ECE Department of HITK presents

AMPERE

overcome Resistance, create Difference

SEPTEMBER, 2020

VISION

The degree holders of the department will carry the image of the institute and the department in India and the world through their commitment and success. They will prove themselves to be good, sincere and successful professionals and teachers. They will prove themselves as good, caring and responsible citizens.

MISSION

Students with degrees from Electronics and Communication Engineering (ECE) Department of Heritage Institute of Technology will :-

- Acquire specialized knowledge in the desired domains.
- Be able to analyze a problem in the given areas and be able to solve it in efficient manner.
- Have confidence and knowledge to start new business activities and show entrepreneurship skills.
- Develop passion for more studies and R & D.
- Inherit leadership qualities for society and workplace.

From the HOD's desk:

2020 - March onwards, is proving to be a most challenging phase in our life. The pandemic crisis, the global economic downtrend – all are adding to the woes of the world. We are part of the big picture and hence, we have to tread carefully to keep us safe first.

Challenges also bring opportunities to engineers and scientists to explore and to design solutions for unforeseen problems. The solutions have to be eco-friendly and economical. So, gear up to face the challenges, to take the situation head on.

Our e-magazine, Ampere, is now coming out regularly only because you, the greatest stakeholder of ECE department, are so keen and sincere. Even in this corona affected year, our students along with support from the teachers and others are on the threshold of another issue of our Ampere.

I tell you one thing frankly. I did not expect this issue in time. I wish all the editors, the contributors and advisors great success. It gives me extreme pleasure when I write this column. Thanking you all once more.

Prof. Prabir Banerjee,
Head, ECE Department

Mentors' Message:

Message from Prof. Siladitya Sen:

Creative work that you have undertaken during this period will showcase your efforts in transforming a rather unproductive period into something meaningful. Our students have always come out with such great ideas which, not only reflected their technical bent of mind, but also their artistic talent and literary skills.

Presentation of such an e magazine by the students of ECE, I am sure, will win appreciation from one and all. Keep up this good effort and involve more and more students in the months and years to come.

Message from Prof. Sayantani Datta:

The journey of the September '20 issue of Ampere from its concept to execution, from the imagination to its implementation in the cyber medium, would not have been possible without the collective initiative taken by the editors in terms of creativity, tech-savvy skills, diligence and patience.

I sincerely appreciate the contributors also who enriched and ensured the smooth completion of this voyage.

Message from the Editorial Board:

"When you are enthusiastic about what you do, you feel this positive energy. It's very simple."

-Paulo Coelho

The enthusiasm and responses we received from our previous three editions encouraged us to present the 4th edition of "Ampere". We are delighted to present "Ampere" as a platform for the students of our department to showcase their talents and present their reports and thoughts on diverse matters happening in the world in front of everyone.

Our new edition includes the categories of electronics, science and technology, creative writing, contemporary, sports, paintings and photography. Transition between these categories includes information regarding electronics, ISRO, Indian cricket, the detective genre of literature and more interesting but lesser known facts.

We thank our mentors Prof. Prabir Banerjee (HOD, ECE Department), Prof. Siladitya Sen and Prof. Sayantani Datta for encouraging us throughout. We also thank the contributors and students of ECE Department who have made this magazine possible. We hope this edition can match up to your expectations.

Welcome to Ampere 4th edition.

