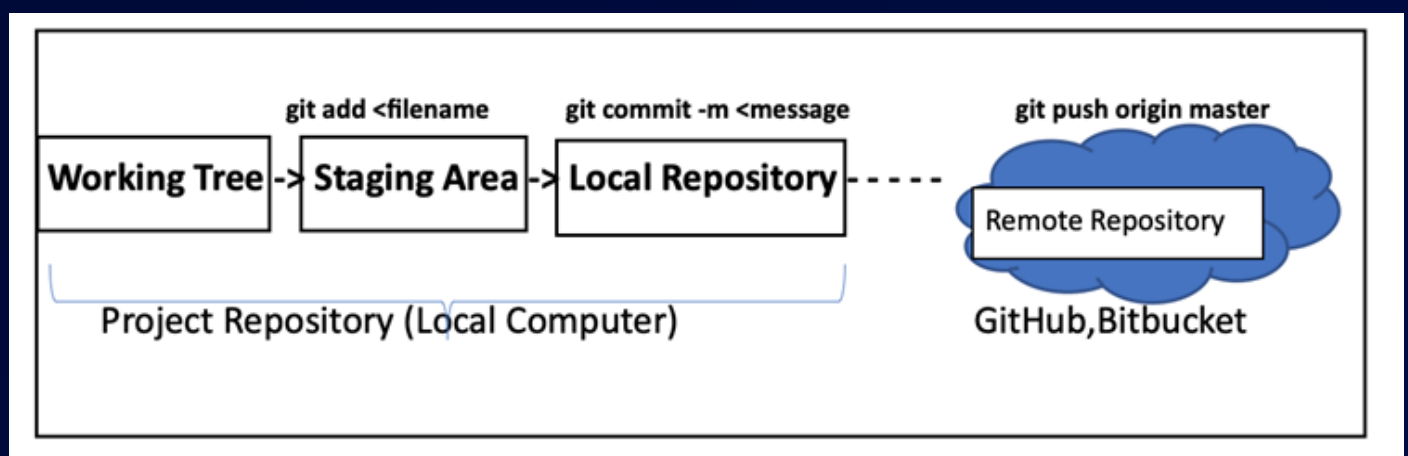
I will try to show you how you can simply push (store) one of the code file on your local computer to a remote repository on GitHub.

Don't worry about some jargons I have used, just follow the steps below and your doubts will be cleared hopefully.

Let's say you have a file called helloworld.py anywhere on your pc and you want to now create a backup on GitHub.

1. Install git from the official website of git.

https://git-scm.com/downloads

2. Once you are done with that, go to the directory where you have file.

3. Go to github.com and simply login and make your own repository as private or public depending upon your requirement. If you need to make it open source then leave it 'public' otherwise make it 'private'. (Repository – File Location)

4. Now, you will be getting a remote url link once you create your repository. Keep this link with you.

5. Now go to a local directory where you need to have your local copy of remote repository you just created. This process is called "Cloning Repository". It is like having a cloned bcr or gcr locker room at your house. Cloning helps you to edit your files kept remotely on GitHub without actually visiting github just by editing at your local computer. (In simple terms)

6. Right click inside your local file directory and open git bash and type following command.

```
git clone <URL which you got on step 4>
```

7. After this you will be able to view a file named same as your remote repository which you created in step3. Now just go inside that file and add your helloworld.py in it and open gitbash there. (Right click and open it)

8. Now follow the below mentioned commands one by one.
I.   git status
II.   git add helloworld.py
III.   git status
IV.   git commit -m <any message you want to have about the file and its update>
V.   git status
VI.   git push origin master

Note : You will notice git status thrice above , don't worry you can type it or not. It's upto you, it's optional but yes it's a good practice to check status of your file as you apply various commands.

And every git status above will inform you about the journey of your file from staging area to the remote repo as shown in the diagram above.

And now if you visit your remote repository at github.com you will notice a file named helloworld.py added to your empty repo.
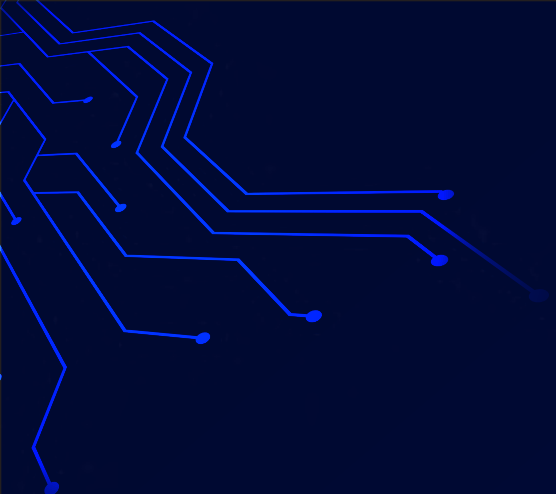
Now next time, let's say if you add a function helloguys() in your file helloworld.py, then once you save it you need to follow each command in step 8. Then you will be ready to code more and more without being haunted by backups and versions anymore.

For more detailed and in depth tour of git visit my github repo ,

https://github.com/Shivuu1300/Git-Quick-Tour-Series

Happy Coding :)

Algorithms, the rhythm of machines.

Sudheer Tripathi
SECOMPS

"Less than a minute !!!", I whispered with surprise when the professor explained how a few lines of code could solve a problem in less than a minute which would take more than 10 years otherwise. That was the experience of an online course I took a few months back.

While we shop online, browse the web, scroll through Facebook, make digital payments, work with our laptop, book a cab, travel the world, even as we save lives, they back us in our every action. It's as if our modern world is held together by them. They are getting better and better every day and we won't even notice. These are step by step instructions called algorithms. Yes, that course was on Algorithms. An algorithm, in easy words, is a set of instructions we follow to solve a problem or perform a task. Making tea, for example, involves a set of tasks. You can't make good tea by putting tea powder, sugar, ginger, water in a bowl, and turning on the gas all at once. You need to follow the steps, the recipe, the algorithm. The set of tasks you perform to reach college from home can be called an algorithm. The faster you reach college from home, the better your algorithm is.

