

CONTENTS

- Guest Article
- Back to Venus
- Time Travel Paradoxes...
- The story of the...
- Interacting with Atoms...
- Covid -19
- Inner Beauty is...
- One Wish
- Events



CONTENTS

- Holy water
- Turiya
- Good O' Days
- I'm
- Poetic Vibe
- Paintings
- Photos



Part-2

All about scrum from a SCRUM MASTER



As interviewed with
Mr. Saugharsh
Senior Developer and Scrum Master
Principal Global Services,
Pune, Maharashtra.

Any advice for students like us sitting at their homes and studying engineering?

You know, this is kind of addressing your younger self. So, I'll tell you what I didn't do when I was in engineering. As a matter of fact, in engineering what I feel is, more focus is given to studying the theory. Even the course practicals are not enough to challenge the programmer in you, not sure what kind of practicals are given today but talking from my experience. If you want to be a developer then start coding on your own. Find

complex problems and start working on them. All the information or tools and techniques that you need to do are available freely. You can open your account on GitHub and work on your repositories over there. Then there is a tool called JetBrains. JetBrains offers you a series of the integrated development environment (IDEs). PyCharm for python and IntelliJ idea for java development. There are a number of free tools available at JetBrains for students. You can go there, you can create your own environment on your personal laptop and then you can start coding. So, start finding complex problems on your own and start coding. Your hands-on experience is a must, and it helps you to be job-ready.

we will increase it to 35, so on and so forth. We are turning in more work than before. Find innovative ways to do that without having to increase the workload among the team. Another thing that we try is making a self-sustainable team where we don't have any roles as far as engineers are considered. The same person who does the testing should be able to do the development as well.

Juggling between multiple projects

If you are doing it in college the only thing I can think of is managing your time better and working a bit extra in order to achieve that. But when it comes to the corporate industry, you never do that. It is not advised to work past your working hours. It is sufficient to work 9 hours a day. You don't need to work 10 or 12 hours in order to do the extra work. There in the concept of priority gets introduced. So like we have said about the example of you developing a website for your college and you also have a chatbot in that. So chatbot is kind of a fancy feature; your primary requirement would be your website. After the website is done, then your chatbot is another fancy feature that you can add to it. If you are working on a website and chatbot at the same time, your website will always take priority over your chatbot. Let us say if you have a feature, to work from your chatbot epic (we call it epic), so developing a website will be an epic and developing a chatbot will be another epic. If you have a piece to work from chatbot epic and a piece to work from your website epic, then your website epic will always take priority. So, you will work on the chatbot epic only when you are done working on the website epic.

Sudden Changes in a project plan

When you experience a sudden change, you get together

as a team you brainstorm on that and collectively come to a solution. When such things happen, every 15 days you do a retrospective. And in retrospect, you ponder over the things which have gone wrong and you could have done better and steps you will take in order to make this better in future. You learn from what you know in retrospect. When some sudden change comes if you have faced something similar in the past you surely have some learnings from that particular incident. If not, you get together as a team, you brainstorm it and you come to a solution.

Challenges or setbacks we are expected to face in the industry

The challenges that you might face, first of all when you enter into a project, you will be overwhelmed by the complexity of the code. Even if you have done a bit of good training as in training you revisit the basic features and overall structure of a particular language. But when you get into a project you'll get to see the things in detail, those are complex and that might overwhelm you at first. The entire structure is like you have meetings with your stakeholders, you have to give the demos to the stakeholders, you have to contribute to some ceremonies, you have to put your point across, etc. So those kinds of things you might find challenging at first. I would not consider it a setback. But I do think you will find such things challenging at first and as time passes you will get better at it.

Technology that'll excel in the next 10 years

When you have a piece of software written in an older language, you rewrite that software into a newer language. That is called migration. So now what were the pieces of code that were written in java or in the

Impact of COVID-19 on jobs. Is there a new emerging market?

There are actually some new jobs. When we consider the revenue in online platforms or OTT platforms those incomes/revenue are massive. The virtual meet places like Microsoft teams, skype, etc., the usage has increased. And, on top of that, people are going more on the cloud. It is always cheaper to go to the cloud rather than having your own office setup, systems, servers. Hence, there has been an increase in the approach towards the cloud as well. Digital setup has created a lot of opportunities and some sectors like AWS, cloud, virtual meet, and OTT platforms are evident of this new job market.

When we talk about this impact on the industry, how has communication, work-life balance been affected?

Communication is the same as before; it's just you don't see the faces. But communication, largely, has been less interactive. Apart from that, I don't see any change. Talking about work-life balance; that has changed quite a bit. Now when something comes up, people expect you to take care of that even if it is past your office time. In general, if you stick to your routine like you log in at 10 o'clock and sign off at 7, nobody is going to bother you for that. If you're kind of a workaholic and you tend to work past your office hours, then it's easier to get your work-life balance hampered.

Expectation after COVID

First of all, I'd say there'll be a constant increase in the applications being moved to the cloud. In the cities which were previously hubs for technological development like

Pune, Bangalore, Mumbai, the shift will be towards the smaller cities because you can work from anywhere now, you have your setup on Cloud and all you need is a laptop and internet connection. So, that kind of change will be there. On top of that, as I said earlier, there will be an increase in Digital jobs that have been created during this COVID pandemic. AWS and online communication platforms will increase.

When to start with internships? How does one navigate their way?

As a matter of fact, I never got into an internship. I got placed into a company when I was in my third year. But you can connect to your training and placement officer, they will hook you up with some organization. My organization picks up Engineering graduates in their final year. And my company lets them work on Development projects usually based on the cloud. But having said that, if there is some portal that can handle these internships as the job market is being handled right now by LinkedIn or naukri.com it'll be nice. The best way I can suggest is to reach out to your training and placement officer and have them connect to the organization. Let them take care of this particular internship program.

As a team should we set goals and deadlines?

