

INPHASE

Annual Magazine of EEE Department

cep⚡trum

INNOVATIVE AND ADVANCED

Unlocking the potential of
innovation

Empowering the Future

Be the inspiration you want
to see in the world.

Campus Diaries

Capturing memories, sharing
experiences

EDITION

19

APRIL 2023

Foreword



Our lives are moulded positively by the various right choices we make and these decisions are often involved with ideas we are willing to tolerate and what we are not. We often come across the concept of tolerance in our campus life. It is the capacity to endure pain or hardship; many students have endured the difficulties that come across in their lives regularly or accidentally. Students tolerate messy hostel messes that are much unlike their home food. We have shown sympathy for beliefs or practices differing from or

conflicting with ours and often learn from others too. A few centimetres of variation in length can be permitted when designing a bridge across a river while it would be a few angstroms of length for a device in a modern integrated chip. We aim for a zero-tolerance policy on academic integrity and on substance, physical and sexual abuse. Toleration cannot, therefore, be defined as a universal good, and many of its applications and uses remain contested.

This magazine reminds me of the choices our EEE students have made. Along with their regular academic activities, some chose to bring out articles comprising the latest innovative ideas in their field of study. In the context of many students deviating from their branch of study, such interests bring a welcome trend. Moreover, in these articles, I could see also see many lessons for life. I hope that everyone who reads this magazine would relish each article. Whether you chose to excel in the subject of your study or other worthy areas, I am very glad that you are engaged in meaningful creative activities.

It gives me great pleasure to write the foreword for the 19th edition of InPhase magazine for the year 2023. I congratulate Cepstrum, the students' society of the Department of Electronics and Electrical Engineering, IIT Guwahati who have made this edition of the magazine possible.

Yours sincerely

Dr. Roy Paily Palathinkal

Professor and Head, Dept. of Electronics and Electrical Engineering

Professor, Centre for Nanotechnology and School of Health Science & Technology

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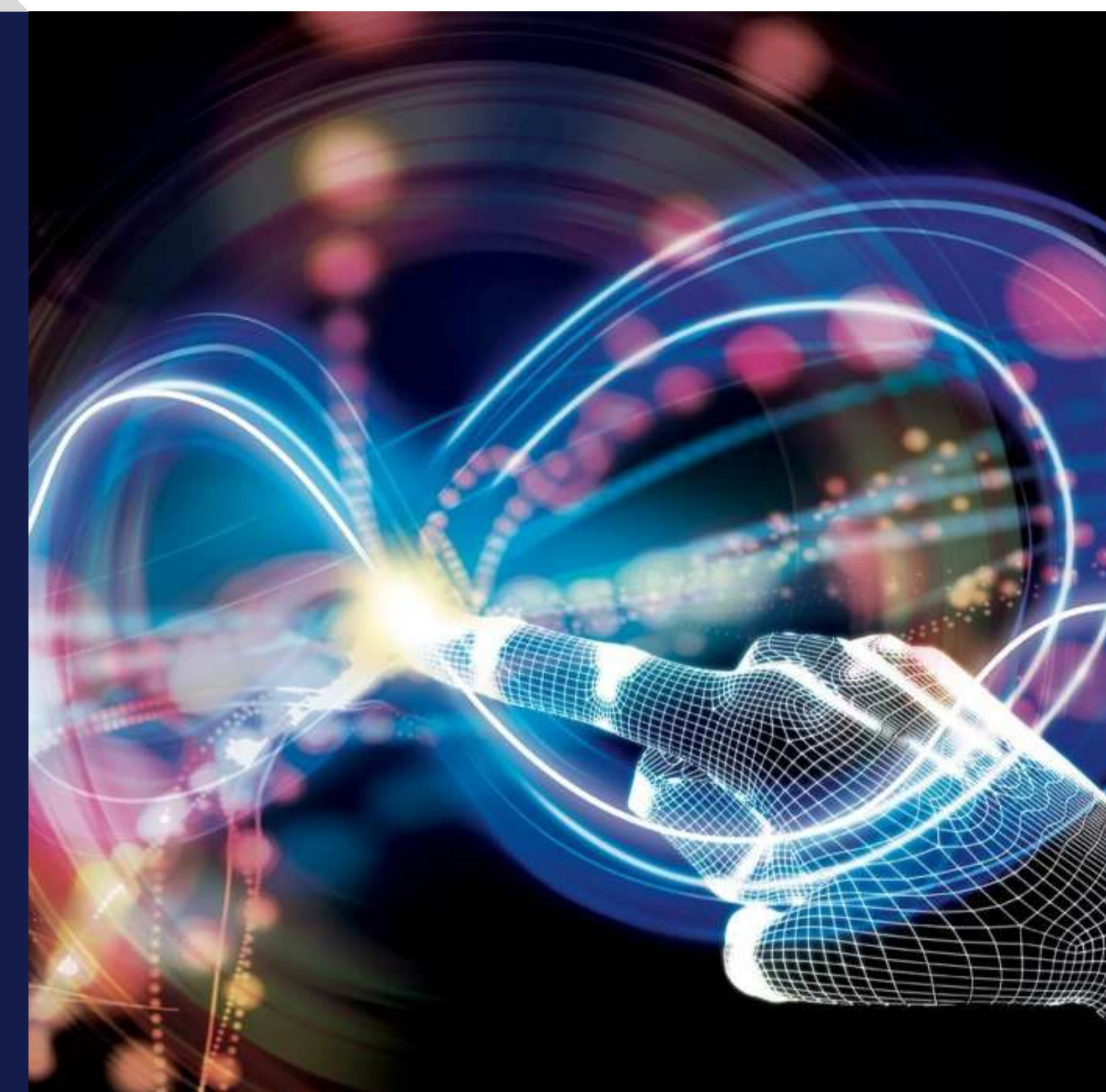
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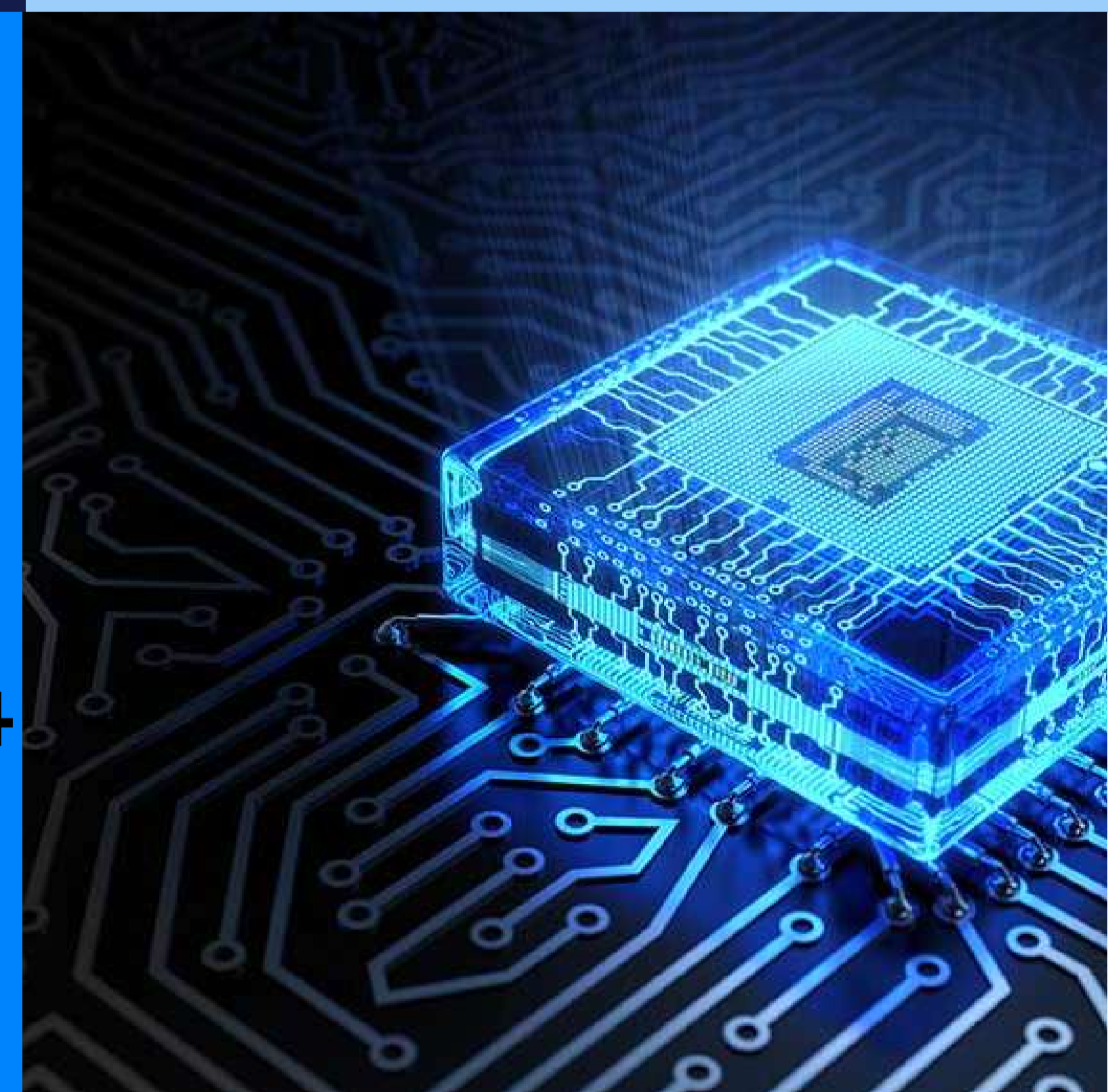
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India's Bid to Become a Global Semiconductor Hub

~Zainab Ali

The semiconductor industry is one of the fastest-growing industries globally, and India is not lagging behind. India's semiconductor industry is booming and is expected to grow at a CAGR of 10.1% between 2021-2026, driven by the rise in demand for electronics, smartphones, laptops, and other electronic devices. India's semiconductor industry has a lot of potentials to become a global leader in the industry.

India has a lot of advantages in the semiconductor industry. Firstly, India has a vast pool of talented engineers and scientists who are well-versed in the latest technologies. Secondly, India has a large domestic market for electronic devices, which creates a demand for semiconductors. Thirdly, India has a favorable policy environment, including tax incentives which attract foreign

investment into the country. To excel in this highly competitive market, India needs to create an ecosystem.

the growth of its semiconductor industry. This includes investment in R&D, infrastructure development, and policy initiatives that attract foreign investment.

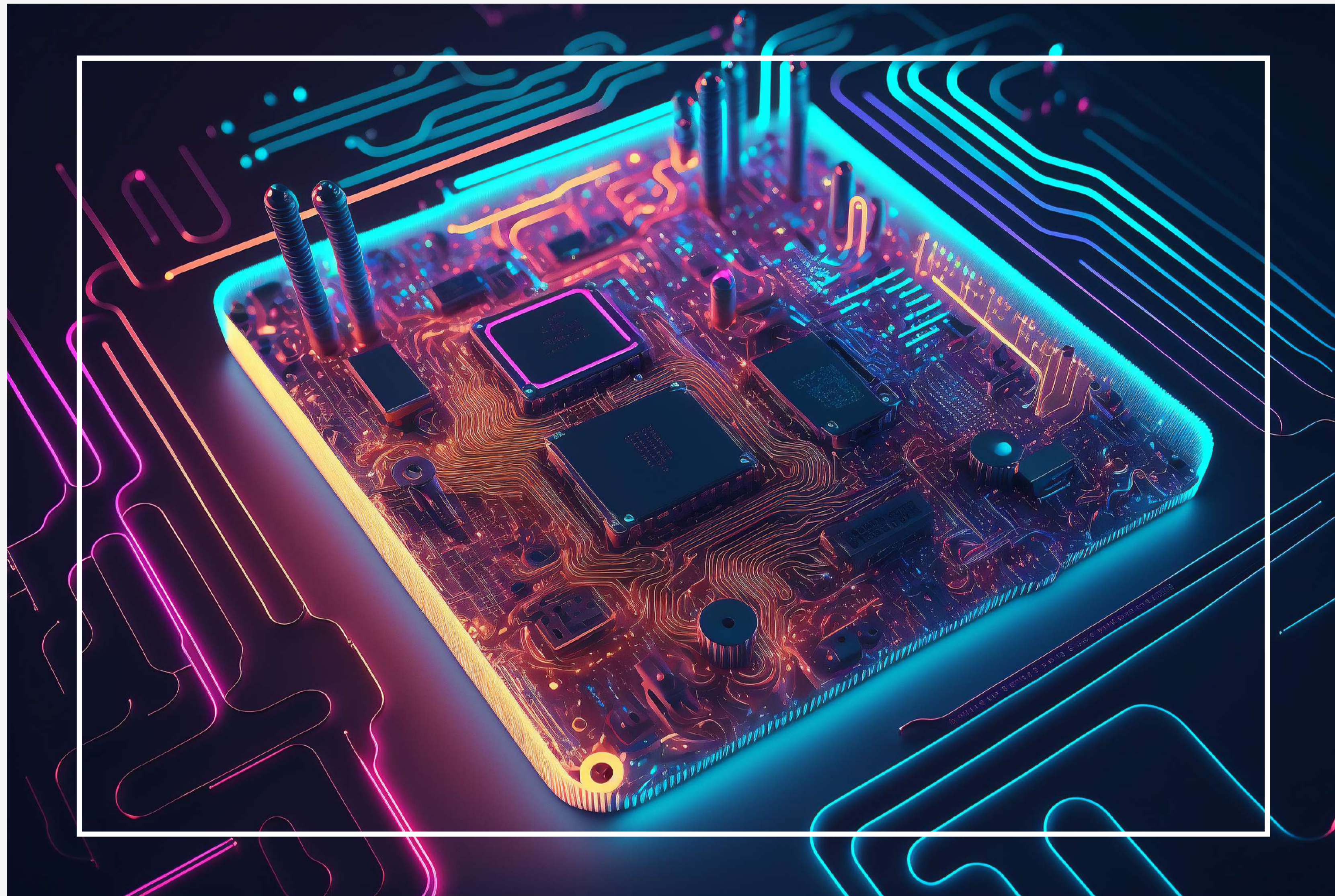
‘ Trade War ’

The trade war between China and the United States has created opportunities for India in the semiconductor industry. The shift in the global supply chain and investments towards these countries

have provided a boost to their semiconductor industries. The Indian government's policies to boost the semiconductor industry and the Taiwanese government's support for its semiconductor industry have also attracted investments.