It's after decades of research, algorithms are faster and more efficient than they have ever been. But you may ask where do we see algorithms? Well, you can't see them because they work behind the scenes. When you use Google search, you get about a million results in less than half a second. On top of that, the most relevant results are always on top. It's because page-ranking algorithms combined with searching algorithms do the magic. Remove the algorithm, and your search results will both take time and be unrelated. With the right knowledge of algorithms, one can cut short the time taken by computers to solve a problem from hours to seconds. Algorithms at their core make use of mathematical observations to solve problems.

You must have studied prime numbers in school. Yes, the uncanny ones that can be divided only by 1 and themselves. They showed no patterns and seemed useless. Well, this mysteriousness has led us to develop algorithms that keep our digital data secure. For developing encryption algorithms we need big prime numbers.

Even for generating prime numbers quickly, algorithms already exist. The speed of an algorithm depends on how fewer instructions it takes to achieve the same results.

We use algorithms on data, but sometimes structuring or ordering the data helps the algorithm achieve its full potential. This ordering of data combined with algorithms has helped us make the quickest responding Databases today. This is the reason modern web applications respond to your queries instantly. Ordering data is one thing but reducing its size without loss of information requires another type of algorithms. When it comes to storing data, videos occupy the most space. Facebook, WhatsApp, Youtube, Twitch, or any video streaming application, contain videos with

watch time from million to billion minutes. Videos with a total watch time of several years are up-loaded on Youtube every hour. Space issues are solved by a class of algorithms called compression algorithms.

There's another class of algorithms called dynamic programming algorithms. Dynamic programming is a problem-solving technique where you store the result of your calculations so that you don't calculate things again. I'll give you a quick example, let's say you need an algorithm that gives the sum of all numbers between two numbers a and b, where a is a two-digit number and b is a four-digit number. For example, if a is 90 and b is 1051, you calculate the sum from 91 to 1050. If I query you 1000 times with different values of a and b each time, and you simply calculate sum by going through each number from a to b, that's too slow. There's a better option, what if we pre calculated the sum from 100 to 1000 and stored the sum somewhere? That way we only have to add the sum from a to 100 and 1001 to b, add the previously stored result to this and there you have your answer. We have cut short the number of calculations for every next query. That's what an OS in a computer does to load programs faster, browsers do to load webpages faster and servers do to respond to queries faster. That was just a small glimpse of how an algorithm does its magic. The example may seem easy but using dynamic programming in completely new problems is more complicated.

The tech giants, the conglomerates, use algorithms to extract data from users. When someone has access to what you like, what you buy, how you behave, that's a very powerful thing. Applications and products like Facebook, WhatsApp, Youtube, The Google search engine, Gmail, GSuite (Drive, Docs, Sheets, etc) all being free isn't a coincidence, they all use your data to sell you the future. And this gazillions of gigabytes data is useless without algorithms that process them. These algorithms are called machine learning algorithms, to get it working you need to feed it with the relevant data and it finds out patterns in that data that can be used to analyse, classify, and predict things. These algorithms are used to make traffic predictions, self-driving cars, video surveillance, disease prediction, weather prediction, probability sampling, data segregation, etc.

Algorithms are everywhere. Computer code is algorithmic. The games you play are a game of algorithms. Online-dating, all form of ads, book recommendations, course recommendations, product recommendations, GPS mapping, interactive gadgets, digital assistants, financial transactions, online trading, etc. Everything is a play of algorithms. Even cyber-attacks and breaking into cryptographically secured places are done using algorithms. Algorithms have reached a point where they are self-programming and self-evolving.

We can't imagine a world without algorithms but with great power of algorithms, comes great danger if misused.

Is AI the next revolution in mankind?

Gaurav Shetty
SEIT

Artificial intelligence (AI) is a unique innovation. It is different in the sense that, it has the ability to think, reason and solve a problem. Imagine a person working 24/7 on a topic, he would eventually become an expert on that thing. Now we know that no human can do that, but what if we build a machine which can keep learning and give output like a human would. This would allow humans for better and fast understanding of a particular subject, thus increasing the rate of technological advancement.

Many AI researchers are still working on making AI which mimics the human brain. Currently the best AI system is not even as good as a brain of a toddler.

Artificial intelligence is not just the next big wave in computing but the next major turning point in human history. As stated by AI oracle and venture capitalist Dr. Kai-Fu Lee, "AI is going to change the world more than anything in the history of mankind, even more than electricity."

Artificial intelligence is used almost everywhere today, in systems such as mail spam filtering, credit card fraud detection, virtual assistance, recommendation system which gives the best results for our searches based on our browsing history and so on. Many companies are now using AI for increasing their productivity. Other salient applications of AI are in prevention of wild life poaching, for smart agriculture, developing chatbots, in human resource management and even in cybersecurity.

I believe there is no end or limitation to the number of applications with Artificial Intelligence to make our lives better. In fact some AI systems are proving to be better than humans, for example 'Deep Blue' which is a chess playing computer developed by IBM is known for winning a chess match against a reigning world champion under regular time controls.

But what we majorly require is the use of Artificial Intelligence and technology to prevent human deaths, replacing humans in dangerous jobs like firefighting, mining and other careers with high mortality rate and even in rescue missions. Normally responders need to examine aerial footage to determine where people could be stranded. However, examining a vast number of photos and drone footage is time consuming and labor intensive. Such a time critical process might very well be the difference between life and death for the victims. Thus by using AI, we can reduce search times drastically.

Even in medical science, Artificial Intelligence can play a vital role in performing clinical diagnoses and suggesting treatment. AI has the capability of detecting meaningful relationships in a data set and has been widely used in many clinical situations to diagnose, treat and predict

the results. A scientist named Carl Djerassi wrote Artificial Intelligence program called DEN-DRAL, which could automatically discover unknown form of medications.