It's imperative that you set goals. The kind of goals that we set is very important since we work in Agile. There are some matrices by which we measure the improvement, quality of a team. Velocity is a metric. Wherein you calculate how many points or how much work you have done in a particular interval say two weeks. So, when we calculate that it's done in points. Say we have locked 30 points for these two weeks. In the next,

mainframe that is being written in more cloud-friendly languages, say, Python or typescript. In the coming time cloud and fields such as data mining, data engineering, data science etc. these fields along with the cloud will rule the technical industry. Many languages will be obsolete by then. I'm not sure if java will still be a thing by then, Python will rule the technical industry. Languages evolve.

basic human skill to have. Sometimes a person will be good at technical skills but may not perform better owing to some personal issues, in such a scenario, being empathetic puts you in someone else's shoes and makes you understand the problem. If you can help that person, it will help the development of the project as well. So being empathetic is important not just in the corporate milieu but as a human being itself.

Non - technical

Will MTI [Mother Tongue Influence] be an obstacle for freshers to get placed and to sustain themselves in the industry?

Freshers will face issues because of MTI especially when they are in a situation to communicate with a person whose mother tongue is English, and to a wider audience outside the country. It will be advisable for the upcoming aspirants to overcome this challenge to survive in the industry.

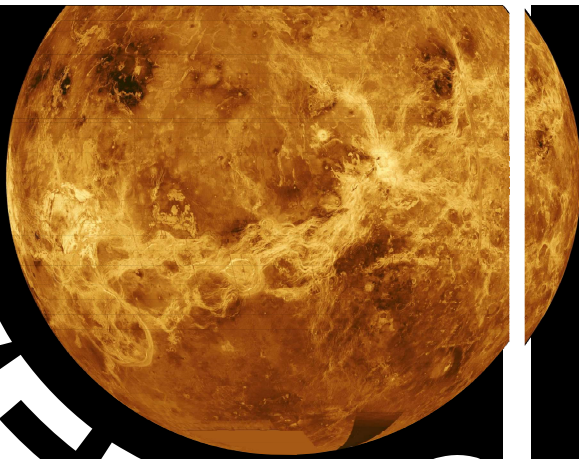
Role of Emotional Intelligence [EI] and being empathetic in a corporate milieu

EI is needed because if one doesn't have the basic level of EI at times things results in conflict. When it comes to conflict resolutions, it is important to maintain calm and listen to the person against you. In situations where a person bursts out, it is EI that would help you in solving things as you would be a good listener who doesn't jump to conclusions. Yes, being empathetic is a



As interviewed by
Ms. Aparna Kholia
Mr. Ananya Talwad
Moderator
Dr. Manjusha C B

BACK TO



VENUS

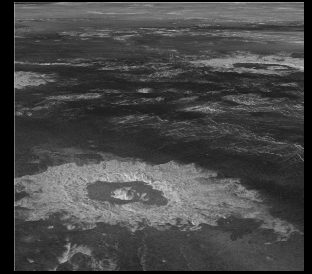
Imagine the Earth. Now fill the skies with thick, sun-obscuring clouds of sulfuric acid; boil off the oceans by cranking up the temperature to 900 degrees Fahrenheit (nearly 500 degrees Celsius), and raise the air pressure high enough to crush you like a pancake. What you now have is Venus, a rocky planet equal in size to Earth but incompatible in almost every other way. These circumstances are too hard for a human being to face and survive. But it is the destination of upcoming NASA launches.

THE JEWEL OF THE SKY

NASA is going back to Venus, Earth's twin, after more than 30 years. The U.S. space research organization has announced two new missions to Venus, Earth's nearest planetary neighbor, on June 2, 2021. As a part of NASA's Discovery Program, these missions will study the "Lost Habitable" world of Venus.

The missions aim to understand how Venus turned out to be the hottest planet in our solar system, though it has similar characteristics to ours. Who knows - it could have been the first habitable world in the solar system with oceans and Earth-like climate.

The missions are the final selections from "Four Mission Concepts" picked in February 2020 as a part of the Discovery Program established in 1992. Nasa is awarding 500 million dollars for development for every mission. These missions are expected to launch between 2028-2030. Before knowing more about the journey, let us first grab some details about our twin planet.



Up to a Magellan image dubbed the "Copper Face", we see the curious (yet not) volcanic activity and rugged terrain. These impact craters are distributed in the lower (southern) perspective view of the surface of Venus. Credit: NASA/JPL-Caltech

It all began in 1962 when Venus became the first planet to be explored by a Spacecraft. NASA's Mariner 2 successfully flew off the planet at a range of 21,660 miles on Dec 4, 1962. It was a quick 42 min scan by the spacecraft before continuing to heliocentric orbit and gathering some notable information about the planet's surface and atmosphere.

Next, it was the turn of NASA's Magellan spacecraft. It was the first deep-space probe launched by the U.S in almost 11 years. It entered orbit in Aug 1990. For the next 4 years, it used radar to pierce through the acidic clouds of Venus, and guess what? It found volcanoes, long lava channels, pancake-shaped domes, and evidence of hot mantle plumes at depths.

Based on the data gathered, the results showed that Venus has a surface temperature of around 887 degrees celsius and high atmospheric pressure of 92 atmospheres. It also found no evidence of phenomena such as "Continental Drift" in our twin planet.

In the summer of 1993, after gathering 1200 gigabytes of data and collecting 83.7% of its surface data, the controllers commanded the spacecraft to drop into the outermost region of the Venusian atmosphere. Then they successfully used an aerobraking method to circularize its orbit. It was commanded to plunge into the Venusian atmosphere to gather aerodynamic data. After 10 hours, it burned in the Venusian acidic atmosphere, becoming one of the most successful deep space missions.

Later on, many attempts were made by leading space companies to gather information about the inferno-like world, such as recent ESA's 'Venus Express' orbited from 2006-2014; Japan's 'Akatsuki', Venus climate orbiter, orbiting since 2016. But NASA's 'Parker Solar Probe' has made multiple flybys of Venus by being within 515 miles of the surface on July 11, 2020. During a brief encounter, Parker detected some natural radio signals that revealed that spacecraft had flown through the upper atmosphere. This is the first direct measurement of the Venusian atmosphere in almost 30 years.