‘ Trends and Opportunities ’

Semiconductor devices are used

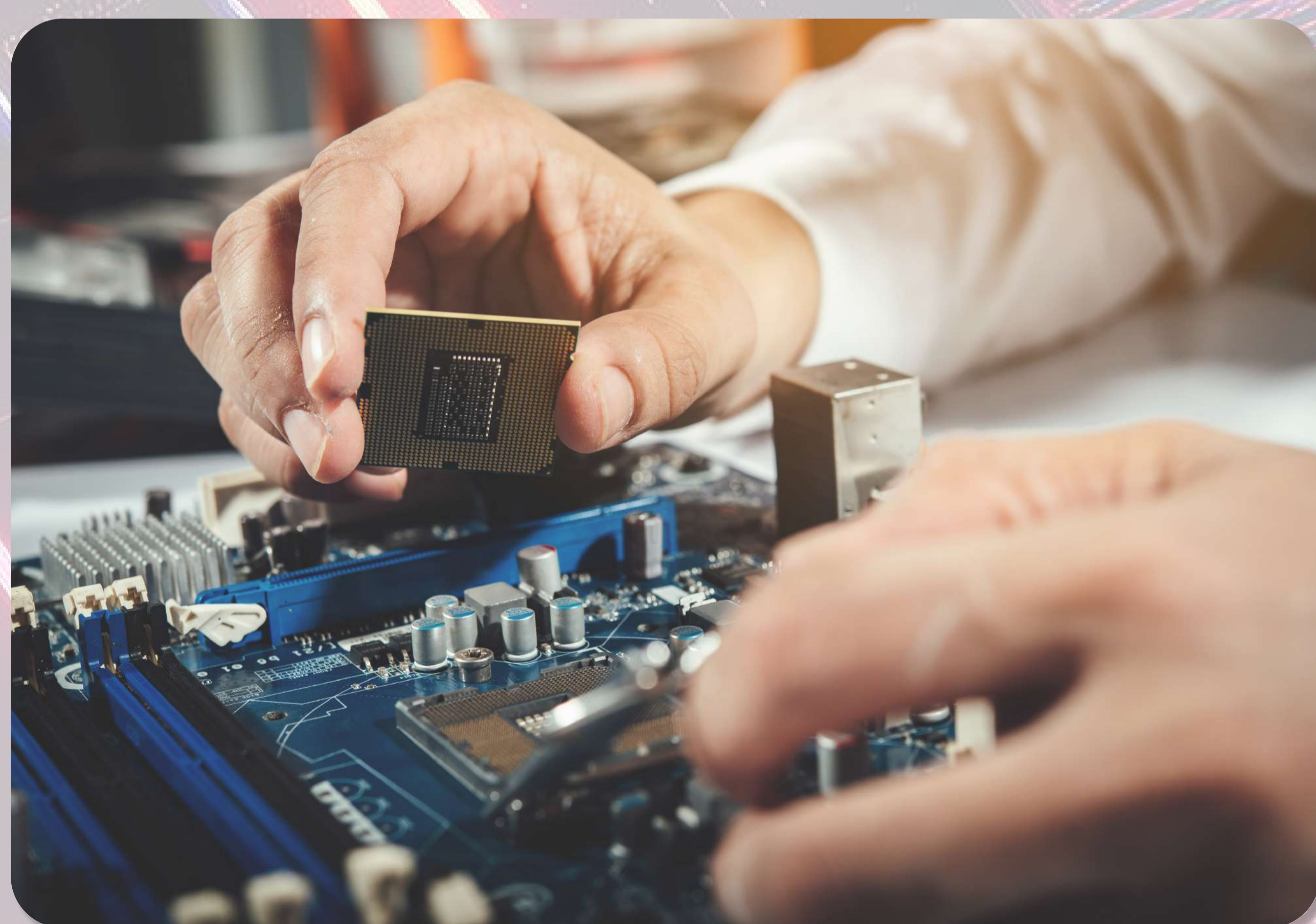


in several industries such as wired and wireless communication, consumer electronics, industrial

electronics, automobiles, computing, and data storage devices. Globally, computers account for the bulk of semiconductor demand, estimated at around 32%, followed by mobile phones and communication devices at 31%. Automobiles, consumer electronics, and industrial equipment each account for approximately 11-12% of semiconductor demand.

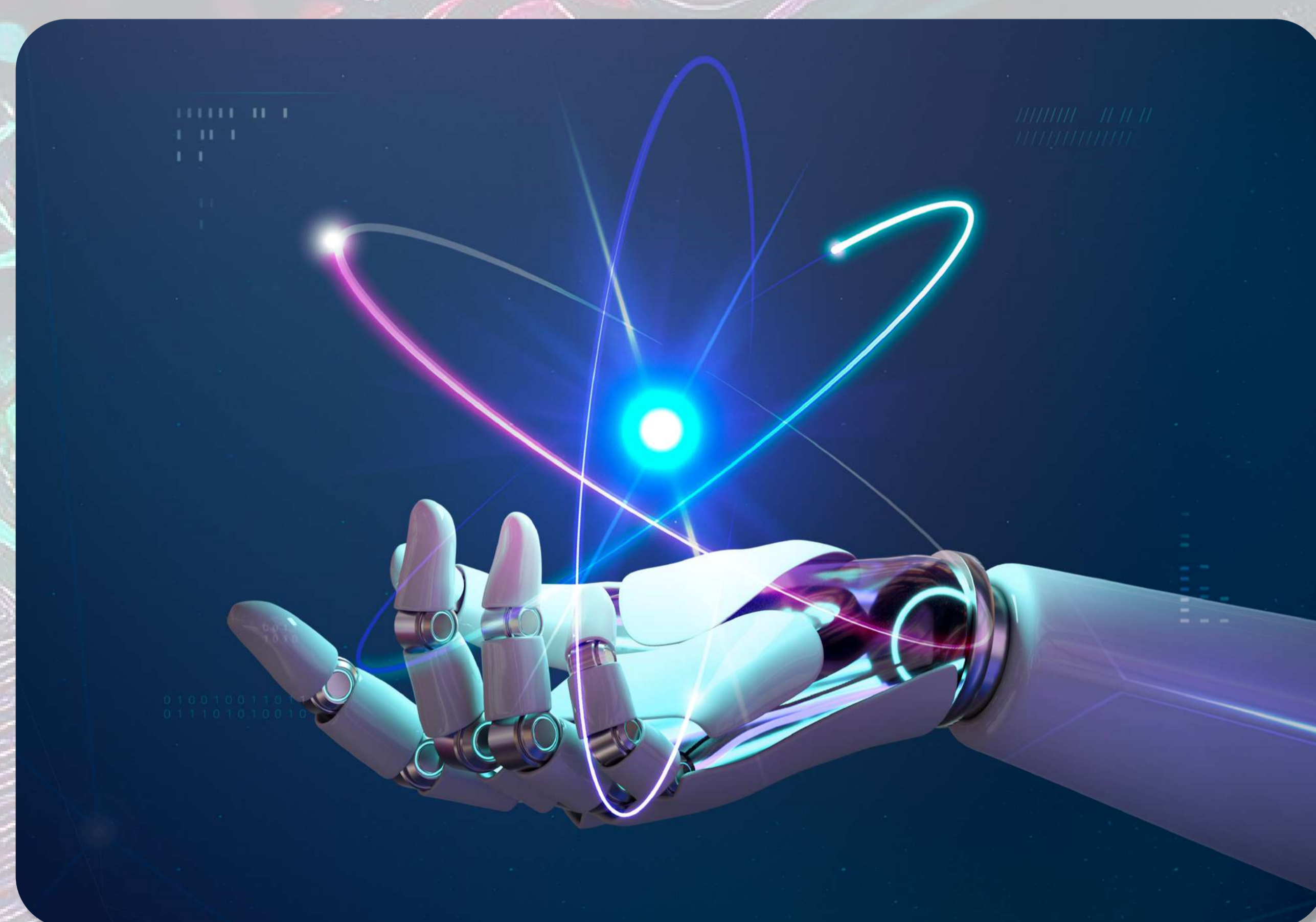
The future prospects of the semiconductor industry are promising, with several emerging trends. With the COVID-19 pandemic forcing companies to shift to remote work, remote employment is expected to fuel the growth of the semiconductor industry.

One of the latest trends in the semiconductor industry in India is the development of 5G technology. India is preparing to launch 5G technology, and this has created a demand for semiconductor products, such as 5G chips and modems. Several Indian companies are working on developing 5G technology, and this has created a lot of job opportunities for electronics and electrical students.



Another trend in the industry is the development of Artificial Intelligence (AI) and Machine Learning (ML) applications. The growth of Artificial Intelligence (AI)

is also expected to drive the demand for semiconductor devices. Many semiconductor companies in India are investing in AI and ML research and development to stay ahead of the competition. AI and ML technologies are used in a wide range of applications, including autonomous vehicles, robotics, and smart homes. This trend has created a demand for skilled professionals in the field of AI and ML.



Moreover, the demand for semiconductors is not limited to consumer electronics. Additionally, there is a rise in the demand for electric vehicles, which is expected to drive the growth of the semiconductor industry in the automotive sector. The automotive sector is anticipated to experience the fastest growth, with demand perhaps tripling or quadrupling due to developments like autonomous driving and e-mobility.

There are many employment opportunities for electronics and electrical students in the semiconductor industry in India. Apart from R&D and manufacturing roles, there are also opportunities in sales, marketing, and customer support roles. Indian semiconductor companies are also hiring fresh graduates and providing training programs to help them develop the necessary skills.