-Editorial Team

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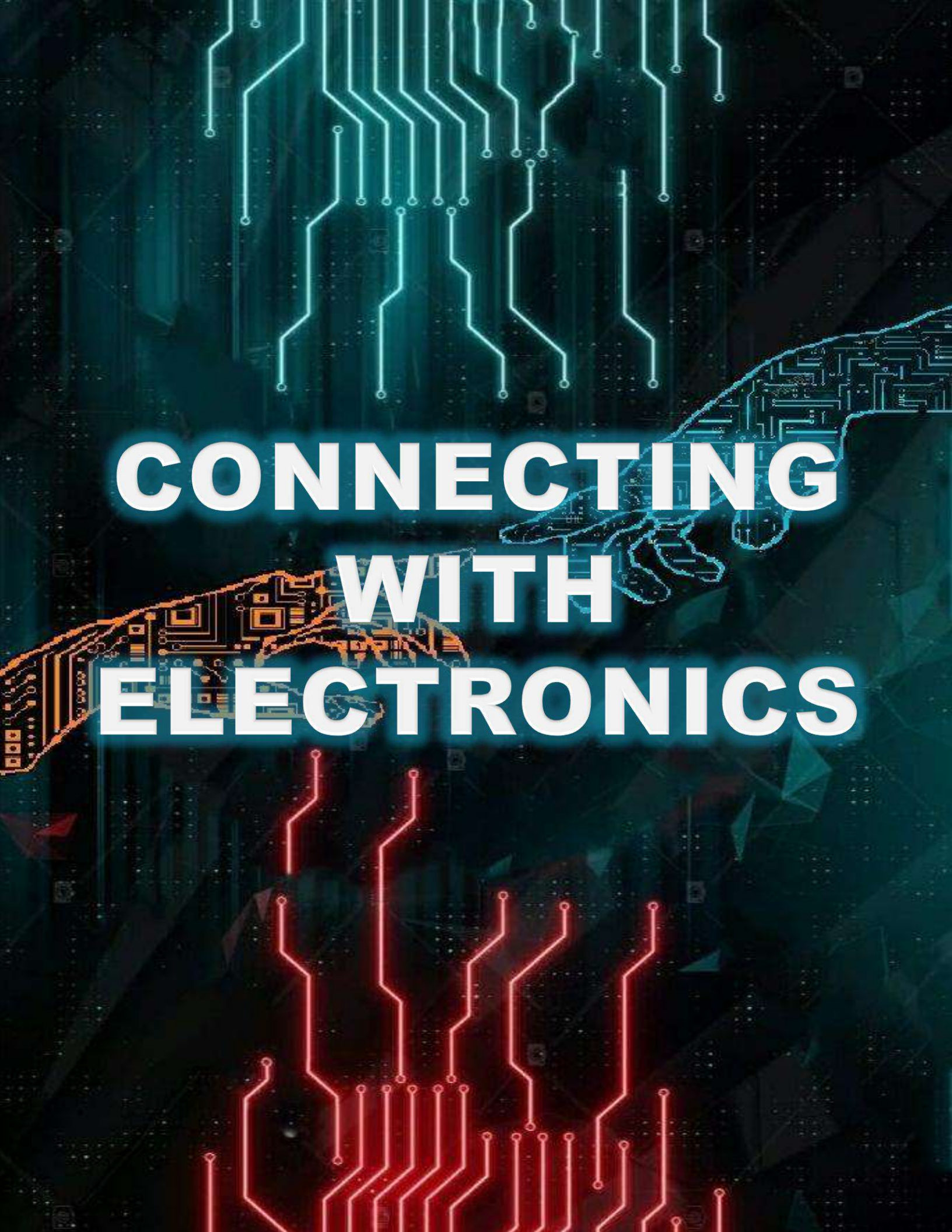

CONNECTING
WITH
ELECTRONICS

Integrated Photonics: The Fourth Revolution in Technology and Future of Silicon

After the invention of fire and electricity, the third technological revolution of the human race commenced with the advent of the semiconductors. The pioneering work of William Bradford Shockley, John Bardeen and Walter Houser Brattain in finding transistor effects using composite semiconductor materials led to a gradual advancement for the semiconductor fabrication technology starting from BJT to MOSFET and its counterpart, the C-MOSFET. Today we can boast of highly compact devices having low power and high speed. Trillions of MOSFETs having dimensions of the order of nano-meter are packed densely. The latest devices marketed by Apple, Samsung and by a few others are of 7 nm technology and winding up for launching 5 nm devices. It means the MOSFETs used in the coming devices are of 5 nm scale, i.e., only 45 times larger than a silicon atom, that has the atomic radius of 0.111 nm. One can say each MOSFET is nothing but a stack of 45 atomic layers of silicon! Such a great level of miniaturizations gradually leads the *electronic* technology to an exhaustive end, by the coming decade. As a consequence, the skyscraper demands of Silicon and associated industries may touch the bottom in absence of alternative solutions. However, light is found as an obvious alternative because it is very much faster than electrons and consumes less power. Therefore, the new devices are going to use *light* in place of electrons, to satisfy demands for higher speed and lower power compared to those earlier in generations. However, the major disadvantage of light over the electrons is its radiative nature, making it to spread out into surrounding medium, while electrons are naturally confined within materials. Provisions are investigated to make light confined within materials, and *total internal reflection (TIR)* is the first among a few successful techniques. The designs of fibre optic cables (FOCs) are based on such a theory. The TIR phenomenon is described for a system of materials

having dimensions larger than the wavelengths under consideration. As a result, the assumption for light as ray adequately supports all the necessary physics. Thus, the study of TIR and associated applications falls under *ray-optic regime*. But such an assumption is not enough to describe the behaviour of light for the devices of micro-meter order, which is suitable for IC fabrications. . As the dimensions of materials get reduced to an order of wavelength, new physics becomes necessary to describe light-matter interaction at the scale of wavelengths and sub-wavelengths. Therefore, the *wave nature* of light is adapted, where the propagation and characteristics of light are governed by the theory of electromagnetism.