NASA's two new missions:

On June 2, 2021, as a part of the Discovery program 1992, NASA came out with two new missions to Venus.



"These two sister missions both aim to understand how Venus became an inferno-like world, capable of melting lead at the surface."

Bill Nelson
NASA Administrator

1) DAVINCI+ (Deep Atmosphere Venus Investigation of Noble gases, Chemistry, Imaging)

This will be an atmospheric probe. That means it is a descent mission, which will be dropped into the atmosphere of Venus, and instructed to collect the measurements on its way. The probe consists of three stages. The first stage will investigate the atmosphere. The probe will collect the composition details of the atmosphere in layers as it plunges. It will then take precise measurements of Noble gases and other elements responsible for turning Venus into a fiery world. In addition to this, the probe will return the first high-resolution picture of unique geological features of Venus known as 'tesserae'. It will also aim to decide whether Venus ever had an ocean. The 'tesserae', which may be comparable to Earth's continents, can suggest the existence of plate tectonics in Venus. The second stage will observe the lower altitudes. The last stage will be commanded to capture high-resolution pictures of the surface. The DAVINCI+ will be hosting the Compact Ultraviolet to Visible Imaging Spectrometer (CUVIS) built by Goddard. This will make high-resolution measurements of Ultraviolet light using a new instrument based on freeform optics.

The principal investigator for this mission is James Garvin of Goddard Space Flight Center. (source - nasa.gov)

2) VERITAS (Venus Emissivity, Radio Science, InSAR, Topography, Spectroscopy):

This is a bit different from the first mission as this spacecraft is a planetary orbiter. It will map Venus' surface to determine the geological history and better understand why Venus has developed so differently from Earth. VERITAS will use Synthetic aperture radar and examine the surface elevation, create a 3D reconstruction of the topography, and confirm whether phenomena such as plate tectonics and volcanism are still active on the planet

In addition to this, NASA selected a pair of technical demonstrations to fly along. The VERITAS will host the Deep Space Atomic Clock-2, built by JPL and funded by NASA Space Technology Mission Directorate. This will help enable autonomous spacecraft maneuvers and enhance Radio science observations. Suzanne Smrekar of NASA's Jet propulsion Laboratory is the principal investigator. (source: nasa.gov)

These missions, if successful, will not only help us extend our boundaries to exoplanets but also answer a lot of unanswered questions over decades.

- Mr. N. Sujith

ONE WISH

- Mr. Aman Vignesh Kundeti

I personally don't believe in magic. Though for some time during my childhood, I thought I might get an invitation letter from 'Hogwarts School of Witchcraft and Wizardry' (It's not a pun, I desperately hoped it to be true). I didn't, but one night changed everything.

It was a cold winter's night. The breeze was giving my friend and me some severe chills while we were taking a walk. We had just seen a movie and were discussing the plot holes. The weather became sombre and bitter. I mentioned, "You might want to return home as there is a test tomorrow." He was about to turn back when, suddenly, we heard strange sounds—the rustling of trees, irritating bats, dogs howling, etc. We noticed an object that had fallen between us. As we examined it, we realized it was a lamp, not any ordinary lamp, but 'The Genie's Lamp'. We felt that it was a fake one, but we wanted to have some fun, so we rubbed it.

And, no, it was not fake.

A Genie appeared and introduced himself. But this time, he just granted one wish instead of three. We thought of asking for more wishes as a wish. But, it is not possible. Genies can only give the number of wishes granted initially (often 3, but not in our case). Wishes for wishes are invalid and wasted. Remember that I was not alone. I had a friend with me, who had some desires too. We both understood the elephant in the room and decided to wish for something beneficial for both of us. The catch here was, we had nothing in common. He said that he wanted a car, but I wanted all the scripts of the upcoming Marvel movies. He wanted money but wasn't specific about how much, I wanted to be a famous movie director.

The discussion went on and on. I guess Genie got bored of the two men quarreling like Godzilla and Kong and asked us, "What is your wish?" to which we furiously replied, "I wish that you go away. Can't you see we are fighting?"

He replied, "Wish granted."
And that's how you blow up an opportunity.

TIME PARADOXES

TRAVEL

INTRODUCTION

The scientific definition of Time Travel is:

Time travel is a hypothetical concept of traveling between lapses in time, analogous to movement between different points in space by an item or a person, with the aid of a time machine or some other hypothetical technique.

Time Travel will always be a gripping topic. Everyone might have thought about traveling back to our past and rectifying the mistakes made in their lives.

If Time Travel is possible, and you traveled back in time, then you might be predestined to travel and involve in this perplexed activity of Paradoxes.

The Time Travel Paradoxes broadly falls into two categories:

1) Closed Causal Loops:

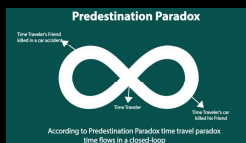
The Predestination Paradox and the Bootstrap Paradox involve an uncreated time loop in which cause and effect run in a vicious circle but are also internally persistent with the timeline.

2) Consistency Paradoxes:

The Grandfather Paradox and others such as The Hitler paradox and Polchinski's Paradox generate many contradictions in the timeline and alter past events.

Predestination Paradox:

A predestination paradox happens when a person traveling back in time's actions become part of past events, perhaps causing the event he is seeking to avoid to occur. This paradox explains to us that events happening in this time-lapse must happen like a closed loop. Sounds complicated? Here is an example:



Imagine a close friend of yours died in a car accident. You traveled back in time to save her but the truth is that you are the person who caused the accident and killed her. So no matter what you do, the outcome is predestined to happen in the same way as a vicious circle.

Bootstrap Paradox

A Bootstrap paradox occurs when an object, person, or a piece of information is transported back in time, resulting in an indefinite loop in which the object has no real genesis and lives independently of its creation.

Reference: many might have watched the web series 'Dark'. A book named 'A Journey through Time' will be revolving around the time loop without its actual creation in that series.

Grandfather Paradox

The Grandfather paradox results in the clearance of self-existence from the timeline caused by killing grandfather. For example, if you traveled back in time and killed your grandfather, you would never have been born and would have been unable to travel back in time. Imagine you decided to kill your grandfather because he is the main person to ruin the world.