The New Potential Semiconductor Hub

It is true that India's semiconductor industry is still in its early stages and lacks the infrastructure and technology required for manufacturing. However, with the renewed government interest and investments from both domestic and international companies, the semiconductor market in India is

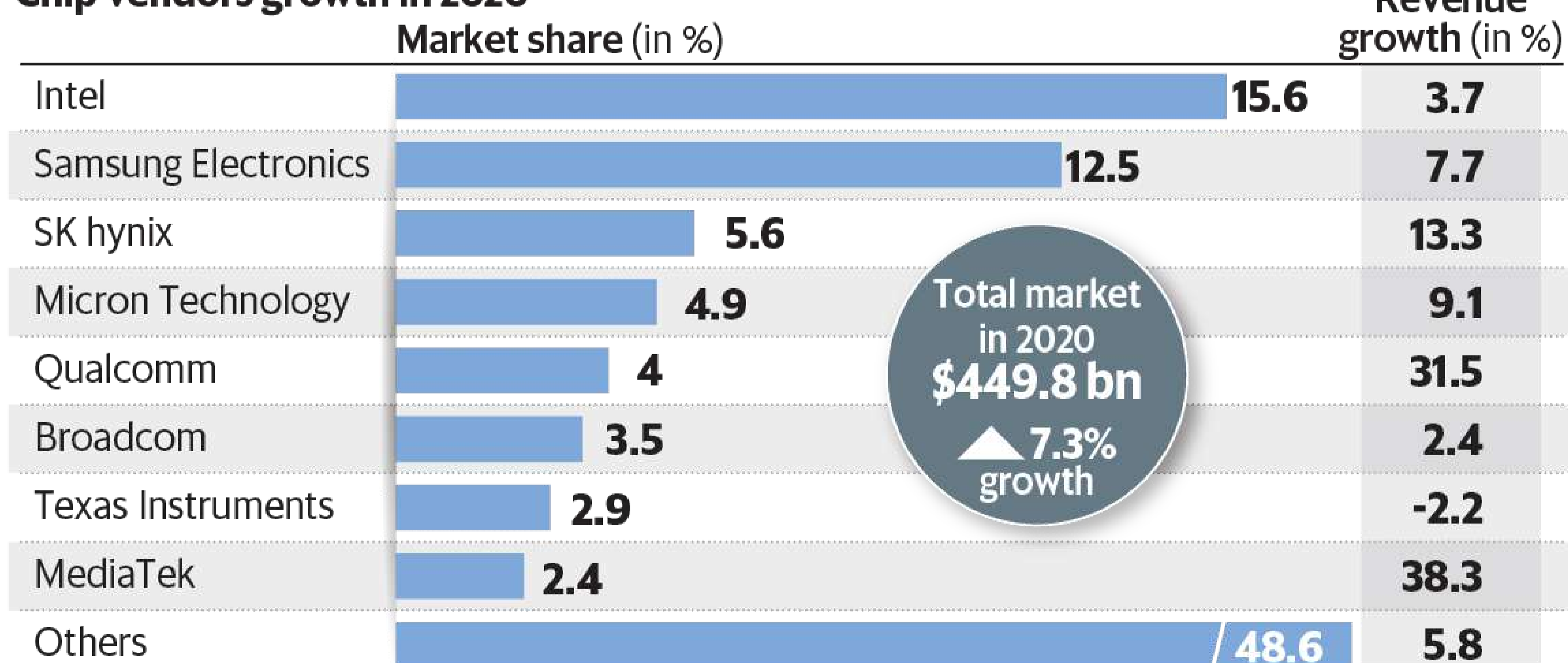
expected to grow rapidly in the coming years.

It is also true that India has a strong presence in chip design, with many notable global companies having research and development centers in the country. However, in order to become a major player in the global semiconductor market, India needs to build a robust manufacturing ecosystem, including the necessary infrastructure, technology, and resources.

Some of the major players in the Indian semiconductor industry are Intel, Texas Instruments, AMD, Qualcomm, Samsung, and IBM.

These companies have established their R&D centers and manufacturing facilities in India, which has provided employment opportunities to thousands of Indians. Many of these companies have also entered into partnerships with Indian companies to develop new technologies and products.

Chip vendors growth in 2020



Source: Gartner

Apart from these companies, many startups have emerged in the semiconductor industry in India. These startups are working on developing new semiconductor products, such as microcontrollers, microprocessors, and memory devices, which are used in a wide range of applications.

The Indian government has launched several initiatives to support the semiconductor industry, such as the National Electronics Policy, which aims to make India a global hub for electronics manufacturing.

Additionally, the government has launched the Electronics Manufacturing Cluster (EMC) scheme, which provides financial assistance to companies for setting up their manufacturing facilities. The government has also set up semiconductor manufacturing clusters in various parts of the country, offering incentives to companies that set up their manufacturing facilities in these clusters. The Indian semiconductor industry has many research areas that students can explore. Some of the research areas include chip design, embedded systems, microcontrollers, artificial intelligence, and machine learning.

These areas are crucial for the development of new semiconductor products and technologies, which are in high demand in the industry.

The semiconductor industry in India is booming, and it is a great opportunity for electronics and electrical students. The industry has a lot of potential, and it is expected to grow in the coming years. With the right skills and knowledge, students can find employment opportunities in the industry and contribute to its growth. The Indian government is also supporting the growth of the industry, which provides an enabling environment for students to develop their skills and contribute to the industry's growth.

CONCLUSION

In conclusion, India's bid to become a global semiconductor hub is a bold and ambitious move that has the potential to transform the country's economy and put it on the map as a major player in the semiconductor industry. With the government's support and investment in building world-class infrastructure and attracting global players, India has the opportunity to become a leading semiconductor manufacturing hub, which could create jobs, boost exports, and reduce the country's

dependence on imports.

The semiconductor industry is one of the fastest-growing industries globally, and India is not lagging behind. India's semiconductor industry is booming and is expected to grow at a CAGR of 10.1% between 2021-2026, driven by the rise in demand for electronics, smartphones, laptops, and other electronic devices. India's semiconductor industry has a lot of potentials to become a global leader in the industry.

India has a lot of advantages in the semiconductor industry. Firstly, India has a vast pool of talented engineers and scientists who are well-versed in the latest technologies. Secondly, India has a large domestic market for electronic devices, which creates a demand for semiconductors. Thirdly, India has a favorable policy environment, including tax incentives, which attracts foreign investment into the country.

To excel in this highly competitive market, India needs to create an ecosystem that supports the growth of its semiconductor industry. This includes investment in R&D, infrastructure development, and policy initiatives that attract foreign investment.





CONSTRAINTS

~Koustub Gururaja Rao

What is life but constraints?

*It colours our life with different
paints.*

Where u wanna spend your time?

Whom to choose?

Where u wanna end up?

What to lose?

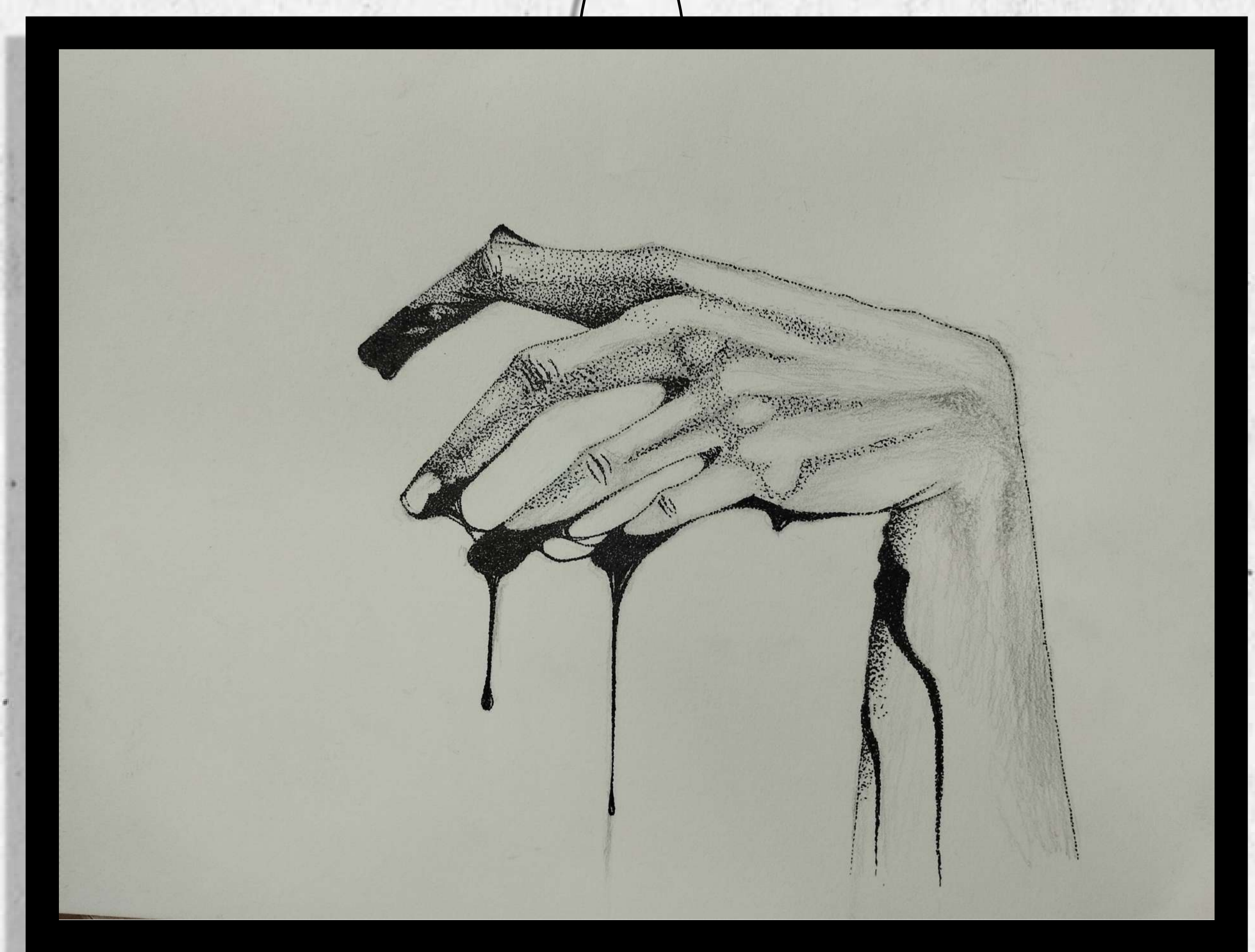
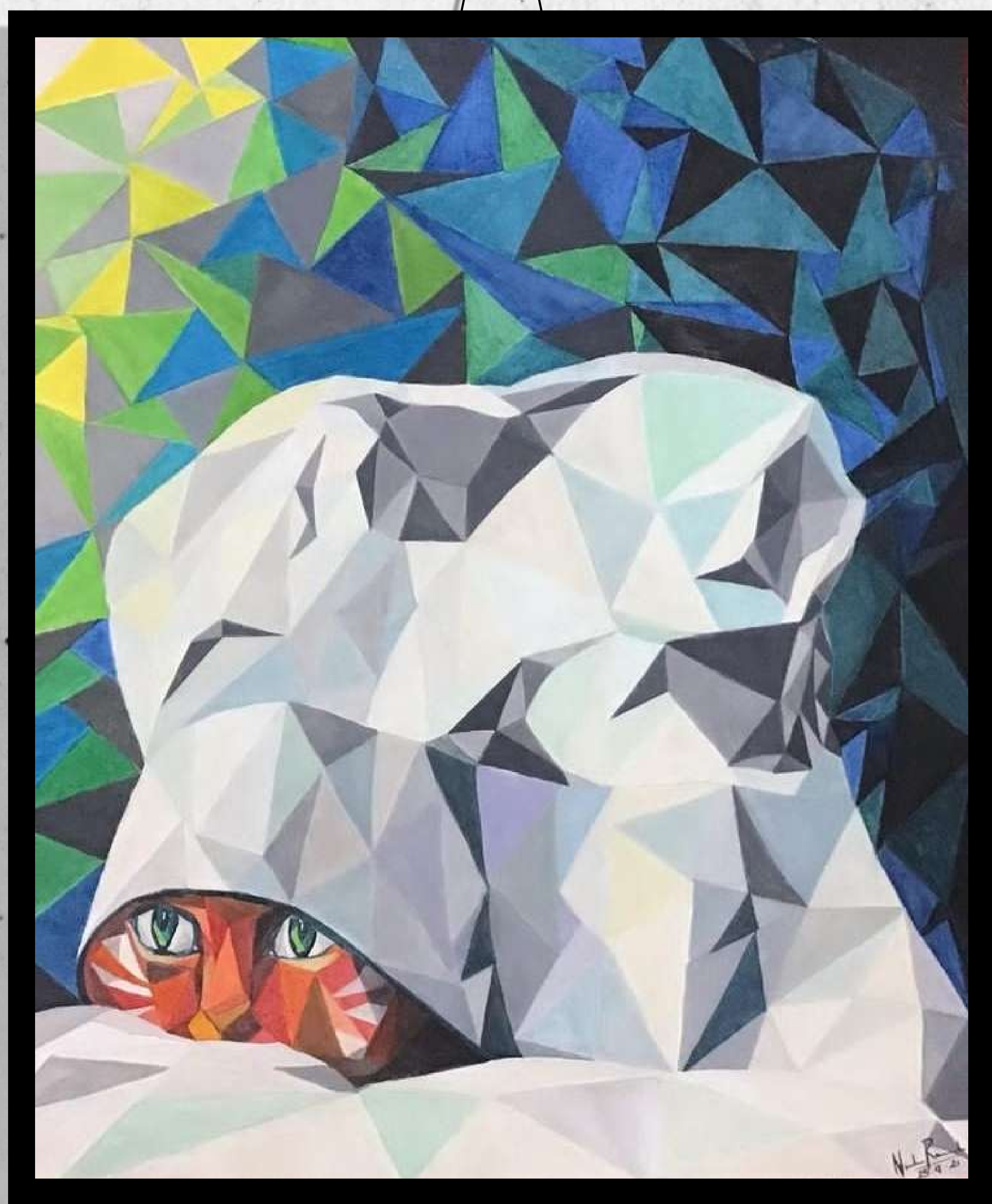
Life asks for too many sacrifices

*For some it is a dead end , for some it
suffices.*

*These constraints are limitations of
the mind
These constraints ,are what shape
your time
And just look at the irony,
I spent mine, on this rhyme.
To keep your life in equilibrium,
These constraints are the proposition
They pull you back, they take u
forward
They are the cause of joy and
depression.
It is hard to make a comment on it,
They are the cause for survival of the
fit,
Gotta move with them, move with the
flow,
Cuz If you're slow, then down you'll
go.
Gotta understand these equations,
That govern our lives evaluations.
They guide you to your destiny,
And drive your life's necessities,
They give you your identity
Your melody, jealousy, ecstasy.
And these constraints when one
cracks
In their future, success he packs.
So do what is necessary
Cuz constraints are the spices of life's
curry.*



Arts and Creatives



Nisha

Three most important lessons I learned in the last few years are :-
Network is your net worth, choose your friends wisely and believe in yourself. To any undergrad reading this I sincerely hope I'll be able to break down a few myths and help you in your life. Think beyond placements - Let us be frank here. You all are among the top 5% minds in your age group and most of you will be placed with very good packages. Don't run after 1 Cr package. Very few people will get that but think for a moment - 1.5L/month is too good for a 22 years old undergrad. Rather strive for something new, something exciting. Don't clutter your mind about placements from 1st year. Rather learn skills that matter. Get your hands dirty the latest tech like blockchain, AI and see where you can add the most value.