Amongst all the good things from which AI can offer us, there are some negative impacts of Artificial Intelligence like AI-enabled terrorism, social manipulation and AI bias, surveillance of the public, DeepFakes, etc. But the biggest threat is the long-term problem introducing something that is super intelligent and taking over human being to become more dominant species on the planet.

In January 2015, Elon Musk and a group of Artificial Intelligence experts signed an open letter on AI, calling for research on the societal impacts and urging researchers not to create something which cannot be controlled.

Ultimately, I think that Artificial Intelligence is impacting the future of virtually every industry and every human being. Artificial Intelligence has acted as the principal factor of emerging technologies like big data, robotics and IoT and it will continue to act as a technological innovator for the foreseeable future.

A.I. and COVID-19

Sherwyn D'souza
TECOMPS

The last few months have dragged with lockdown and quarantine. COVID-19 has become one of the deadliest pandemics one could ever have witnessed. During these past months sitting at home wondering what day it is, I came across many interesting and unique projects in the field of Machine Learning, Deep Learning and Computer Vision that could help in either stop the spread of this deadly virus or help us keep track of the current situation and narrow down on the major problems.

There are 3 main projects I want to talk about in this article that I really found interesting:

1. COVID-Net by Linda Wangg

As we know, Coronavirus typically affects the respiratory system (i.e the lungs), causing symptoms such as coughing and shortness of breath. Some people, including older adults, are at risk of severe illness from these viruses. Since the lung is the most susceptible organ to Coronavirus, it should be the one to be monitored first.

It is necessary to try to find any kind of abnormalities in the lung as soon as possible to help detect a case of COVID-19. This is done by screening the patients. Chest X-rays using 'Chest Radiography' technology is the key approach in the screening process. With the help of the Chest X-ray and AI we can help detect a case of Coronavirus.

Motivated by this technology and inspired by the open source efforts of the research community, this project was born. Presenting, COVID-Net, a Deep Convolutional Neural Network which is designed to detect abnormalities related COVID-19 in the Chest X-rays. In deep learning, a convolutional neural network refers to a class of deep neural networks that is most commonly applied to analyzing visual imagery. This project was made with an aim not only to gain a deeper insight about what all could be the critical factors in detecting Coronavirus symptoms from a chest x-ray but also to help clinics and hospitals in improving the screening process.

2. Predicting the Growth and Trend of COVID-19 Pandemic by Shreshth Tuli

As the number of coronavirus cases has grown exponentially since the lockdown, an important factor comes into mind viz. Statistics. Statistics play a very important role when it comes in analysis and prediction of a situation based on the analysed data.

Machine Learning can be used in this case. Machine learning in short is considered as a subset of artificial intelligence dealing with the study of computer algorithms that improve automatically through experience. Machine Learning can be trained to analyse and figure out patterns and trends in a large amount of data which can be used for predicting the growth and trend of a certain situation.

Considering the COVID-19 situation, this project was created to find such patterns and trends in the statistical data. This project by Shreshth Tuli, does this job with great accuracy and finesse. With the help of a web app and interactive graphs, it makes understanding of the COVID-19 trend much better. This study applies an improved mathematical model to analyse and predict the growth of the epidemic. The project shows that a better fit can be obtained to develop a prediction framework by using iterative weighting for fitting Generalized Inverse Weibull distribution,

For more accurate and real-time prediction of the growth behavior of the epidemic, this has been deployed on a cloud computing platform. This project helps us gain a better intuition about the COVID-19 pandemic and how it is affecting the world as a whole.

3. Mask or No Mask by Chandrika Deb

The 2019–20 coronavirus pandemic is an ongoing pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). A mask is very important to fight the coronavirus. When an infected person coughs, they can send showers of tiny droplets – known as aerosols – filled with the virus into the air. This can be easily prevented with the help of 'Masks'.

As the coronavirus cases are slowly reducing, it has resulted in a number of countries undergoing an 'Unlock'. People are allowed to go outside for essential purposes. It is essential at all times to wear a mask while stepping out of the comfort of your home.

Mask or no mask is an important project which can help knowing if a person is following protocol or not. In the present scenario due to COVID-19, there are no efficient face mask detection applications which are now in high demand for transportation means, densely populated areas, residential districts, large-scale manufacturers and other enterprises to ensure safety.

Built using Open-CV and Convolutional Neural Networks, this project plays a very important role in ensuring protocol is met by the people. It simply checks whether a person is wearing a mask or not. People who wear a mask are tagged with a green box and those not wearing a mask are tagged with a red mask (i.e. indicating DANGER).

The use of the special entity "The Mask" is very important in the time of such a devastating pandemic. It helps in reducing the spread of this deadly disease.

So, this is it. Three amazing projects in the field of Machine Learning/ Deep Learning and Computer Vision that have pretty important use cases in the current pandemic. These projects show just how an innovative idea can be used in such serious times. I'd like to end by a quote - "Keep feeding your curiosity!"

Real History of AI based Robots

Upamanyu Jha
FEB

The History of AI-based robots, it is vital to understand more about the history of robotics and the history of humanoid robots.

400BC was the starting point for the era of robotics when Mathematician Archytas created the first steam-powered mechanical bird. In its best run, it flew 200 meters before running out of steam. It was not only the first robot ever created, but it was also one of the first instances of scientific research into flying.

Leonardo da Vinci sketched a plan for the first recorded humanoid robot, known as Leonardo's Robot, around 1495 which had the capabilities to stand, sit, raise its visor, and move its arms. Several pulleys and cables were behind the operation of the entire robot.

In 1913, Henry Ford successfully installed the world's first conveyor-belt assembly line in his car factory. The motive behind it was to make his Model of 'T car' affordable for everyone. So to gain the benefits of economies of scale, he needed to build them more. Thus conveyor belt assembly line reduced the time from over 12 hours down to 93 minutes to make those cars.