You thought if you can kill him before he meets your grandmother, then the entire family (including you) will disappear, and the world will be a better place. According to theoretical physicists, but the situation cannot be the same because of hypothesis like:

- Timeline protection hypothesis
- Multiple Universe hypothesis

Let's Kill Hitler Paradox

Similar to the Grandfather Paradox, which results in the prevention of your existence. The Killing Hitler paradox clears the reason for traveling back in time to kill him. Furthermore, while killing Grandpa might have a limited "butterfly effect", killing Hitler would have many consequences for the entire world. We all might have studied about Hitler in history, so in the first place, you shouldn't have traveled back if you don't know about Hitler. Killing him erases the history of Hitler, and the reason you traveled back will be uncertain

Polchinski's Paradox

Theoretical physicist Joseph Polchinski gave a mind-bending puzzle to other physicists in a letter: Consider a billiard ball sent into a wormhole with a particular angle. The billiard ball is then propelled back in time through the wormhole, where it collides with its former self due to its trajectory, knocking the ball off its course before entering the wormhole, traveling back in time, and striking itself.

It's a non-violent version of The Grandfather and killing Hitler Paradox.

These are some Time Travel Paradoxes. I made this resourceful for you to enjoy reading this article.

- Mr. HASWANTH RAJ

The Story of the Limit

Madhava's Infinite Series.

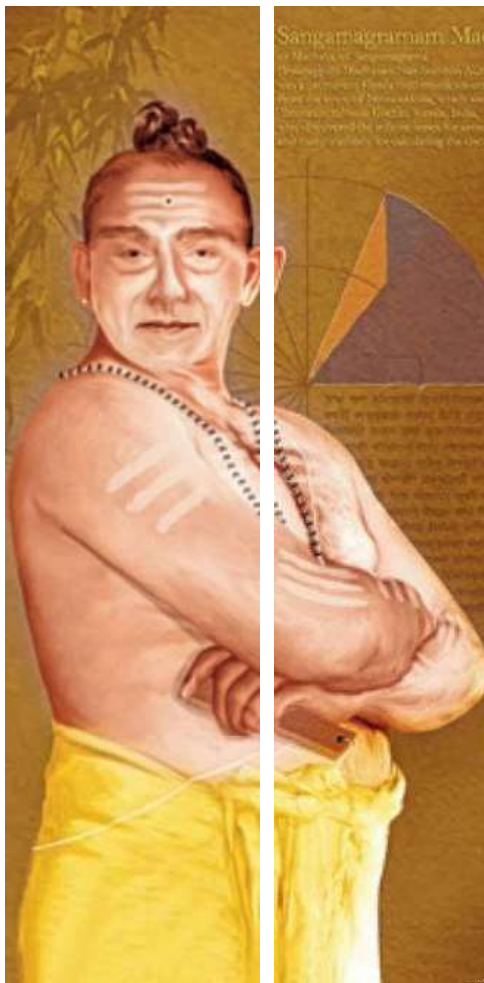
- Mr. NEEL SHAHAKAR

We all have learned that the concept of infinite series was invented by Leibnitz, which was later modified to develop the concept of the LIMIT by Newton in early modern era Europe. But is it true? Weren't infinite series and limits used before that? Let's look at the works of Madhavacharya, the founder of the ancient Kerala School of Mathematics.

The Kerala School of Maths and Astronomy began in the 2nd century AD but came to fame only after Madhava of Sangamgrama, Trichur, in the medieval era. He could write only in Malayalam script in the Sanskrit language and taught the children of his village. He had read the works of earlier Indian scholars like Bhaskaraacharya, Varahamihira, and Aryabhata.

Sitting on the banks of backwaters, observing boats moving back and forth in a damped manner due to the force of water in his village in Kerala, an idea struck him. He thought of moving in a similar damped way on Real number lines. This was aimed at improving the accuracy of a summation series.

The value of pi was available at an accuracy of a few decimal places given by Aryabhata, but the exact value of pi was required. And the fact that pi is an irrational number was also known. Infinite approximations were required to find the precise value of such a number. So, he created an infinite summation series for the value of pi by moving infinite times on the number line in a damped way like the boat.



He knew that pi is between 3 and 4, so he first moved forward to 4. Then he moved 4/3 units backward. Then 4/5 units forward. Then 4/7 units back and so on. By doing this, he tried to move closer and closer to pi. He

knew that by doing this infinite times, he would converge at pi. This is how the first recorded infinite summation series was created.

$$\pi = 4 \sum_{k=1}^{\infty} \frac{(-1)^{k+1}}{2k-1} = 4 \left(\frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots \right) \quad \text{Madhava's Infinite Series}$$

But to compute the summation value, one needs to apply a limit to the value of K as it tends towards infinity in the same damped way. This became the base for the concept of limit, which his students then developed. These concepts later propagated worldwide and reached Europe, influencing modern era mathematicians a few centuries later. They are thought to have inspired scientists to develop the concept of calculus. This particular series was also independently formulated by Leibnitz in the modern era. Madhava also gave a geometrically derived correction term to the series later, making the series more accurate. Another feature of this series was that accuracy for the value of pi could be gained by limiting the number of terms. Madhava's work is notable for the series, but what is truly remarkable is his estimate of an error term (or correction term). This implies that he understood the limited nature of the infinite series very well. Thus, Madhava may have invented the ideas underlying infinite series expansions of functions, power series, trigonometric series, and rational approximations of infinite series.

Madhava's series with correction term at the end.

$$\pi = 4 \left(\frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots \right) + \frac{8}{3^2} - \frac{16}{5^2} + \frac{64}{7^2} - \frac{256}{9^2} + \dots$$

He used a similar technique to determine the infinite series for trigonometric functions. A few centuries later, this was independently discovered by Gregory in Europe. He also developed the sine tables similar to that of Aryabhata but using an accurate infinite series. Note that this was many centuries earlier than the discoveries in Europe.