Story of a Dorm-room Startup

~Arka Dutta

Face your fears - The best thing I did in first year was to try out many things which are eventually helping me in my startup - from YouTube, social media marketing, designing to investing in stock markets - I tried it all. I feared speaking to the camera, so I started YouTube. Always face your fears and choke them before they choke you.

I can, I will - One year back I never believed I'll get Polygon Fellowship where the selection ratio is less than 1%, talk to Founders of startups, then start my own startup, get internship with one month of preparation, pitch to investors on a regular basis and write this article ofc! But, however impossible it seems and negative feedback you get from your surroundings, never doubt yourself. Believe what you can and you will.

Joining clubs and communities - The best way to learn new things and make friends is joining various clubs.



Joining Techniche made me open my LinkedIn account, FEC introduced me to the world of finance, quant and investing, CnA played a monumental role in introducing me to consulting and machine learning. I'll encourage you to be part of 2-3 clubs at least and learn. Don't gossip. Learn as much as you can.

My introduction to WEB3 was through a 2-month long bootcamp at Zuri, a Nigerian Ed-Tech platform that aims to make education free for all. I learned about blockchain, smart contracts, tokens and made a few projects during the course of bootcamp. When every single student was preparing for the internship season, I chose to delve deeper into WEB3, make a few more projects and applied for the Polygon fellowship. For anyone new to blockchain and the world of WEB3, Polygon is a blockchain platform that enables developers to build scalable solutions at minimal gas cost. This was a life changing experience for me. We got weekly learning materials, assignments, attended sessions by industry professionals, built projects, interacted with other fellows and most amazingly had 10 days of offline events, sessions and building in

Bangalore.

Interacting with leading Web3 professionals and founders, made me realise Web3 doesn't discriminate against you based on your age, nationality or DSA skills. There is a massive scope out there, many problems yet to address and huge impact to be created in this field. My first attempt to startup was a decentralised version of Dream11 with many of its shortcomings addressed and new opportunities unfolded. You can buy NFTs of your favourite superstar, flaunt them, trade them to earn money and get added perks like signed T-shirts, merchandise etc from the players. It was going well when suddenly one day, I got a text on LinkedIn, not from a friend but an undergrad from IIT BHU. He was passionate about what we were building and wanted to discuss it further. We got on a call, discussed it for about 2 hours and I really appreciated their project. Security in Web3 is highly disorganised and unregulated and needs effort. Later, to my surprise I came to know we belonged to the



same city and shared the common mother tongue. I became the third cofounder of the startup. It was the beginning of a remarkable new journey. At one point, it was difficult to continue both startups. I had to choose one. It was a tough decision. I chose UNSNARL. Why? There is a burning problem that we are trying to solve here. I knew we were solving a much bigger problem and if we managed to pull it off, it will benefit the Web3 ecosystem, decentralise security and make it affordable and transparent.

The main three problems we are trying to solve :-
 1) Affordability - Auditing is very expensive. For a few lines, of code, these firms are charging \$20,000 which is not at all affordable for Web3 startups.
 2) Lack of transparency - Companies don't get to know who are actually working on their project, whether they have expertise in that particular field.
 3) Centralised - In the present scenario, these auditing firms are centralised - only a small team of 4-5 people work on these projects. So, there is a high chance of errors persisting in their code. We are solving this with a

progressive bug bounty platform and world's first freelance auditing platform. We are now backed by Polygon and ETH India and received ETH India grants back in December. Recently, we got into Antler Fellowship - which shortlists 20 student startups from the nation every year and gives a grant of \$10k to them to create a runway of a few months and gives the first institutional check after they show traction. We believe that like every market, smart contract auditing will become commoditized, prices will come down and these large numbers of small auditing firms will need a marketplace. Currently, our community has grown to over 2000+ developers, auditors and pen-testers.

of things, many of which are outside your control. But , I will never regret this decision, whatever the outcome may be. It has already taught me so many things, helped me connect with many brilliant people and helped me grow as a person that no other thing can possibly do.

I'll end with a quote of Andrew Tate, 'The man who goes to the gym every single day regardless of how he feels will always beat the man who goes to the gym when he feels like going...' . True in all facets of life.

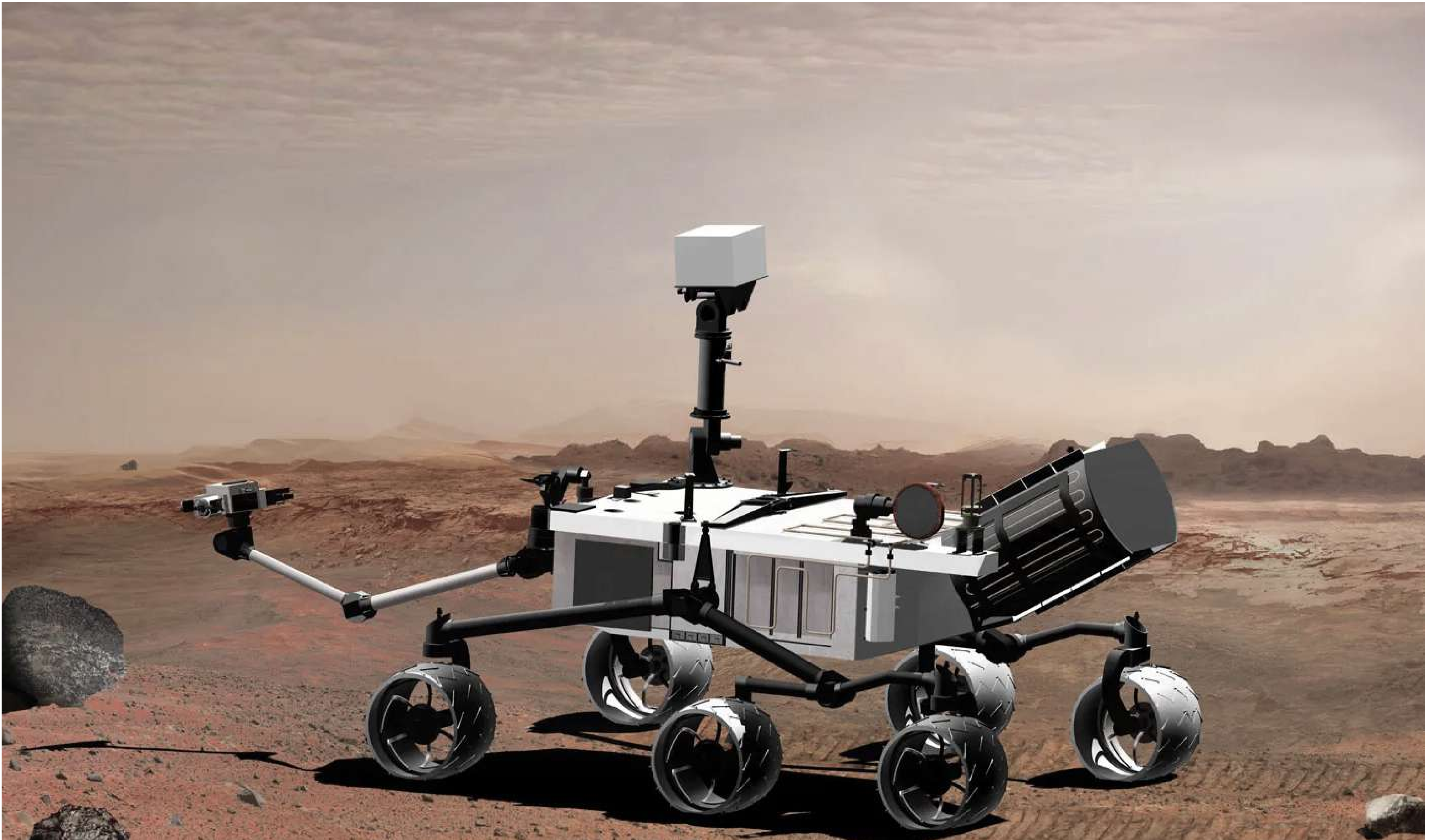


Along with securing startups, we are also trying to bring more people into Web3, organising bootcamps, hackathons and sessions to help you learn from people who know it.

Success of a startup depends on a lot

Yuvaan Mars Rover

~Aayush Sharma



Tell us an overview of the Yuvaan Mars Rover project.

Yuvaan, which holds the essence of 'youth' in its meaning, is a two-year-old Mars rover created by the Robotics Club of IIT Guwahati. Through its infancy, the rover has proven to be one of the most promising Mars rovers developed by a university team. The project is multidisciplinary in nature and covers domains like mechanical,



electronics, AI, computer vision, software development etc. Yuvaan aims to participate in various rover challenges organised all over the world.

What were the challenges faced while working on the project and how did the club overcome them ?

Several challenges were faced while building a project of this scale:

- Coordination between modules - Since the project is divided into several modules, Mechanical, Electronics and Software, Bio Assembly, Autonomous and Manipulator, it becomes significantly important to have all the modules to remain in touch and have regular talks about each other's progress. It helps to minimise a lot of errors while building a prototype.
- Time management - Managing the project along with academics and other activities poses a different challenge. But our team's dedication and efforts have reflected that it was handled well.
- Logistic and financial management - Yuvaan holds a lot of components together. It becomes extremely important to

procure these components on time which requires prior planning. If not ordered in time, this can lead to a delay in the process which can be frustrating at times.

What is the current progress and what are the plans for future enhancements or iterations?

So far, we have built the second iteration of the project, the one that participated in the finals of the International Rover Challenge 2023. Most of the modules have been built and tested. We will now be working towards increasing controllability, implementing autonomous navigation and making it more robust and compact.

It would be interesting to learn more about the technical details related to communication system used in the rover.

For communication, we are using tplink directional antennas which require a constant 24 volt power supply. A gamepad controller is used to give commands like movement etc. These commands are then received by a Flutter based GUI. With the help of websockets, we publish this data on ROS topics which is then

The club and the college take pride in the achievements of the project. Share some of them with us.

Yuvaan began showing its capability as a university rover right from its first year. Listed below are some of its achievements so far:

- Secured international rank of 16 in The International Rover Design Challenge 2022 which improved to 11 in The International Rover Design Challenge 2023.
- One of the top 16 international teams in the The International Rover Challenge (IRC) 2022.
- Won the Best Project award during Techevince 8.0, the Annual Technical Exhibition of IITG.
- Went to Bengaluru to participate in the finals of IRC 2023, among the top 18 teams internationally.

As the secretary of the Robotics Club and the head of the project, describe your feelings and emotions when the rover took its first step and was successfully tested?