The 1920s was the period when robots broke into mainstream media. The word "robot" was first coined in 1921 by Czech play-writer Karel Čapek in his play RUR (Rossum's Universal Robots) the play was about a factory that makes artificial people, robots to be servants for humans.

The first year robots made to Hollywood was 1926. The first movie to own a geminoid robot was Metropolis. 'Maschinenmensch' became one of the most iconic robots for several years after the film.

Herbert Televox was first created by Westinghouse Electric and Manufacturing Co in 1927, as the first 'Humanoid' robot. Televox's creation started the developmental process leading to their later robots like Elektro, more accepted as the first created advanced humanoid robot.

A legendary science fiction writer Isacc Asimov released the quick story 'Liar!' in 1941 that outlines the three rules of robotics.

We still consider three rules of Asimovs the best safety restrictions that could program a robot to abide; the three requirements are:

1. A robot might not injure a human being or, through inaction, allow human nature to come to harm.

2. A robot must obey any orders given to it by the citizenry, except where such orders would conflict with the First Law.

3. A robot must protect its existence as far as protection doesn't conflict with the First or Second Law.

In 1952, Alan Turing developed the 'Turing test' in order to determine if a machine has the power to think for itself in a true manner. To pass a robot or computer must be indistinguishable from a human during a conversation.

In 1961, the general motors production line installed the first operated and programmable robot, the Unimate. The robot used to lift desirable pieces of metal from a die casting machine and stack them.

In 1967, Waseda University started the WABOT project. They completed WABOT-1 robot in 1972 and were the world's first full-scale android humanoid robot. The first robot able to walk and communicate with people in Japanese, navigate an area and grip, and transport objects. They later created WABOT-2, which could read a musical score and playing an electrical keyboard.

George Lucas has released the first Star Wars movie in 1977, which became one of the highest-grossing movie franchises of all time. The film inspired a new generation of research by demonstrating a human future shared with robots like the now-famous R2-DT and C-3PO.

With one of the first instances of artificial intelligence, IBM created a computer known as deep blue in 1996. They designed the machine to play chess and on May 11th, 1997, it beat world chess champion, Garry Kasparov.

In 1997, Japan Held the first-ever Robocup tournament. RoboCup aimed to promote AI-based robot research by offering a publicly appealing but formidable challenge. The goal of the RoboCup is to have a fully automated team of robotics that can beat the world's best football team by the year 2050.

In 2000, after over two decades of research on Honda debuts ASIMO, ASIMO had 11 robotic predecessors that were developing to research bipedal walking robots. The most advanced robot in the world was ASIMO upon its release, since then it is being continually developed and was the first robot capable of running, jumping, and using the stairs. We still see ASIMO as one of the most advanced robots in the world today.

Aldebaran Robotics released Nao in 2006, a 2-feet tall humanoid robot, which is being used worldwide by universities as a research platform and educational tool. Nao has become the face of social robotics. By replacing Sony's Aibo robot dog, Nao has become the standard platform for the Robocup. Over 5000 of these robots are being used in over 50 unique countries and have programmed to do several things such as help in company receptions, care homes, and even help Autistic children.

NASA and General Motors revealed Robonaut-2 in 2010, a highly advanced dexterous humanoid robot that was part of the Discovery shuttle launch in 2011. Robonaut assisted NASA with spacewalks and has enough ability to use tools and work alongside astronauts in future space expeditions.

NASA later developed Valkyrie, a robot with the ability to set up habitats on Mars before human arrival ultimately.

Softbank Robotics released Pepper in 2014, which quickly became the world-leading commercially available social robot. They rolled pepper out in Softbank's mobile stores in Japan and have since been using in Carrefour and Renault stores across France.

Hanson Robotics released the first-ever AI-based robot Sophia in 2016, a social robot with silicone skin, and the ability to interact with people and display over 50 facial expressions. The Sophia robot is also the first-ever robot that has the human-like appearance and behavior to gain citizenship of a country.

Thus we understood that robots are no longer concerned only for factory applications, but also used in a more complex and unstructured outside world, the automation of various human activities, like caring for the sick, driving a car, making love, and killing people. New robots, therefore, literally concerned automation from a desire to war. The military sector and also the car industry are reliable drivers behind the development of this unknown information technology. They have always been so. The car industry took the lead in introducing the industrial robot and with the robotization of cars. The military, especially in the U.S., stood at the forefront of artificial intelligence development, and now artificial intelligence is driving computers and the internet. More precisely, robotics makes use of the current ICT infrastructure and also implies a continued technological evolution of these networks. Through robotics, the internet has gained senses and hands and feet. The new robot is thus not usually an efficient system. To grasp the probabilities of modern robotics, therefore, it is essential to realize that robots are supporting a network of data technologies, such as the internet, and often presented as networked robots.

Long-term engineering ambitions drive new Robotics. First, there's the engineering dream of building machines that will move and act autonomously in complex and unstructured environments. Second, there's the dream of building machines capable of social behavior and has the capacity for moral deciding. I mention the notion that this might be technologically possible within a couple of years as a strong AI. Thus, the future of AI-base robots is an exciting prospect!

Facial Recognition in Our Daily Lives

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TE IT

In modern times, security is a huge risk. With developments in technology as much as we believe that we are becoming secure, at the same rate, hackers are becoming smarter. Cracking someone's password can be done with brute force or by something even as simple as knowing a few of the user's personal details.

But with the recent advancements in technology, more unique forms of security can be achieved, for example, facial recognition, fingerprint identification and voice recognition. Although the aforementioned identifications are distinctive, they are not impossible to imitate and/or spoof.

In the present-day, facial recognition, fingerprint identification and voice recognition have found their way into the common man's life through the aid of smartphones and similar technologies. Nowadays, you can just look at your phone or just tap the fingerprint scanner and it'll unlock.

Movies and TV shows like to portray how the authorities catch criminals using facial recognition, comparing millions of photos from thousands of sources.