Madhava's legacy continued to give more jewels in mathematics and Astronomy through the Kerala School of Mathematics for four more centuries. Even though disregarded, Madhava's work was crucial for developing the idea of Calculus that we study today!

COVID-19

-Mr. Shivendra Pandey

From Virus to Vaccine, the world has embarked on a new journey, and we have come a long way in a short time. But it's just the tip of the iceberg. The world is facing the century's biggest challenge, and humans are not leaving a single stone unturned to save humans. The only possible and viable solution to win over the battle with this pandemic is vaccination. A shot in the arm is the only way to stop the spread of the virus and save millions of innocent lives.

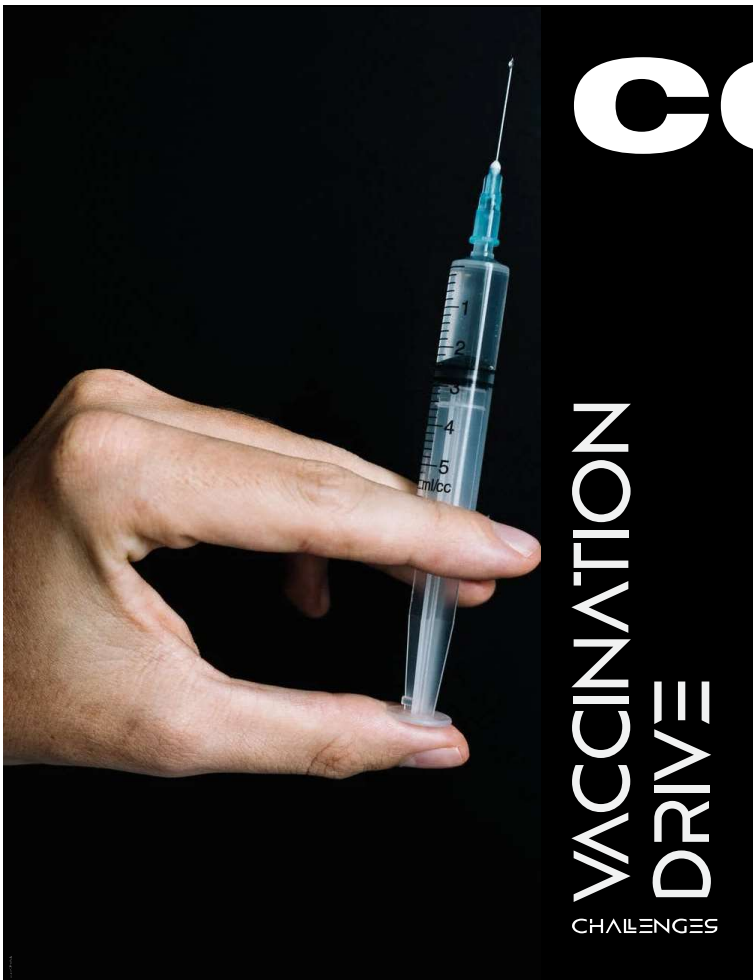
The Covid-19 vaccination drive is going to be the biggest program humankind has ever seen and handled. It's the question of inoculating 7.9 Billion people with about 16 Billion doses, and when the numbers are this big, the challenges are even bigger.

The first challenge was developing a safe and effective vaccine, which has been possible due to scientists, researchers, and pharmaceutical manufacturing companies worldwide, responsible for producing maximum doses in the minimum possible time. Specifically, talking about a country like India with about 1.38 billion people, it's a gigantic task to vaccinate everyone. We have to be ahead of the spread, and there's no other option.

Another major challenge for the vaccination drive is distribution and timely administration, as even a single dose getting wasted means someone's life is at risk. This is a global responsibility. The next paramount challenge is the development and trial of vaccines for those under 18 years of age. This portion of the population is still under threat and without any medical protection. These are the practical challenges. But, there's an even more significant challenge prevailing in rural India. People are frightened and have a misconception that the vaccine is dangerous for them, so there's a need to create awareness about the importance of vaccination.

We need to find a concrete solution for these challenges as there are some upcoming hurdles as well. The researchers claim the efficacy of the vaccines ranges from 70-90%, and there's no significant number for how long the immunity gained through vaccines will last. There have been speculations that there could be a need for another booster dose to maintain immunity.

The whole world is working to fight this pandemic and minimize the loss. India being the second-most populous country in the world, has a tremendous responsibility for the global community, and these challenges need to be addressed. After all, it is lives that matter the most.



VACCINATION
DRIVE
CHALLENGES

INNER IS THE REAL Beauty

At last, I would like to quote a few lines -

"Beauty is only skin deep,
It dies and fades away.
Develop an
inner beauty
That never fades away but,
only grows and matures with time."

"Beauty is not in the face. Beauty is a light in the heart."

This is a small and simple sentence with profound meaning. Beauty doesn't mean having a stunning face and body. True beauty lies in your soul, character, and confidence.

"Your inner beauty never needs makeup."

But what do inner beauty and outer beauty mean? The former can be defined as the beauty that shows our inner character, moral values, or ethics; whereas, the latter can be defined as the beauty that is pleasing to the eyes. Inner beauty can only be felt, not seen. It's entirely based on one's emotional, intellectual, and spiritual qualities. Looking beautiful is every individual's desire, but does that really define you? A famous saying goes, "Beauty lies in the eyes of the Beholder." This phrase points to the fact that different people have different ways of judging others based upon appearance. Though beauty attracts the eyes, one's personality and true character capture the heart. Feeling your best is more important than looking physically attractive to offer your talents, intelligence, and knowledge through kindness, compassion, gratitude, and empathy because that is nothing else but your inner beauty. Develop a positive attitude - 'I AM what I AM.' Just be YOURSELF. The most important thing is to be a good person in life, which is above all the material success. It only requires a heart filled with love, care, and empathy to help selflessly and watch the smile and satisfaction on another person's face. Always try to be an angel in someone's life, an angel with beauty in the heart and not on the face.

- Ms. Neha Porwal

Interacting with Atoms Who offer Quantum Memory!

Hello friends, I am an atom.