We started building this project during COVID. There were lots of constraints and restrictions. But the grit and determination that our team

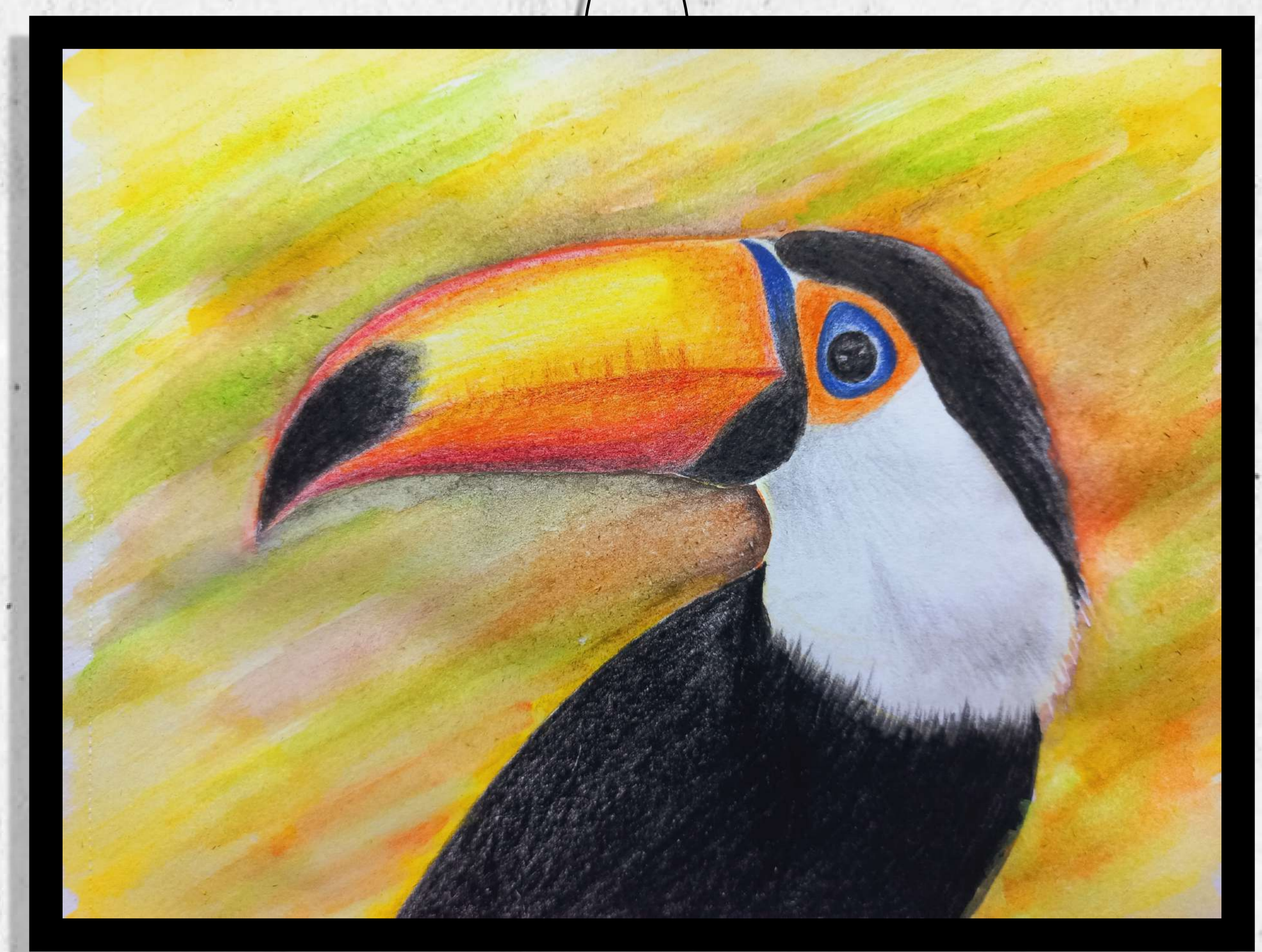
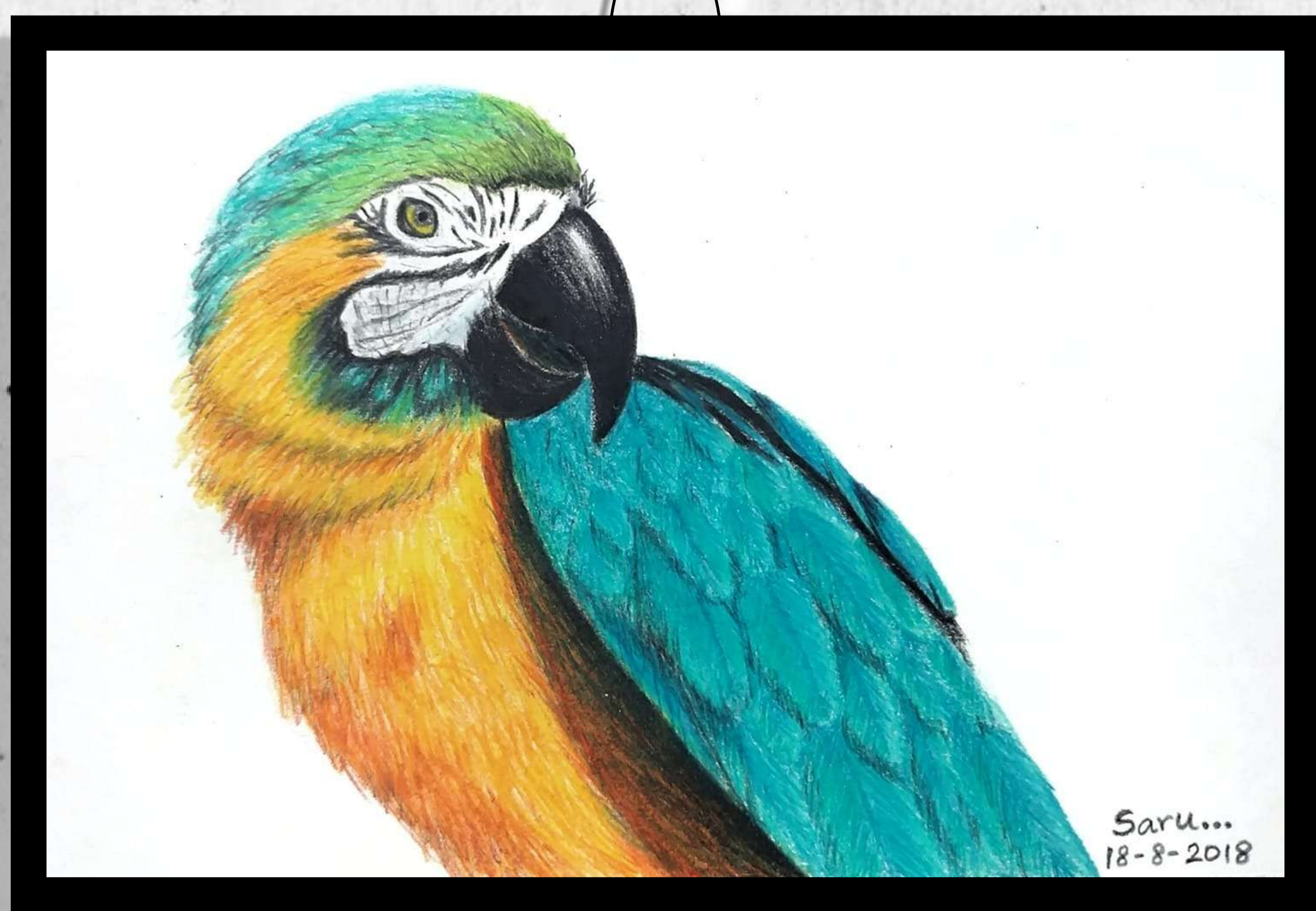
has shown has been exceptional. Yuvaan has not only played an important role in uplifting our



technical aptitude but also has shaped our characters and has built a competitive attitude and team spirit. To see it on an international stage is a feeling that cannot be described in words. There is a deep sense of satisfaction to see our vision and hard work come to a fruition. At the same time there's more hunger to improve and build a better version. We want to extend the vision Yuvaan forward, build a new team with new faces and take it to greater heights.



Arts and Creatives



Saranya

Haptic Technology

~Ashutosh Kumar

Virtual and augmented reality is becoming increasingly popular in many areas of our lives, from gaming and entertainment to education and training. However, one key aspect is still missing from these virtual environments – the sense of touch.

Enter ultrasonic haptic feedback technology, which promises to revolutionize how we interact with virtual objects.

But what exactly is ultrasonic haptic feedback? Think of it as the superhero of virtual reality, giving you the power to touch and feel virtual objects just as you would in the real world. How does it work? The device sends ultrasonic waves that bounce back after hitting a virtual object and then generate corresponding haptic feedback for you, allowing you to experience the virtual world in a new way. Haptic technology provides a sense of touch and allows users to feel and manipulate virtual objects, making the experience more immersive and interactive. Imagine playing a virtual reality game and feeling the weight of a sword in your hand or the rough texture of a rock are endless, and the



excitement is real!

Imagine feeling the weight of a sword in your hand while playing a game. No Doubt this Technology is going to revolutionize the gaming experience. What else? Imagine seeing Nuclear fusion from your room, walking on some other planet, or witnessing Historical things happen from the comfort of your home. That sounds

crazy but wait for Haptic Technologies. Isn't this more interesting if we could interact with these virtual environments? Imagine the development this can bring in the Gaming, Education, and Medical Science field. Augmented reality can change how we interact with the world, but the lack of touch currently limits it. Ultrasonic haptic feedback technology could change this by allowing users to touch and feel virtual objects interacting with the real world.

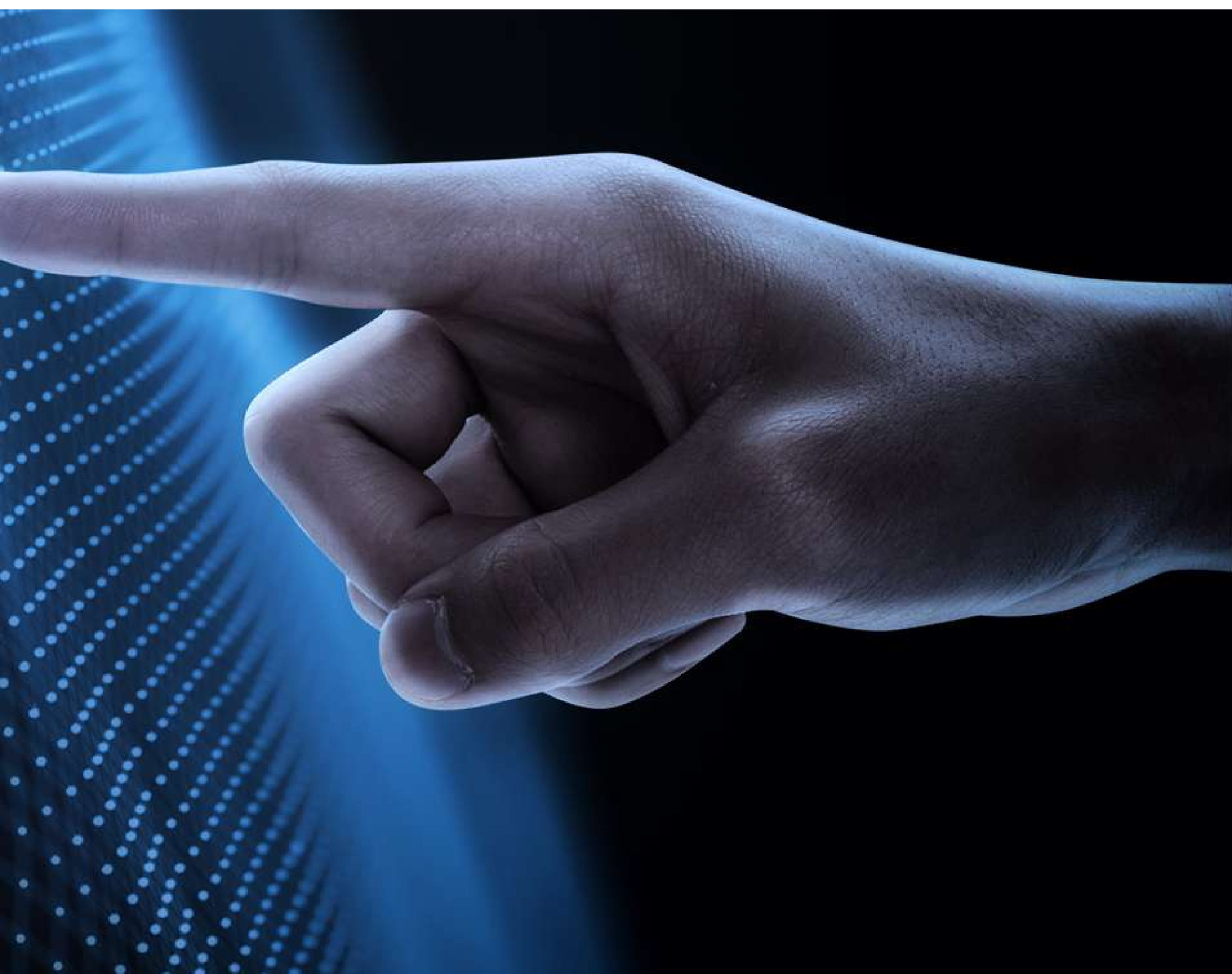
Ultrasonic haptic feedback technology could also significantly impact mobile devices like smartphones and tablets. Currently, these devices rely on vibrations to provide haptic feedback, which can be limited and unsatisfying. Ultrasonic haptic feedback technology could change this by giving users diverse touch sensations. Is Ultrasonic Haptic Feedback Technology only available Haptic Feedback Technology in use? Obviously No, We already have Vibration Feedback, Electrostatic Feedback, Thermal Feedback, and Force Feedback. Vibration feedback is a commonly used technique in haptic technology to provide a sense of touch. Vibration feedback, also known as vibrotactile feedback, involves using small motors or actuators that produce vibrations to simulate the sense of touch. In haptic technology, vibration feedback can be used to provide tactile cues for

various applications. For example, in video games or virtual reality, vibration feedback can simulate the feeling of explosions, crashes, or other events. In medical or rehabilitation applications, vibration feedback can provide sensory stimulation to assist with motor control or relieve pain. Vibration feedback can also be combined with other haptic feedback techniques, such as force feedback or thermal feedback, to create more realistic and immersive experiences. For example, a haptic glove that combines vibration feedback with force feedback can simulate the feeling of grasping and manipulating an object with varying levels of force and texture.