Facial recognition is a technique that recognizes a human face through the assistance of technology. A facial recognition system uses biometrics or human specific characteristics to map facial features from digital media like photographs or videos. It compares the information with a catalogue of known faces to find the closest match.

This is something that our ancestors would have called "sorcery", and ask us how can we trust these computers? We can say that modern-day innovation is the past's magic.

Companies like Google, Apple and Samsung have invested a lot of time and effort into creating the present-day facial recognition in smartphones. But it is important to note that each of these companies has a different approach to how they identify the individual.

An approach that I found to be interesting was Apple's approach of using a technology termed as the TrueDepth camera system for their Face ID authentication. This TrueDepth camera system then captures accurate facial information by projecting and analysing numerous invisible dots to create a depth map (or 3D depiction) of your face while also capturing an infrared image of your face. This depth map is what sets Apple's facial recognition software apart from many, if not all, its competitors.

The newer generations of iPhones have an advanced neural engine that is responsible for transforming the depth map and infrared image into a mathematical representation and compares that representation to the registered facial data.

Face ID will automatically detect and accommodate to changes in your appearance, such as wearing makeup, spectacles or growing facial hair. If there is a substantial or sudden variation in your appearance, like shaving off your beard, Face ID confirms your identity by using your chosen security pin before it updates your facial information stored in its memory. Face ID is designed

to work with most accessories like hats, contact lenses, and certain sunglasses. Essentially, Face ID has been built to function in many diverse environments like indoors, outdoors, and even in total darkness.

Face ID matches against depth information, which isn't found in print or digital media. It's designed to protect against deceiving by masks or other techniques through the usage of elaborate anti-spoofing neural networks. Face ID is built to perceive whether the user is paying attention or in other words, it said to be "attention-aware". It is capable of discerning whether your eyes are open and your attention is focused towards the device. This makes it more rugged, while also prevents unauthorized access to your device without your prior knowledge and consent, such as when you are sleeping.

A major disadvantage of facial recognition is that it fails when too much of the face is covered, just how you may see criminals escape wearing a mask, sunglasses and baseball cap on the silver screen.

Many tech-enthusiasts use facial recognition in their home ecosystems with the support of Nest automation. Nest is a brand of Google used to endorse smart-home products including thermostats, smoke detectors, routers and security systems including smart doorbells, cameras and smart locks.

Even though so far all I have listed are the positive aspects of facial recognition like everything else in this world, it has its pros and cons. Facial recognition can help verify an individual's identity, but it also comes with certain risks.

So, what are some of these risks that you should be aware of?

- Security: - As your face is something you always show to the world, it can be gathered and stored, anonymously without your consent. The data can then be accessed by hackers.

- Ownership: - In this digital world, although your face is yours alone, the same cannot be said about your pictures. Nowadays no one has got the time to read every Terms of Agreement and Privacy Policy. We just hit "I agree" to hasten the process and may inadvertently give up the ownership of whatever we upload on that website/app. And with the growth of accuracy of search engines, anyone can track down your data and even misuse it.

- Safety: - Facial recognition software is becoming more commonplace and hence if someone happens to take a picture of you in public and run it through the software, your identity may become compromised. This could escalate to harassment or stalking.

- Mistaken identity: - There is no system built by mankind that's perfect, consequently facial recognition software can make mistakes and the effects can lead to harm for a completely different person. What if the police arrest the wrong person based on solely the conclusion reached by this software?

- Basic freedoms: - If your facial data is collected by the Government and other agencies then they can easily track your every movement, making anonymity and privacy virtually impossible.

Importance of Math in ML and DL

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I'm sure many of you reading this article have heard about Machine Learning and Deep Learning. These topics have been plastered everywhere on the internet and you even see them creeping into your day to day life. In fact you'll see them in your syllabus as well depending on which stream you have chosen. These topics are certainly important and the attention they get is well deserved. As many of you are aware their applications are widespread. So you've seen many people who are learning them for different reasons like employment, internships, higher education etc. Very few people learn these topics because they are really interested.

While doing your research about any topic in general you must have seen many blogs or websites online which have titles like "Implement a topic XYZ with library ABC in language MNO". The premise of implementing something impressive in a short amount of time is really lucrative. It is human tendency to be lazy and get things done quickly. But you might be doing yourself a disservice in this manner. Training a Neural Network for example requires knowledge of hyper- parameters like learning rate, activation functions, gradient descent, etc. Rarely, you get good results without tweaking such parameters and their modification is impossible without knowing the impact of hyper-parameters on the final result.

While experimentation with values may help, the only guaranteed way to get good results is by having an in-depth knowledge of the topic. And the only way that is happening is by knowing the the subject which is the building block of every scientific stream ever: Mathematics. Many people have an ingrained fear of mathematics due to a variety of reasons, most are related to the method with which it has been ingrained in you. Math isn't just solving questions; it is much more than that. It is a tool to solve problems of any kind. When it comes to Machine Learning and Deep Learning, it is not incorrect to assume that everything contained in it is maths in disguise.

Thus you'll need to know a multitude of math concepts to get a grip on Machine Learning and Deep Learning. Linear Algebra is a very important topic. It's a starting point for any kind of future work, along with Statistics. As you go deeper into the rabbit hole, you'll need to know the basics of Multivariable Calculus, Probability and Counting. Now this may look a little overwhelming, but they are not. In fact most of these are covered in your previous classes. While starting your journey in this stream it's important to get an understanding of the concepts and see how they relate to with what you're learning. Concrete mathematical understanding can follow when you're more comfortable with your concepts.

Coming back to online resources, it sure is tempting to just read a blog post and 'repurpose' their code and call it a day, But in doing so have you really learnt the topic? The answer to this question depends on what expectations you set for yourself. If you're content with just skirting along doing the bare minimum, then that's alright. Just keep in mind the pitfalls of knowing something superficially. But the satisfaction of knowing something in detail is unmatched and the benefits are useful in a variety of ways. As with nearly all things in life, the choice is yours to make.