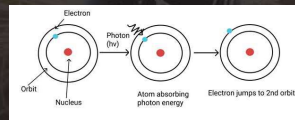
The building block of everything around you. Allow me to narrate to you my fascinating story!

The birth of my concept was triggered in ancient Indian and Greek philosophy. Indian philosophers called me 'Parmanu', the basic unit of all energy and material entities in the universe, while Greek philosophers called me an 'atom', the smallest possible particle of matter that could not be subdivided.

A better understanding of me began through a series of experiments in the early 19th century, which revealed that I was made of smaller particles, happened to be negatively charged electrons, positively charged protons, and no charge neutrons, wherein electrons are mass-less, protons and neutrons are of equal significant mass. At the core, protons and neutrons clustered together to form the nucleus, whereas the electrons revolved around the nucleus like planets revolved around their source star.

Quantum Ambiguity... Wave-Particle Duality

At minute subatomic scale (i.e., quantum level), subatomic particles would behave strangely by not being localized to a specific position and not having specific momentum (velocity) at a given instant of time. Such a notion would be difficult to perceive, as it is against your human intuition. In fact, for a given macroscopic object around you, you would be able to determine its specific position and momentum accurately.



In 1927 Werner Heisenberg gave a mathematical description of the uncertainty existing at the microscopic level using a couple of simple inequalities involving the uncertainties. It occurs while measuring any two complementary variables, such as position & momentum or Energy & Time: $\Delta x \Delta p \geq h/2$, $\Delta E \Delta t \geq h/2$, where h is reduced Planck's constant ($h = h/2\pi$).

Apart from having uncertainty in my electron's position and momentum, I possess another peculiar property. The electrons revolving around certain fixed orbits do not lose any energy for running around the orbit, which is the main reason for my stability. Otherwise, electrons would collapse to the nucleus by losing energy. Further, everything would have collapsed into the nucleus. Neils Bohr called these orbits stationary orbits having quantized angular momentum $mvr = nh$, and when external energy is supplied, the electrons jump away from the nucleus into larger orbits.

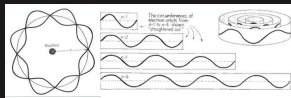
On the other hand, energy from me is lost only when the electrons jump back to the lowest orbits, wherein the energy difference between the involved orbits is emitted. Max Planck showed that such absorption or emission of energy would always happen in fixed quantized units called 'Photons'. This idea concludes that energy and its flow occur in the form of units of photons, which are also known as pockets of energy. For example, electromagnetic radiation (light)

transfers energy as a propagating wave with integral multiples of photons, with each photon having fixed energy ($h\nu$).

Planck revealed that photons associated with a propagating wave would also behave like particles, a material property, with duality exhibited by waves. Interestingly, a French physicist by the name of Louis de Broglie suggested that wave-particle duality is not only restricted to radiation; it must be universal and applicable to particles of matter, which must display the wave nature in addition to their conventional material property. He has given a mathematical relation describing the wavelength λ associated with the matter waves using a relation of energy to momentum: $p = h\nu/c = h/\lambda$, which implies de-Broglie wavelength $\lambda = h/p$.

When it comes to the duality possible with matter or waves, if you try to probe the atoms, they exhibit only particle nature. The wave nature ceases to exist due to external interaction. Atoms or subatomic particles behaving like waves would substantiate their

uncertainty of not being localized, wherein their presence could only be described using Probability. There exists a connection between such probabilities of particle existence to mathematical function describing particle waves called Wave Function, denoted by the Greek letter Ψ (psi).

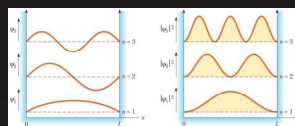


Schrödinger Equation... Dynamics of Wave Function

Erwin Schrödinger proposed the quantum model of microscopic particles, per se, an atom, wherein electrons are treated as matter waves using the wave function concept. Further, mathematically he connected the wave nature of quantum particles to the state of a quantum system carrying certain energy. The resulting Schrödinger equation became the fundamental equation in Quantum Physics, analogous to Newton's 2nd law of motion,

$F = ma$, which connects force acting on an object of mass 'm' to its acceleration 'a' in Classical Physics. There could be multiple possible waves (with the same energy) propagating along the atomic orbit for a given electron in that orbit.

The wave function Ψ also carries the information of position or momenta, which could be obtained by taking the square of its absolute value ($|\Psi|^2$). The information would be in terms of probabilities with which electrons could exist at certain locations or with certain momenta.



The Quantum model of an atom answers many questions that Bohr's and other atomic models failed to do. Quantum particles such as electrons, behaving like waves (spread around in space), substantiate their probabilistic existence at multiple locations.

Finding the probabilities of the particles through the wave functions and further running several simulations to reveal the probabilistic locations of electrons at different energy levels would lead you to get a clear understanding of different orbital structures.



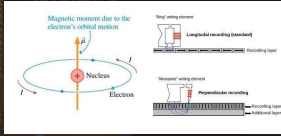
Even after all this description, you may think how matter at the quantum level could exist in more than one state. This dilemma could be cleared by Schrödinger's thought experiment involving a cat in a box with some poison container with the possibility of breaking out. If the poison is released due to the triggering of nuclear radiation, then the cat would be dead. Otherwise, the cat would be alive. But the result would be known only when you look into the box. Unless and until you look into the box, you could not know its state, till then the cat would be in a superposition between dead or alive—the same works with quantum particles. The mere idea that quantum particles could exist in multiple

states lead to a path-breaking application in the area of computing known as Quantum Memory.

Atoms as Classical Memory & Quantum Memory Devices

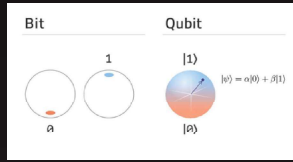
In conventional classical computers, the information is stored in the form of Binary Digits, i.e., "Bits" 0 & 1, by permanently aligning the magnetic dipoles of the collection of atoms. This results in the formation of a small bar magnet at a certain memory storing location, wherein the overall alignment would correspond to the bit either 0 or 1 being stored. As mentioned earlier, quantum particles at quantum regimes are bound to possess multiple possible states. For example, an electron in the outermost orbit of an atom. When external energy is supplied by sending in a suitable photon, the electron may excite to a higher energy state or may be confined to the ground state without excitation. Here the electron either being in the ground or excited states could be described in terms of probabilities, which offers a means to simultaneously store two bits of information

on the same atom, leading to an elementary quantum bit called **Qubit** in the area of computing.