Electrostatic feedback, or electro-vibration feedback, is used in haptic technology to provide a sense of touch. Electrostatic feedback involves using high-frequency electrical charges to create the sensation of texture or vibration on

a user's skin. In haptic technology, electrostatic feedback can be used to simulate various textures, such as roughness, smoothness, and even temperature. Electrostatic feedback creates a high-frequency electrical charge between two surfaces, producing a slight but noticeable vibration that the user can feel. One advantage of electrostatic feedback is that it can provide highly localized and precise feedback, allowing users to feel textures and sensations on specific parts of their body. Electrostatic feedback can also be combined with other haptic feedback techniques, such as force feedback or vibration feedback, to create more realistic and immersive experiences.



Force Feedback uses actuators to physically push or pull on the user's hand or finger, providing a sense of touch. It is often used in gaming controllers and virtual reality devices. In haptic technology, force feedback creates a more immersive

experience by allowing users to feel and interact with virtual objects as if they were real. For example, a force feedback joystick might provide resistance or vibration to simulate the feeling of pushing a button or controlling a vehicle. Force feedback can also be used in more complex haptic devices, such as haptic gloves or exoskeletons, to provide a more realistic and naturalistic sense of touch. For example, a haptic glove might use force feedback to simulate the feeling of grasping an object, with varying levels of pressure and resistance depending on the object's texture and weight.

Thermal Feedback uses heat or cold to provide a sense of touch. It is often used in medical devices and virtual reality devices. One example of how thermal Feedback can be used in haptic technology is the creation of thermal displays. These displays use temperature to provide tactile feedback to users. For example, a thermal display might use heat to simulate the feeling of warmth or cold to mimic the feeling of a cool surface. Thermal feedback can also be combined with other forms of haptic feedback, such as vibrations or pressure, to create more realistic and immersive experiences. For example, a haptic glove that provides thermal feedback could simulate the feeling of holding a hot or cold object and provide pressure and vibration feedback to simulate the texture and weight of the object.

The newest entry in this field is

Ultrasonic Haptic Technology. How does it achieve its goal?

Ultrasonic haptic technology is a type of haptic technology that uses high-frequency sound waves to create tactile sensations in mid-air. The technology generates ultrasonic waves at frequencies higher than the range of human hearing, typically between 20kHz and 40kHz, that generate pressure waves in the air that the user can feel.

A wide range of haptic sensations can be created by controlling the frequency, amplitude, and direction of the ultrasonic waves. One of the main advantages of ultrasonic haptic technology is that it does not require physical contact with a device or surface to create haptic feedback. This makes it particularly useful for touch-less interfaces and virtual and augmented reality applications, where users can interact with virtual objects and environments without needing physical controllers or devices. Ultrasonic haptic technology has potential applications in various industries, including gaming, medical and rehabilitation applications, and the automotive industry. For example, in automotive applications, ultrasonic haptic

technology could create touchless controls for in-car infotainment systems, allowing drivers to interact with the system without taking their hands off the steering wheel.

In conclusion, haptic technology has come a long way since its inception and has revolutionised the way we interact with digital



devices. From providing tactile feedback to enhancing virtual reality experiences, haptic technology has opened up new possibilities in various industries, including gaming, automotive, healthcare, and more. As technology continues to evolve, we can expect to see even more advancements in haptic technology, making our digital experiences even more immersive and engaging. While there are still challenges to overcome, such as the need for more widespread adoption and standardisation, haptic technology has the potential to transform the way we interact with the digital world and enhance our overall quality of life.

Looking Forward To The New Year Celebration

~Lipika Boruah



*We'll wait for the New Year in two faded overcoats....
You recite poetry, I will give you a cup of apong
Looking at the aristocratic faces in the market ahead
I'll smile dryly
And
We'll wait for the New Year
In a song that the West doesn't understand
We will dance independently
We'll bring everything for the little ones what they
want
Promise once again
We'll secretly sleep in a pleasure
Suddenly, the sound of fireworks.....
We will remember the New Year at midnight
We are going to sleep again waiting for a new day.*

SAB Chronicles

~ Jayant Jaiswal

Hi there! In this article, I will be writing about my Students' Academic Board (SAB) Joint Secretary experience and what I've learnt from it.

Let me start from the beginning with a small brief about SAB. The Students' Academic Board (SAB), IIT Guwahati, is a student body that addresses all academic concerns and issues of IIT Guwahati students. The SAB is intended as a student forum that will strive to redress the academic problems of the entire student community.

SAB and Intern season

I have been associated with SAB since my first year. I got into the team of Research Conclave 20,

met new people and learnt how to work with people who are seniors to you. In my 5th Semester, a form of SAB EC 21-22 was floated while our Intern Season was in full swing. Meanwhile, I gave the interview and was selected as JS and Subhash bhaiya as GS.



UG Council Put in Active mode

The first thing I did was restart some work that was stopped due to covid. I started making some policies and

reforms in SAB for UG. The reorganisation of the UG council enabled SAB to contact the UG community quickly. Departments like EEE, CSE already have a UG student body (Cepstrum, CSEA) which does a lot of intra departmental activities which eventually help their senior junior interaction. Departments like Physics, Chemical didn't have this kind of body. This council gave confidence and recognition to Branch Representatives at the institute level. This not only motivated them to form a UG student body in their department as well.

RIC22

The next challenge was Research and Industrial Conclave 22 . As soon as I joined SAB, the then RIC convenor resigned due to some personal reasons. Since we have announced the RIC dates, the stakes were high. Generally in other boards/fest teams work round the year for events, so these type sudden crises don't happen there. Everyone on the board took some responsibility for the event. I took the responsibility of developing the whole Web application. The deadline was strictly for releasing the site in 1 week. I started the work immediately on the techstack. The site and registrations were opened in November 2022. In January 2022, it was planned to be held in a hybrid mode. But, the sudden outbreak of a new COVID wave in our institute and



the subsequent lockdown compelled us to shift the whole event ONLINE at short notice of 20 days.

Nevertheless, we hosted a set of informative and interactive events for about 1500 registered participants, featuring acclaimed experts, including Nobel Laureate Prof Lars Hansen.

Workshop Cell

Soon after RIC, I started working in one of my agendas i.e Workshop Cell. The aim behind it was to inculcate critical thinking ability. Prof. G Krishnamoorti was also excited about this idea. With a series of rounds of talk with Chairperson SAB, we eventually formed a cell under SAB.





PAL Classes

Peer Assisted Learning Program, which aims to provide extra classes to all those First-year undergraduate students who face difficulties in understanding the concepts well and hence fail to score good marks in some of the ongoing courses. The institute counsellors were also involved in the program. They used to provide us with their suggestions, tips for making the classes more connected and fruitful. Moreover, they suggested 1st Year UG students to join the classes if they face any difficulty (pacewise/concept wise).

Fresher's Orientation and Registrations

The SAB team coordinated with and assisted the academic affairs section in conducting the physical registration of first-year undergraduate students in October 2022. The team helped in setting up desks to handle queries and conduct document verification, and assisted with logistical and organizational tasks at these events. During October 2022, the first-year undergraduate

batches of 2022-23 presented themselves for physical registration at the Institute. SAB provided logistical and organizational support to the academic section during this process. The team also solved queries of students and parents about registrations and campus life. Members of the UG council played an important role in making the process smooth and easy for the newcomers. In addition, SAB conducted an orientation about the institute's academic policies and the responsibilities of SAB during Institute orientation held for newcomers and their parents.

Festivals and Celebrations



A Gala Dinner was organised at the B Type Community Hall for celebrating the success of the Research and Industrial Conclave, on 6 March 2022. All the Deans, Faculty Convenors, Co-Convenors, Advisors, Jury members, team members, volunteers, and staff members were present. Saraswati puja and Holi were also celebrated by the SAB team members.

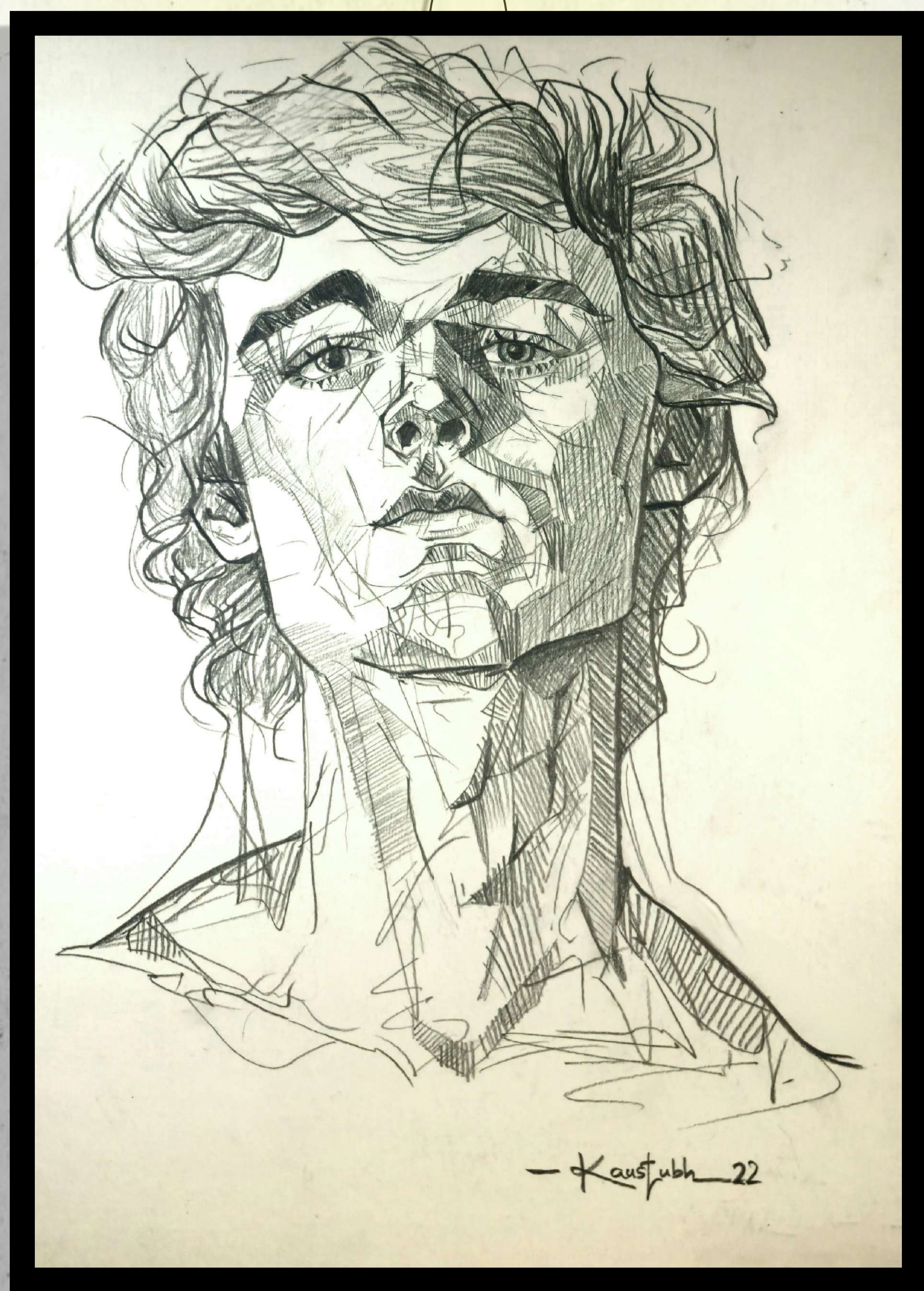
Between October 2021 and December 2022, We conducted a range of workshops, lectures, and PAL classes, in addition to the flagship RIC. This year, we attempted to eliminate registration fees for lectures and workshops to ensure that as many students as possible have access to them. This was done by reducing organizing costs by using online formats wherever convenient, without compromising on the quality and output of the classes.