So the other day AI asked: What is Love?

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When I started with machine learning, I was quite disappointed with how all these ML algorithms are trained to understand a problem and find out how we as humans solve the same, in fact in some cases the solutions are unconventional but unexpectedly accurate. But when you take a deeper look at these algorithms, it is quite obvious to realize that the approach is more like objective-based learning which is far from how the real world works i.e. subjective model, which solely depends on the scenario based decisions what we make and how a person as an individual feels about something, and this is quite a legit definition of being conscious.

Don't get me wrong on this, all the achieved milestones with these algorithms are exceptional in a true sense. One of the articles I read, states that the trained Convolution model on the pictures of criminals having a neutral face in most of the images can predict if the person is criminal or not by extracting the facial details during interrogation with 83% of accuracy. And there is a considerable amount of amazing models ready to use in all kinds of domains. But let's now think above all this, where exactly are we going? To make it simpler, take the Internet of Things (IoT) as an analogy to understand how objective-based models can help in subjective learning. Think of these ML algorithms as sensors used in IoT, as an interface with the real world, the working principle of these sensors has its own complexity and some error rate, same goes to machine learning models, they are trained for the specific task and have some error rate. Later in IoT, all the collected data is sent to the backbone of the system where the decisions are made, but in case of making machines think like humans the backbone is still missing, the consciousness, and this is what AI is all about.

Understanding AI is more like a study about humans than the technology. We as a human, our system consists of biological and emotional hormones which work simultaneously. Rather than writing programs that try to mimic specific human behaviours like love, we have to build machines that learn and develop the way humans do. This multidisciplinary field is called developmental robotics. The whole idea is to fill the gap of subjective learning and make a true humanoid. One of the approaches to develop consciousness is to allow a robot to self stimulate and become aware of itself, once that is done we can assign an objective task to it with bare minimum rules unlike many machine learning algorithms and let it learn by trial and error. Now, can we make it behave like a human? Human sadness is often linked to slower-paced speech, sluggish body movement. Anger, on the other hand, is generally associated with intense, abrupt speech and quick, aggressive movements. Emotional robots may be able to communicate with us in ways we intuitively understand, like showing a sluggish walk when their battery needs recharging, instead of a confusing panel of lights and beeps, modulate voice when it feels sorrow or anger.

In the recent interview of Hooman Samani, a director of the Artificial Intelligence and Robotics Technology Laboratory at National Taipei University, Taiwan says, "We tried to mimic that in our

robot. For example, an increased level of ghrelin (a biological hormone) makes you feel hungry. Digital ghrelin makes the robot want to charge its battery, and from the physiological standpoint, oxytocin is the hormone of love. Its level increases when we interact with our beloved ones. It decreases when we are deprived of this interaction."

To make this AI work, we move from a statistical approach to probability based approach specifically towards Baye's probability which calculates the dependent/conditional probability. This gives us the ability to do risk assessment which is widely used in autonomous cars. The Bayesian approach can be easily understood by thinking of how we should classify a spam email from a bunch of emails. The idea is to find the probability of being spam given the words used in the mail by already knowing the probability of words used in a mail given that the mail is spam. But to make this more efficient, to mimic the emotional hormones of human body researcher use "Dynamic Bayesian Networks" or DBNs. Now, robots can dynamically (on real-time) understand how the inputs should be interpreted and decide what is the best reply or action to be taken which has minimal risk. So without any hesitation, an autonomous vehicle will kill a rabbit and save a human being if it had only option to save any one living being. To all the rabbit out there, stay safe, stay home. We, humans, are too mean to be alive.

All this does work amazingly, no doubt. These cutting edge findings do enable robots to understand us and give an appropriate response which might sound emphatically correct to us but do they really understand us? Can they build an image of each individual they interact with? In a way, what I am asking here is, when we talk to someone we use our knowledge and experiences to interpret the message and reply with our opinion on the subject. When we meet someone for the first time it is us who decide or guess if the opposite person is of "my type" or not. There is a huge amount of research and funds invested in this field which is known as "Cognitive robotics". But till then the question still remained unanswered, can we make a robot understand 'what is love?'

A Quantum Connection

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Last year, I wrote a sort of an Intro to Quantum Computing, tried explaining, in layman's terms, a few entry level topics such as superposition and quantum entanglement with a few analogies here and there. Well between now and then, a lot of progress has been made in this very difficult to understand field of computing. A lot is an understatement really. The people and companies at the forefront of quantum computing have made a ridiculous amount of progress in the short span of a few years. Revolutions don't happen overnight but realizing the breakneck speed at which quantum computing is moving ahead, one would think twice about that statement. And the interest is rightly present. In classical computing, there is a sort of an observational law put forth by the co-founder of Intel, who many consider the pioneer of modern semiconductor applications (me included). It states, "The number of transistors on a microchip doubles about every two years, though the cost of computers is halved". Now this is a law pertaining to classical computers and it has held up for 40+ years. But experts think that it may be time, that Moore's Law may not hold up in the near future. The reason for this is the scale at which we are manufacturing the core blocks of a classical computer; transistors. Transistors basically reduce or amplify the flow of electrons across a bipolar junction essentially acting as a switch with two different voltage levels corresponding to high or binary '1' and low or binary '0'. So today, the industry standard in personal computers is a 14nm manufacturing process and even 7nm for the ARM processors in your modern smartphones. Now the 14nm or 7nm process is just a commercial term but to put in simple terms, the smaller the number, the smaller your transistors and the gap between them. This leads to a process that allows billions (yes, with an 's') of transistors to fit into an inch-wide processor chip in your phone. Now that is very impressive, but to adhere to Moore's law is to keep shrinking your process. Here's where the problem comes in. Now to put in perspective, the HIV Virus is about 140nm in size and when your chips are so much smaller, it becomes very difficult to work with any equipment because at this size, we start entering the quantum realm. And anyone working with quantum physics would probably use one word to describe the quantum realm; weird. There are so many unexplained phenomena in the quantum realm, the theories published about them have the word "uncertainty" in them. Jokes aside, the quantum realm may be weird but the brilliant minds of our time have seen these phenomena for what they can be. And what they can be is a godsend to the technological progress of humanity at a time when Moore's Law was just about to be broken.