If an electron in an atom could be excited with 60% and not be excited with 40%, then the corresponding quantum state that allows storage of Qubit would be a superposition of those two states: $\Psi = 40\% \text{ not excited} + 60\% \text{ excited}$. To have consistency with wave function concept, a Physicist by the name of **Paul Dirac** introduced more handy notations using angle brackets, left angle \langle called Bra, and right-angle \rangle called Ket, and modified the equation as

$|\Psi\rangle = \alpha |\text{not excited}\rangle + \beta |\text{excited}\rangle$, where α and β being probability amplitudes and $|\alpha|^2$ and $|\beta|^2$ being the corresponding probability densities, respectively with total probability sum to one.



Unlike the classical memory of everyday computers, the states stored in quantum memory would be in a quantum superposition, giving much more practical flexibility in quantum algorithms than classical information storage. There are many other beautiful phenomena in the quantum world, like entanglement, which are rough patches to the human brain. But the nature around you surprises you every time with its behavior.

- Quantum Computing Club
IIT Dharwad

Holy Water

When it poured on my skin,
it felt like a stream of holy water
straight from the heavens,
Flowing for the sole purpose of
beautifying me more.
The holy water kissed my cheeks,
And my cheeks did redden like a rose.
The holy water flowed into my eyes
To see a new world, unknown.
My lover, the angel, had decided my fate.
He didn't think twice,
He didn't want to be late.
He nourished me with god's bliss,
The holy water that some call acid
I will never forget to miss.

- Ms. Yashashi Singh

Poetic vibe

Some sleep; some dream.
Some think; some achieve.
Some procrastinate; some are on time.
Some are fast; some are slow.
Some are smart; some are naive.
Some respond quickly; some react quickly.
Some are consistent; some are inconsistent.
Some plan; some execute.
Some succeed, some fail.
And some fail again and again.
But only some work hard again.
Some have an opportunity; some create one.
Some are givers; some are takers.
Some are happy; some are sad.
Some are theists; some are atheists.
Some have souls; some are dead.
Some are calm; some are disturbed.
Some bring peace; some keep it up.
Some fall and lag.
Some rise and lead.
Some have idols, but some become idols.
The choice is yours.

- Mr. Tanzeem

Turiya

Where it is completely untouched
By troubles, sorrows, and limitations,
Absolutely peaceful,
Ever undisturbed,
There is no world there to disturb you,
And full of joy,
That is your reality.
Advaita.
It is not here
But it shines through all.
People think it is the fourth reality
But actually, it is the only reality.

- Mr. Gourab Chakraborty

Good Ol' Days

Eyes flit to a distant memory, a distant time,
When waking up early on a Sunday morning meant
Riding to the market
On the two-stroke Suzuki Samurai
Sitting astride, arms wrapped around dad's tummy
And watching the world go by!

When the sun shone down upon the market,
Shopeekers pushed harder to unload their wares,
vegetables spilled on the muddy ground,
Vendors with hand-woven baskets,
Overflowing with fragrant produce,
screamed on top of their voices to attract customers.
And customers desperately tried
to bargain for the best price.

The colours and nose tingling
aroma of flowers, fruits, vegetables, and spices,
Gave the market a unique scent.
Weaving through the dense crowds
On the narrow road flanked by
Dry fruits and candy shops on either side,
We thrived on interacting with the vendors,
Bags getting fuller by the minute.
Even then, something would often catch our eyes
And we would stumble out with more bags in hand.

Suddenly, nostalgia looks back on the past
As a pure, perfect time of life,
When life was seemingly simpler and happier.
And memories of small moments of human touch and
interaction
That are now only virtual, flood my mind.

- Ms. Arya Katwe

I'm

It is the second coming.
Yes.
Earlier they told it was a girl,
And -
This time it is a boy.

I carry the dreams of many;
Those unfulfilled dreams,
For months together in my -
Womb.

From experiencing those signs of progress -
feeling those kicks and beats -
bubbling with joy,
And being sombre,
I have observed every little thing.
He listens to my voice -
Dances to my tunes.
Yes, I carry the dreams of many.

They only dream of it,
I make it happen.
Like Christ carried the cross
For the sins of humanity,
I carry your dreams
To pass your legacy.

Like that Phoenix,
I burn myself -
To give wings to your dreams.

I eat and exercise -
to nurture your desires;
Whatever I do,
Reflect your dreams.

Ah! I wish to see your dreams,
Blood and flesh one day.
But, Alas! My dreams are left half-baked
Because I am not allowed to dream.
But, I still carry your dreams.

After that grave pain,
When I open my eyes,
All that I see every time -
is that empty cradle -
With those coloured notes nearby.

I make your dreams happen.
By shattering my dreams -
I carry your dreams.
And -
It does not bother me.

I'm a stone Goddess
For my emotions are burnt.
After an eternity,
Our dreams may meet each other
And walk away like strangers -
Silently,
For they don't know
Who - is - who.

Because --
I'm a surrogate mother.

[PS: This is the first write-up of our series 'Existential Crisis', a concept often left unaddressed, though experienced by many. You will be travelling in this world for the next few issues as well.]