My advice for Juniors

- Mentors can give you real life practical advice from their experiences that most professors don't have.
- Studies can only help you to a certain limit. It's even more important for you to learn and apply real-life skills like networking/communication skills.
- Work on your skills. Try different things. Pursue whatever you find interesting further. Find ways to monetise your passion. This will put you in a better place financially.
- If you have multiple interests, it's fine. It's actually better than knowing nothing

about your interests. Give some time to each of your interests. Observe what you're enjoying most. Look at the demand for each in the world. Pursue what you find common in both. Having multiple interests will only make you more diverse & interesting. Don't hold yourself from trying new ones. The other skills or interests will also help you in some way to be better.



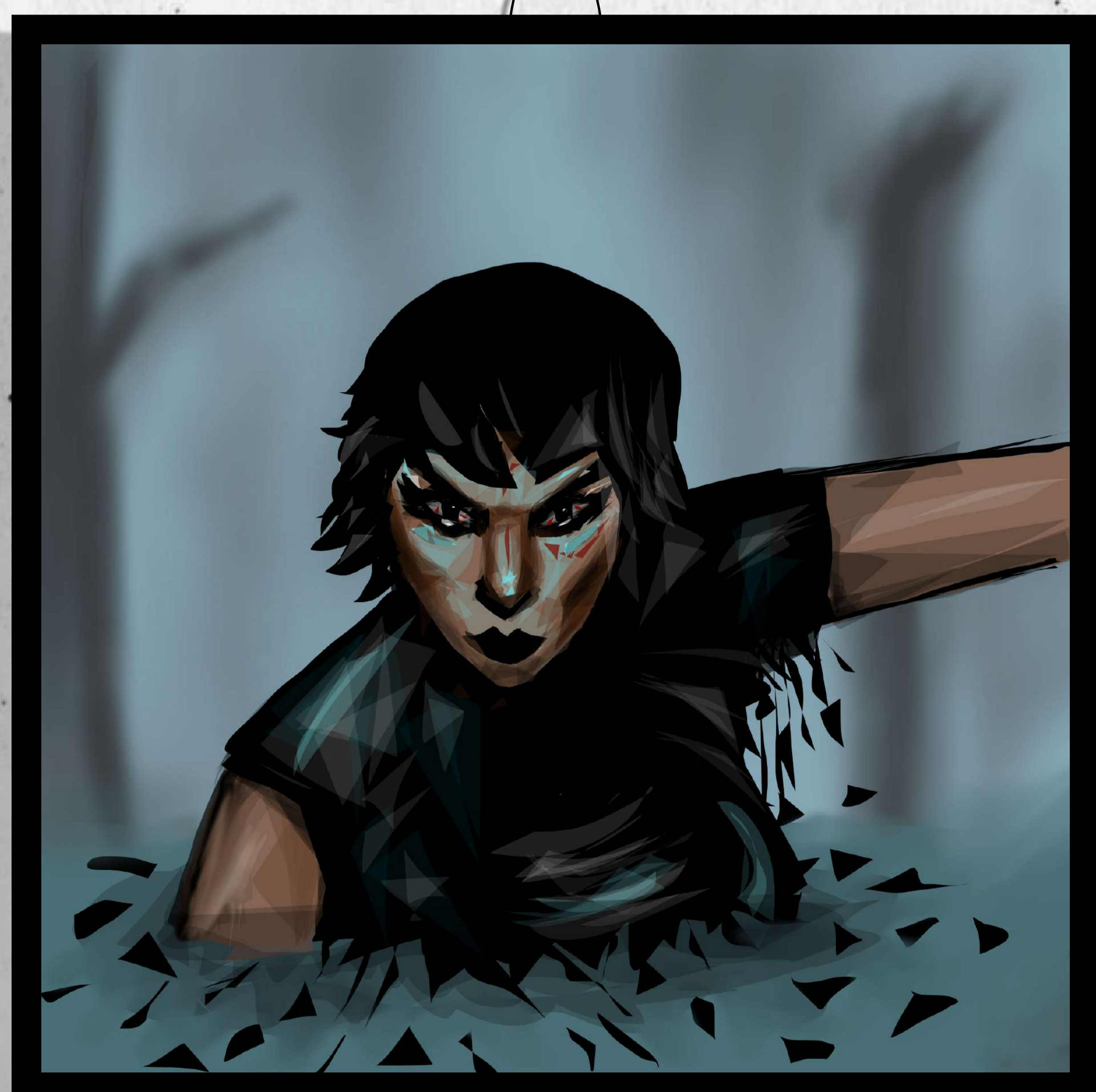


Kaustubh Kumar



Swara

Arts and Creatives



Swara



Swara

Dancing All Night

~Koustub Gururaja Rao

*I wish to dance all night long,
With that someone whose presence,
Itself is the song.
Because with them I am at peace,
There are no hardships at that moment, just the feeling of ease.
No form of dance, no locks, no pops,
Dance is the ocean and we are just the drops.
Movement like the flow of the beats,
Just like her open hair with no ribbons, no pleats.
Just swaying all night with hand in hand,
No one to stop us, so close we stand.
Oh when will it come, this night of charms!
The time that we stay all night, in each other's arms.
No words can express this ecstasy,
This dream of dancing, just you and me.
This dance of my dreams, this symphony,
Is only imaginable by me with that somebody.
I hope I find the courage to ask for her hand,
that person of my dreams, that lady of my land.
Because I wanna dance with her, all night long
that somebody whose presence itself is the song.*

Campus Startup Di-Bi

~*Krishna Khakholia*

1. Tell us an overview about what Di-Bi is all about?


So, once I was traveling and I realized that I had forgotten my wallet and then a thought came to my mind - why is it necessary to carry a wallet? Id, money everything is online but still, a large section of bills are working in offline mode. And from here I got the idea of working on the digitalization of the bill. As I researched more, I realised the amount of important data that invoice has and how greatly they can help both consumer and business.

Di-Bi is a cloud-based software which helps businesses to see all the payment, transaction and customer data in one place including average buy patterns and category-wise spending which helps them to take intelligent business decisions. Also, we automate customer engagement which helps to retain more customers. For the customers, it helps them to get all the bills in one place, whether it be online, offline or any subscribed bills.

Thus reducing the chance of bills getting lost or misplaced and hence helping them in exchange, return and reimbursement. Also at the same, it will help customers to do personal finance tracking with the help of the bill data.

2. Khatabook, Zoho books, Vyapaar are some of the other startups in the billing and finance domain. What unique selling proposition Di-Bi offers that sets it apart from its competitors and makes it superior?

Any other startups like khatabook, vyapaar, Zoho or Tally work for businesses, we were working to create a connection between business and customer, a completely non-saturated open market. While the majority works on inventory management and GST bill creation (which is a very big segment) and some on the ledger, we are not targeting the software market or ledger part. We are targeting the hardware, the printer.

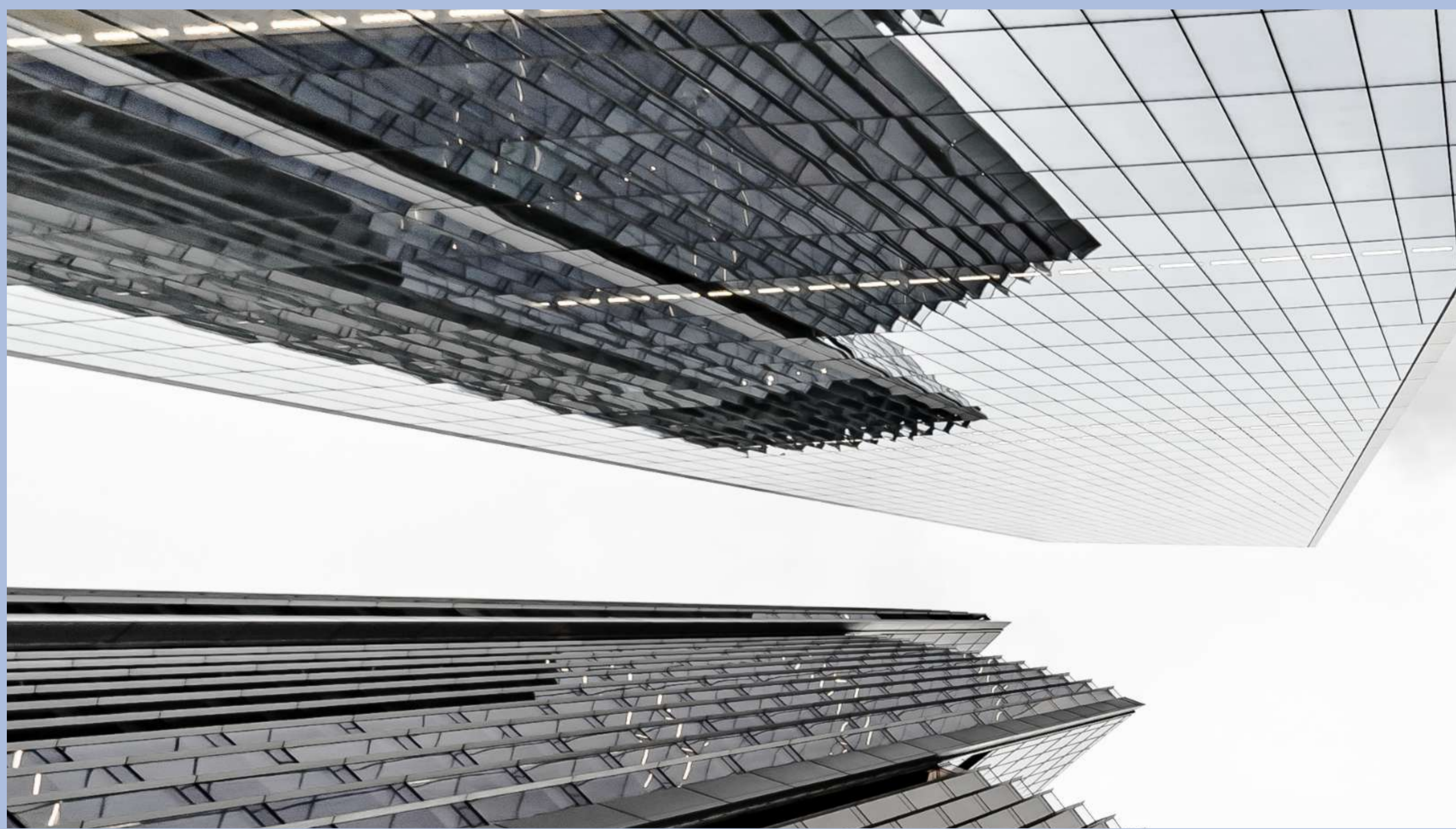


We are working on the digitalization of the bills and using its data to bring customers and businesses closer rather than working on GST or bill creation.

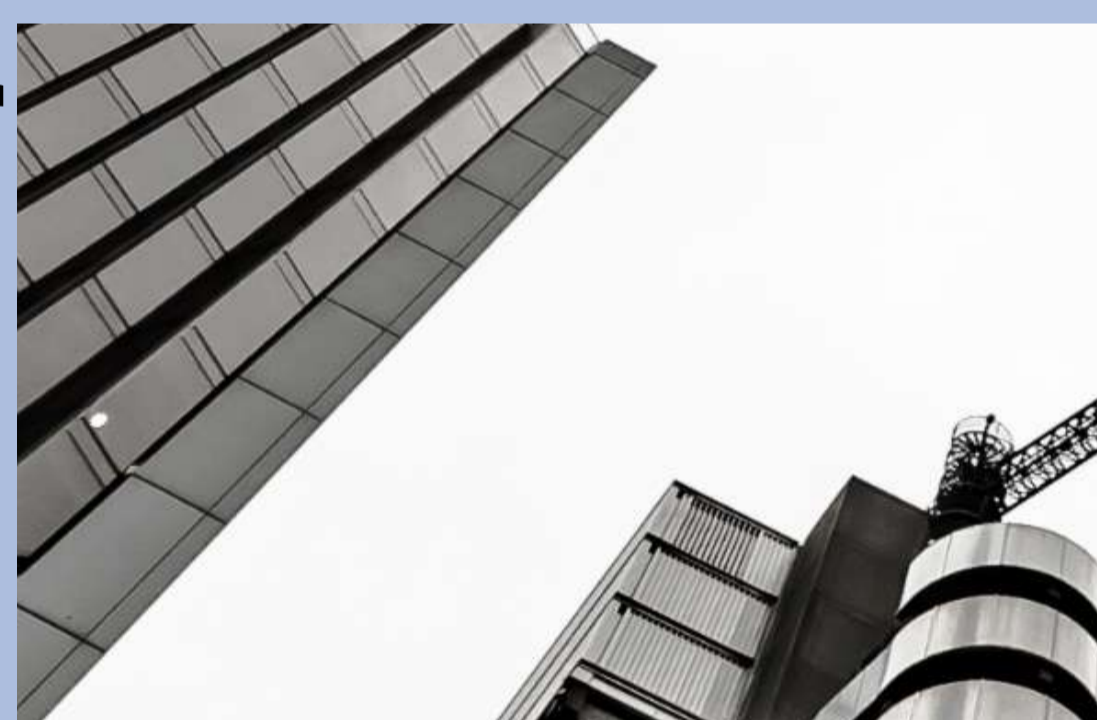
3. College life is loaded with events, fests, academic activities and the rest of the time, students prefer to hang out with friends. How did you manage to start it, your motivation behind it and the challenges you faced ?