Finally, we come to the quantum part of this article. Now the important thing setting apart a quantum computer from a classical computer is the fact that a classical computer depends on bits to store information. Voltage levels used to provide a binary communication method. With quantum computing, there still is a binary system in place, but unlike classical computing where a single bit can either be a '0' or a '1'; a qubit or a quantum bit exists in both those states simultaneously. Now how did that happen? Superposition! Currently there are 2 kinds of su-

perposition used to create the qubit for a quantum computer. Using electrons, the computer measures the spin state (spin down: 0, spin up: 1) while with photons, they measure polarization (horizontal polarization: 0, vertical polarization: 1).

Quantum systems are said to be in superposition since until a quantum system is measured, the current state of a system cannot be known. And the real kicker with these systems is that when you measure a quantum system, you get that measured data for that particular instance of the system but you tamper with any other data you could hope to obtain (shout out to Heisenberg's Uncertainty Principle). This is because to measure any system, you need to interact with it in a certain way. With macroscopic objects, there are so many data points that interacting with a few doesn't really affect the system as a whole but with quantum systems, measuring is essentially destroying. Well then how do you really use the power of a quantum computer if barely touching it destroys everything about it. Well scientists figured, if we are going to tamper in any case, maybe we could minimize the effect that the tampering does. This is why quantum computers are really cold. The D-Wave Quantum Computer is essentially the coldest place in the universe. Yeah, the whole entire universe. Heat is basically energy and any presence of energy is a source of entropy and entropy just creates chaos. So, quantum computers use really cold environments to cool down the system to the point that the only possible disturbance is the measurement itself. No vibrations, no heat, no light, no energy other than lasers trying to measure the state. Well that's all well and good but a computer's got to compute right. That's where the difference between a classical and a quantum computer becomes more apparent.

With a classical computer, you feed it an input, and if your logic should be correct, you expect an output. Well with quantum computers, it's not that simple. Since a qubit is in a superposition of 0 and 1, the input you feed to a quantum computer goes through every single possible output, not just the one you want. So, a quantum computer doesn't just spin its magic qubits providing a trivial answer. A quantum logic gate unlike a classical logic gate keeps performing operations on its input qubits and generates a lot of outputs, a seemingly random table of outputs. But when the quantum gates are arranged in a certain order forming a kind of digital circuit used to manipulate bits, the outputs start favoring a particular answer. Basically, when quantum gates are correctly arranged, we can find order out of this random mix of answers and the output with the highest probability is usually the output that a user is looking for. The process hasn't been brought down to an exact science but the progress is incredible. To measure this progress, the people in quantum computing use the Shor's algorithm which is used for integer factorization. The reason this algorithm is used is because the current encryption standards use prime factors of a really large number for encryption (RSA standard uses 2048-bit keys which is about 617 decimal digits). While a classical computing would need millions of years to process this number using Shor's algorithm, for a quantum computer, it could just be a matter of days. Well, quantum computers aren't quite at this stage yet with the current world record being 56,153. But only last year, this number was a measly 21. So, we are not far off. While this is great from a computation perspective, this is basically devastating to any and all privacy since encryptions will no longer be a viable security method. Not to worry but quantum computers bring forth the answer to that as well.

This brings me to the final part of this article, the quantum connection - A new interconnected network using only quantum endpoints, the perfect harmony of quantum and classical computing. While our personal computers and smartphones don't see a quantum upgrade anytime soon in their future, our security methods very well could. It goes without saying quantum computing is extremely expensive for the time being, but maybe we could morph Moore's Law to fit quantum computing soon. Anyways, this hasn't stopped a Netherlands group of quantum computer scientists from creating the world's first quantum internet. A quote by the lead from the team: "Quantum Internet will provide virtually unbreakable privacy and a foundation of secure communication, guaranteed by the fundamental laws of physics." They do this harnessing the quantum phenomenon of entanglement (which is completely unexplained by classical physics but we know exists) over several small quantum computers. And they have used it at an unprecedented scale of over a kilometer (about 1.3km). Qubits, smaller than molecules, measured in scale of nanometers, maintaining an entangled state, over a kilometer apart from each other. It really is the stuff science fiction is made of. They have used a process which entangles a lot of these extremely tiny particles and using them as a single entangled pair providing an error corrected entangled system where even if a few of those particles lose their entangled state, the system as a whole will provide correct data. This seemingly invisible communication medium setup between 2 Dutch cities today is going to be the basis on which the quantum internet is going to be built. And we have only hardly scratched the surface on this realm of quantum computing. Well I'm done here for now but I highly recommend you check out the IBM Quantum Experience for a peek at the future of quantum computing and a deeper understanding beyond the scope of this article. Thanks for reading!

Soaring Web Technologies

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Today, the greatest question an application developer probably faces in the early stages of their programming career is: Native or Web? For long, native applications built specifically to run on a particular Operating System and Web Apps built to run on the browser have had major differences with native apps leading in performance and stability while web apps enjoy multi-platform reach on a single codebase. Although with advancements in network technology and the amazing interest that web technologies have garnered, this line between native and web apps is starting to blur. The Open Source movement has had a massive impact on driving the progress of technology especially web technologies since these technologies are available the easiest and thus attract a bigger audience. Huge Silicon Valley companies use Open Source extensively in their development cycle since it helps produce applications faster, costs are reduced by a lot, developers work together to help each other and this in turn keeps feeding the flame that is Open Source. Open Source Web Technologies have gained massive contributions from the Mozilla Foundation, Google, Microsoft, Facebook and nearly every other big name in this technology space.