Concept By - Dr Utkarsh Khaire
Penning By - Dr Manjusha C B

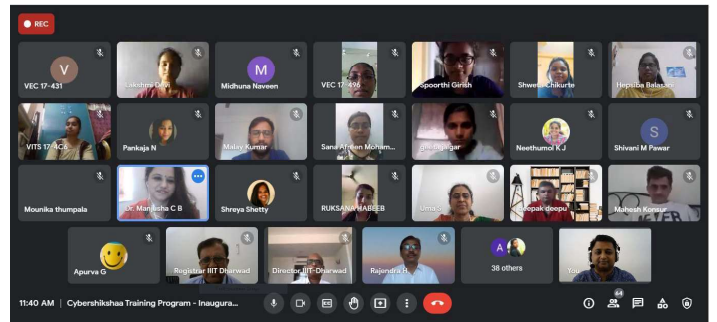
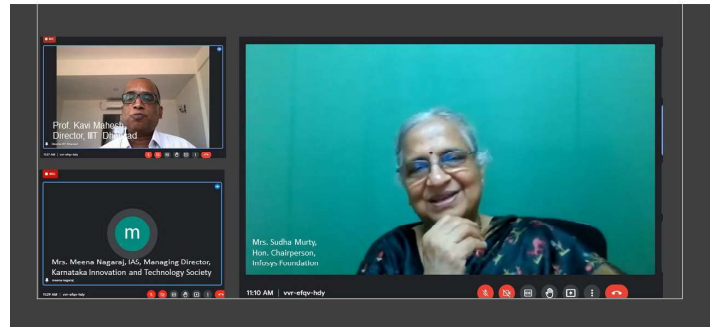
Cyber Shikshaa Training

IIIT Dharwad in association with Microsoft, CySECK, Data Security Council of India (DSCI), and Ministry of Electronics & IT (MeitY)'s has started the Cyber Shikshaa program for skilling women engineering graduates in the niche field of Cyber Security. It is a free, four-month training program conducted for the low income level women graduates to gain the requisite technical skills in Cyber Security. After the completion of the training, these candidates are placed in various top notch companies through this program.

The Inauguration of the program was held on the 6th of July, 2021 in the presence of many esteemed dignitaries viz Mr. Kishore Kumar Thangavelu, Operations Manager, Microsoft Philanthropies India, Mr. Deepak Boora, Senior Manager, DSCI, and Mrs. Meena Nagaraj, IAS, Managing Director. Prof. Kavi Mahesh, Hon. Director, IIIT Dharwad delivered the Presidential Address. The welcome address was given by the Respected Registrar Prof. C. B Akki, IIIT Dharwad. Dr. Rajendra Hegadi, Associate Professor, DSIS, IIIT Dharwad proposed the vote of thanks. Smt. Sudha Murty, Chairperson, Infosys Foundation & IIIT Dharwad addressed the gathering by a pre-recorded message. Faculties, staff of IIIT Dharwad and the participants of the training program joined the inauguration.



CyberShikshaa, in partnership with Indian Institute of Information Technology, IIIT Dharwad launched its new batch virtually



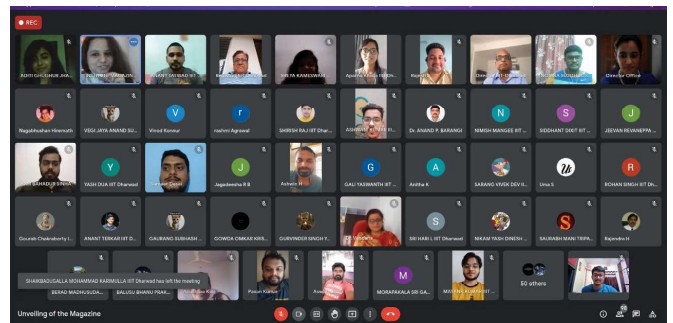
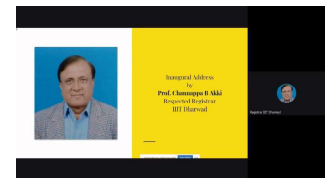
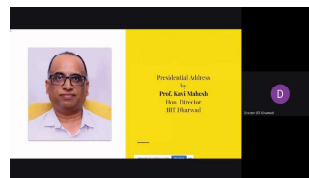
Unveiling of the Magazine

Kaleidoscope is a monthly publication run for and by the IIIT family. The origin and intention behind the name, Kaleidoscope, is simple: 'Reverberate the Patterns of Life'. The objective of introducing this institute-level magazine was to bring to the limelight the creative forte and technical expertise of our students, and faculty. Just like how we can visualize a plethora of patterns through the kaleidoscope, through our magazine, we could envisage myriads of reverberating patterns of life through words, photographs, and paintings. It wouldn't be wrong to state that this kaleidoscope of ours is a symbolic representation of vivid patterns encompassing all orbs of our life.

Kaleidoscope contains a wide variety of compositions that will update you on various topics like technology, fiction, poetry, and reports of activities. In addition, paintings and photographs, distinguished performances and achievements of both students and the staff find pride of place in the magazine. Kaleidoscope wishes to provide ample space and opportunities for those with a verve to articulate their unexpressed emotions and be a platform for the enthusiastic minds to craft their opinions and views on any topic that would add to the store of knowledge of the readers.

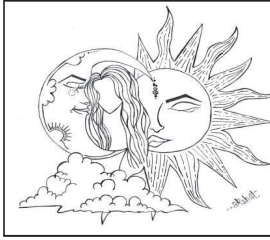
The unveiling ceremony of the magazine was held on the 11th of June 2021.

Here are a few glimpses of the same



PAINTINGS

Mr. Akshat Mishra



Mr. Kottal Kalyana Chakravarthi



Mr. Param D. Mane



Mr. Param D. Mane



Ms. Sabiha H B



Mr. Gali Yaswanth



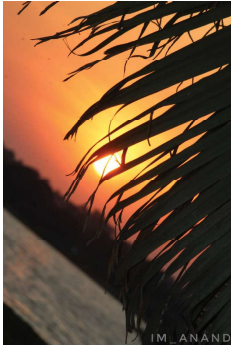
Shot By Gali Yaswanth

Mr. Anand



PHOTO GALLERY

Mr. Anand



Mr. Anand

Mr. Aalekh Prasad



Ms. Sabiha H B



Mr. Aaryan Kumar



"Life is filled with ups and downs. Accepting the unexpected and taking up the challenges with confidence lets us seize the universe. Beyond the horizon, let's travel together, embracing the imperfections."

Be Bold, Be Beautiful, and Be You.

Ms. Apama Kholla
(For magazine committee)

She cried "the oxygen cylinder is empty"...

[Wait for the next issue]