The main motivation behind doing a startup was completely exploring college life and getting everything that college can offer. When I joined IIT, I wanted to use up everything that college has to offer - alumni network, club culture, coding culture, knowledge of professors, peers, government grants and competition and the best way to do so was to do a startup. The main goal behind doing a startup was never to be successful, to be honest, it was the learning and the network one gets while doing a startup.

The main goal behind doing a startup was never to be successful, to be honest, it was the learning and the network one gets while doing a startup. Coming to time management, I would generally work on startup during my class hours instead of just wasting time, which gave me enough time to explore all the clubs and other domains.



I also joined E-Cell for this and continued as a secretary there, so the activities of the club could also be explored and also my interest domain would also align.



The major challenges that I faced were time management and the overwhelming coding culture of the campus. Wherever I went or whoever I talked to, no one wanted to do a startup or motivates anyone to do so, everyone was running behind coding which made it difficult to sustain in this environment.

4. Nowadays, readers are curious about technical details. Brief us about how the backend functioning works in Di-Bi ?

We are building the desktop application with electron, and once we integrate with the PoS, we will use OCR to get the bill data and get that to our database in Mongo DB and from there we supply the required information to the customer and shopkeeper application.

5. In any industry, you've to grow and stay ahead of competition which involves planning for the next phase. What are your future plans ?

We aim to get at least 250-300 shops registered under us in the first phase in Guwahati and Jaipur. We have chosen tier-2 cities for the launch. And work continuously with them to get to our product market fit, with continuous iteration and then expand further. Currently, we are backed by Newgen IEDC which will help us to get to the first phase and after that, we will look into different options to expand.

Journey from fresher to VP

A reflection on the 4 years

Today, on this edition of Inphase, I'd like to share the knowledge I've acquired over the course of my four years in college, starting from being a highly extroverted student who excelled in almost all college fests and activities in my first year to founding two startups and turning them into a successful business in my second year during the pandemic times also mentoring, and organising the Institute's SSC Club, which at that time had over 52 members and 160 volunteers.

Finally, by the grace of God and my student community, they elected me as their leader and gave me the opportunity to serve them as the vice president of the student gymkhana and chairman of the student senate. This gave me the time and opportunity I needed to work on the 360-degree development of the Institute's policies for our students' upbringing and well-being. The one thing I never lost sight of along the road was the importance of paying attention to and respecting the little things that ultimately enabled me to reach such heights. I frequently turned to my mentors throughout the road for advice and assistance with minor things. My mentors included my parents, a few friends, startup VCs, and my counsellor. I used to talk about my problems

and my goals on every phone call, confident that I would discover a solution or a crucial phrase that would enable me to go past the obstacle and accomplish my next objective. We can learn from nature's example of never giving up by seeing the numerous insects and trees that are decimated by human activity yet still manage to adapt and grow even more resilient. Everyone has a significant impact on how one develops as a person; all it takes is for a person to have unusual or perceptive eyes and to view every event or incident as a modest step in that direction.

In order to further illustrate my perspective, I'd like to use a narrative to connect with you all.

An old senior technician who had just retired gave the young technician advice that included never taking a day off and working harder and smarter to ensure that the factory became dependent on him for all of

its maintenance-related work and the smooth operation of the entire facility. The young technician had worked in the factory as an aspirant technician who wanted to achieve high and get promoted to a higher level. The young man followed the advice given to him, but after a few years he recognised that the advice was completely ineffective, even though he was still a junior technician in the factory. He made the choice to see the elderly man once more. The elderly man questioned if he had taken any time off in the previous two years after hearing him out on his concerns and troubles, and the young man said, "No." Once more, the elderly man questioned whether you were responsible for maintaining the factory's operations. The person responded firmly. Consequently, the elderly man commanded, "Go take a day off." The young man took a day off while carrying out his instructions. When a machine in the factory broke down that day, the manager asked the maintenance team to fix it as soon as possible. The team replied that their star player was out sick, so they couldn't fix the machine that day. After the manager recognised the young man's dependability and credibility, he was swiftly promoted to the position of senior technician. After this, the young man was promoted to higher positions and used to take leaves

whenever he felt underappreciated. Finally, he was let go. He went to meet the elderly man after being devastated. The elderly man said that the person only knew a portion of the story. Once a light bulb is turned out, the others notice it and make every effort to keep it glowing, but if a bulb flickers too frequently, it is replaced by one that is less bright and more dependent.



Therefore, we should not take anything in life for granted because we may come to regret losing those who used to bring us joy and security. The second lesson is that we should never take ourselves for granted; it is preferable to demonstrate our worth by taking a break than to again endure the same destiny. Finally, we shouldn't believe that we are unreplaceable and that we are free to do anything we want. Always replace a high-glowing, low-reliance bulb with a lower-glowing, higher-reliance one.



Arts and Creatives



Lakshya Kumar

Alcher: An Emotion Unfiltered

~Tejas Kadre

As I walked onto our sprawling campus, I could feel the excitement in the air. It was the first day of our much-awaited, biggest cultural festival in the North-East - Alcheringa, and the entire campus was buzzing with activity. From electrifying dance competitions like "Electric Heels" and "So you think you can dance" to thunderous theatre performances in "Theatrix", I was so ready for the cultural extravaganza that awaited me. As I made my way through the sea of students, I could see colorful banners and posters announcing the various events and activities that were scheduled for the day.

Alcheringa had something for everyone, from music lovers to comedy enthusiasts, and I was determined to make the most of it. The cricket ground, being the biggest ground in our college, was the center of attraction offering an extensive

range of flavory delights and beverages, spanning from piping hot pies and pizzas crafted by the renowned Pizza Hut to tantalizing street delicacies like golgappa, aloo chaat, and dahi puri that left one's taste buds longing for more. Amidst of me eating my heart out, a distant rhythmic drum beat and the resonant strumming of an electric guitar caught my attention, and I knew it had begun. Rock-O-Phonix is the biggest and highly anticipated rock band competition in the North-East showcasing some of the most talented bands and various genres of rock music, including classic rock, alternative rock, hard rock, and metal, from across the country. I was most excited to see the infamous "Pineapple Express", one of India's finest rock bands, who clearly set the stage on fire. Their energy was contagious, and soon the entire audience was up on their feet, swaying and dancing to the thuds

and bangs of the drums. As the music reached its crescendo, the lead singer jumped off the stage and into the crowd, and the entire audience went wild.

Being a bike guy, the bike stunts in front of the NEW SAC building definitely lived up to their hype. The performers were fearless, executing flips and tricks on their KTM's and Kawasaki's that seemed almost impossible. Stoppies, wheelies, skids, you name it, they did it. The audience held its breath as the bikers in orange and black soared through the

air, accompanied by frequent gasps of amazement as they landed safely on the ground.

Adrenaline rushed into the atmosphere, and I couldn't help but feel awestruck in the sheer skill and bravery on display. Soon enough it was time for Juggernaut, one of the Pronites concert, and the main attraction of the whole of Alcheringa. As the lights dimmed and the crowd roared, "The Yellow Diary" took the stage. The stage was set up with various kinds of instruments and electronics, and



a large screen was positioned at the back of the stage, ready to display captivating visuals. The music was loud, but a beautiful kind of loud, filling everyone with energy and excitement. The beat of the drums and the rhythm of the guitar combined to create a mesmerizing melody, captivating everyone who heard it. As we continued to getting high on the tunes, they played some of their most popular songs, Marz and Rab Raakha for instance, which I became obsessed with and instantly added to my playlist. The lighting adapted to the mood of each song,

from bright and bold in Marz to soft and soothing in Dheere se. The stage transformed into a visual masterpiece, with colors and patterns dancing across the screen. The energy was contagious, and everyone around me was caught up in the

moment. I felt like I was a part of something special, something that would stay with me forever. Next day began with a trip back in time, and a quite nostalgic one. Our generation's childhood idols and inspiration, and first ones who actually got me interested in science and arts were in



front of me. FAQ, Art Attack, and MAD are just some of the TV shows which has motivated me to pursue science, and you could possibly say I'm here in IIT because of the hosts of such shows. Seeing and hearing the wondrous stories of Prateek Sethi (former FAQ host), Gaurav Juyal (former Art Attack host), and Harun Robert a.k.a ROB (former MAD host) made me feel that the quote "time flies by" has never been truer. Alakh Pandey (PhysicsWallah), the man who needs no introduction, after teaching me through most of the online classes, also gave advice on how to pass exams without studying much and college relationships.

The performances continued with a variety of dance and drama performances, each one more impressive than the last. While "Navras" competition displayed the graceful and elegant classical Indian dances including Kathakali, Kuchipudi, and Lavani, "Halla Bol"

showcased the power of street plays which really made the actors brought their characters to life, and their performances were emotional and moving. I was blown away by the sheer talent and creativity on display. After having that cultural extravaganza for main course, it was time for some dessert, and what better option other than the world-renowned fashion competition of Alcheringa – "Haute Couture". As the models strut down the red carpet, all eyes are drawn to their extravagant dresses. One particular lady caught my eye, the flowing yellow silk fabric cascades around her, shimmering in the spotlight. The bodice was intricately embroidered with delicate beadwork, adding a touch of sparkle to the already dazzling outfit. The skirt, voluminous and billowing, created a dramatic effect as she



moved. Layers of tulle fabrics and chiffon create a frothy, surreal look, adding a dreamy quality to the ensemble. The dress is completed by a sweeping train that trails behind her, a final touch of opulence that adds to the sense of grandeur. As she reaches the end of the stage, the crowd erupts into applause, awed by the stunning display of fashion and style.

As the fest headed towards its finale, Crescendo awaited us, a Bollywood night concert starring Vishal-Shekhar. The stage was a magnificent sight, with laser lights illuminating the entire area. From "Radha" of Student of the Year to "Main Agar Kahoon" of Om Shanti Om, each song spread different mood across the grassy ground. The entire stadium swayed to the rhythm as green and yellow lasers pierced

through the night sky becoming a visual marvel. The musicians, flawless as they were, played each note so clear and strong that it would be audible from across the city. As they transitioned into "Dil Dhadakne Do", the atmosphere became more somber, and the lights danced to match the instrumental music. As the night drew to a close, they played "Swag Se Swagat" from the movie Tiger Zinda Hai, and the energy in the stadium reached its peak. The entire crowd was on their feet, dancing and singing uncontrollably along to the infectious beat. It was like a reflex action, not under our control.

Blurry pictures tell stories, taken in a moment when everything just seems to be happy. Alcher was nothing less than such blurry photos for me. The feeling of euphoria has never been more evident in me. Alcher had been an unforgettable experience, and had left a lasting impression on me. It had brought people from all walks of life together, and provided a platform for creativity and self-expression. Witnessing the limitless potential of human creativity had given me a newfound appreciation for the power of the arts, which I knew will stay with me throughout my life.



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FROM TEAM INPHASE

The 19th Edition of InPhase is here, and we are thrilled to present to you a compilation of brilliant thoughts, ideas, and experiences, all shared by the talented individuals within and beyond the EEE department.

We extend our sincere gratitude to all the authors who have contributed to this edition and have helped us put together a collection of exceptional works. We hope this edition inspires and motivates you to break free from the confines of your comfort zone and explore new horizons.

We value your feedback and would love to hear your thoughts on this edition of the magazine. Please feel free to share your constructive criticism, as it will enable us to improve and bring you an even better edition next year. Thank you for your continued support, and we hope you enjoy reading the this edition of InPhase.