But how exactly have web apps been able to catch up to native applications? Generally speaking, native apps shine in providing direct hardware access, offline availability and crazy performance compared to traditional web apps. With modern applications requiring greater processing power and ease of use and accessibility becoming a must have for any app, it seems discouraging to develop a massive web application which is bound to fail pertaining to these reasons. But all hope is not lost. The Open Source community took it upon itself to make this happen. The vision was simple, to have people write code once, use anywhere without having to worry about any of the traditional drawbacks. There are 2 major relatively new technologies introduced to tackle these issues head on. Firstly, with modern browsers allowing web apps to store greater amounts of data than ever on the client side and providing easy-to-use APIs for direct hardware access, it was just a matter of providing a standard to create these hybrid apps using the code of a web app while possessing the offline features of a native app. These are PWAs or Progressive Web Apps. Second, and the most difficult hurdle with web apps which is performance has been the biggest turn off to developers thinking of moving to web app development. To deal with this, the W3C (World Wide Web Consortium) has added a new language to the recommended native browser support languages which previously included only HTML, CSS and JavaScript.

Let's have a look at PWAs first. Progressive Web Apps are exactly what they sound like. The progress of technology has allowed their existence to come into being. Progressive Web Apps harness the power provided by modern browsers (majorly Chromium project by Google, another open source product) to establish client-side storage for crucial components of an app

which may take a longer time to be transferred over the network over and over again and also establish core offline functionalities such as push notifications, offline data persistence and more interactive native-like interfaces. PWAs are not only the subset of web apps which take advantage of client-side storage but they are also built using the best practices in web development. PWAs force HTTPS to be able to utilise HTTP/2 which is a more efficient and secure transport protocol allowing greater speeds without compromising on data integrity using binary framing layers encapsulating HTTP semantics as opposed to HTTP's plain text format. Desktop Browsers allow up to 500mb while mobile browsers are capped at 10mb of client-side storage capacity and so PWAs are made responsive keeping these limitations in mind. But since web apps use languages which were designed to cost less storage and using compressed assets to save network round trip times, PWAs were set up for success even before being introduced back in 2015. PWAs in general use the PRPL Pattern as guideline for maximum efficiency. PRPL is Push or Preload critical resources for initial URL Route, Render initial route, Pre-cache remaining routes, Lazy-load and create remaining routes on demand. Preloading is used to prioritize loading certain files in your app without which your app does not reach its initial view or landing page. This is done by adding the declarative fetch attribute of 'rel = "preload"' to link tags. Rendering the initial route refers to the first bit of processing that your app needs usually written in JavaScript. You can add non-crucial JavaScript operations to a different file which can be deferred using "async" for an asynchronous load pattern. Pre-caching is keeping a cache of assets used in your app on first load so that the service workers in your browser can act as a proxy fetching the cached assets instead of pulling resources from the server on every request. Finally, Lazy-load is a relatively new technique brought about by web bundlers such as webpack which allow splitting your dependencies into chunks which can be loaded on demand. For example, you would only request pulling axios, a wonderful http client API only when you actually submit the form which needs the library to function. Thus, all of these minor things work toward having a blazing fast first paint or initial render of your web app by reducing the amount of data sent over the network and the initial processing done on the client side allowing to pave the way for growth of PWAs further.

Next, we come to the performance issue. Let's get into it with a backstory. A few years ago, Mozilla saw this potential in the web, the very thing this article is based on. The developers at Mozilla thought they were limited by their JavaScript engine performance and as such came up with a framework called asm.js which was supposed to be a low-level subset of JavaScript. They had the idea that browsers would see the special string designed for asm.js and switch to a super-fast JavaScript engine and they released it to the public. Google being the big bad bowser king, was expected to add asm.js support to their browser Chrome. But the folks at google were like why don't we just make the regular JavaScript engine faster and they did it and essentially succeeded to make the performance boost provided by asm.js a miniscule one. (Personally, I just think it's really cool/kickass how Mozilla came up with this new idea and Google was just like "Hold my beer"). Now the problem with this approach was that the end result was still JavaScript and there are only so many optimizations you can make to the core functionalities of a language. Well that was before WASM was brought into picture. WASM short for Web Assembly is an Assembly Level language for the browser. If you had to draw comparisons, WASM

code is like the bytecode generated by Java compilers which can run on any JVM irrespective of the platform it is running on with relatively the same speed. Here your browser is the JVM equivalent. WASM is a compile target meaning you write your code in a language you feel comfortable in and then you can leave it up to the compiler to provide you with a final product in form of a WASM bytecode. WASM was first developed keeping low level languages in mind since they provide the most granular access to OS level features which help performance most. As such, C++ was the first language to be compiled into WASM. Today, WASM supports nearly all languages under the LLVM (Low Level Virtual Machine) umbrella including Rust, Swift, Clang and more. Rust has been particularly interesting in the web field. Rust has seen tremendous progress in performant, reliable code and with syntax taking cues from high level languages while still being a low-level systems language, Rust is now used in compilers creating the WASM binaries. Mozilla has been heavily pushing Rust as a memory safe language having replaced a lot of C++ code in their browser with Rust but that is outside the scope of this article. All I can say is Rust may just become the next C++ :P

If anything, this web movement is better late than never. Apple had the opportunity to fast-track this in the days of the launch of the first iPhone. When asked about app development for the iPhones, Steve Jobs said he expects developers to create web apps. But there wasn't a whole lot of developers coming up with any ideas and in the end, Apple crumbling under pressure, decided to go with the creation of the app store and the entirety of the ugly iOS development environment. Well, all of that to say the future of the Web is bright and we may very well see more web apps being developed using low level languages harnessing every bit of power provided by the hardware, the permissions provided by the OS and the optimizations provided by the Browser. You can check out Mozilla's vision for the future of WASM at hacks.mozilla.org in the "Web Assembly Post MVP Future" article. Thanks for reading!