Thus, the study of the light-matter interaction falls under *wave-optic regime*. The electromagnetic wave equation, known as Maxwell's wave equation, characterizes light in a manner the Schrodinger equation characterizes electron-waves in crystalline semiconductor materials, where the atoms are arranged periodically with a period of the order of electron-wavelength. Therefore, the behaviour of electrons within a periodically arranged crystalline semiconductors materials can be imitated by light if it propagates through a periodic medium having a period of the order of wavelengths of the light propagating through it. With such an idea, periodic structures made of Silicon are designed and investigated for the optical frequency band. Interestingly, like the electronic band-gap observed in semiconductors, *photonic band-gap (PBG)* has resulted for such artificially engineered periodic structures called Photonic Crystal (Phc). Like doping in semiconductors *defects* in Phcs prolong its applications in diverse dimensions. The devices available for the microwave band become feasible, now, to realize them at optical frequencies with dimensions of the order of micrometer. A few new devices based on the extraordinary properties of the Phcs such as *self-collimation*, *left-hand propagation*, *photonic band-gap* are of greatest research interests at present. In addition, the existing support for Silicon-based electronic IC fabrication technology made the Phcs attractive as it is going to revive the future of Silicon and associated industries. Thus, the Phcs extend the ways to optical IC fabrication.

Metals appear extremely lossy at optical frequencies and are avoided generally. But periodic structures made of metals over a dielectric (Silicon) substrate exhibit unprecedented properties of light, if the periods become sub-wavelength in comparison with that of the Phcs.

The noticeable properties of such artificially engineered material, known as *metamaterials*, are the refractive index, that can be made negative, even *less than unity*! Negative index results in *superlens* increasing lensing efficiency beyond the limit of the best microscope available at present. Making the refractive index less than unity the electromagnetic waves beat the speed of light while propagating through such a material! Such an achievement made the design feasible for *invisible cloak*, a region the light bends across making 'things' within the region invisible to the observers. In addition, the *frequency selective surfaces (FSS)* called the *Meta-surfaces* used in designing the Stealth fighter planes are being investigated to gain possible advantages in the field of integrated photonics.

These are the most impressive fields being studied right now and attracting huge funds from industries running Silicon-based electronics IC fabrication infrastructures. Therefore, the future of Silicon that was seemingly found to an end is thriving up once again with upcoming photonic integrated technology, and opening up new opportunities for higher studies, internship, high profile engineering job, research and investments.

Prof. Dr Susovan Mandal
Assistant Professor
ECE Department

Nanotechnology:
Applications and Future Prospects

Nanotechnology is the act of manipulating materials at very tiny scales. With dimensions under 100 nanometers, they start displaying unique properties (become much stronger, conductive or reactive). The concept was introduced by the famous American physicist , Dr. Richard Feynman.

Some popular applications are:

- Fullerenes (carbon nanostructures which include nano-tubes and buckminsterfullerene) are supersensitive nano-sensors and ideal for catalyst support.
- Nano drug encapsulation helps in the delivery of TB, HIV/AIDS and malaria drugs.
- Quantum dots (semiconductors with nano dimensions) are used in solar cells and flat panel displays , and also in biosensors to pinpoint disease in the body.
- Nano-sized whiskers are being used to make water and stain repellent fabrics and also in the manufacture of bullet-proof jackets.
- Nano-filtration membranes are being applied for removal of dissolved salts from salty water, removal of micro-pollutants, water softening, and wastewater treatment.
- Nanolithography is being used for fabrication of chips.
- HP is currently developing a device called memristor, which uses nanowires coated with titanium oxide. They can be used as single-component memory cells in the IC, helping achieve higher memory density than flash memory chips.
- Gold and silver particles are being used for biomedical imaging to produce exceptional images of tumors sites, and such nanomaterials are talented drug delivery systems to affected areas.

Nanotechnology covers many areas of science, research and technology. Some future developments include thermoelectric screen printing, liquid-repellent materials , light-seeking synthetic nanorobot and super-powered bionic plants. It is a remarkable science which is growing rapidly, and presents new opportunities to improve how we measure, monitor and manage. Nanotechnology is the future of advanced development and we must embrace it!

Akanksha Das
4th Year

DIY-DUINO!!!

Building a Piano

So, we will be building a piano with the help of a micro-controller ATMEGA-

328P (namely Arduino UNO R3), push buttons, resistors and a piezo buzzer.

Components Required:

Only a laptop or desktop with good internet connectivity.

Steps:

- Open up a browser and search for tinkercad (online simulator) or you can directly visit the link

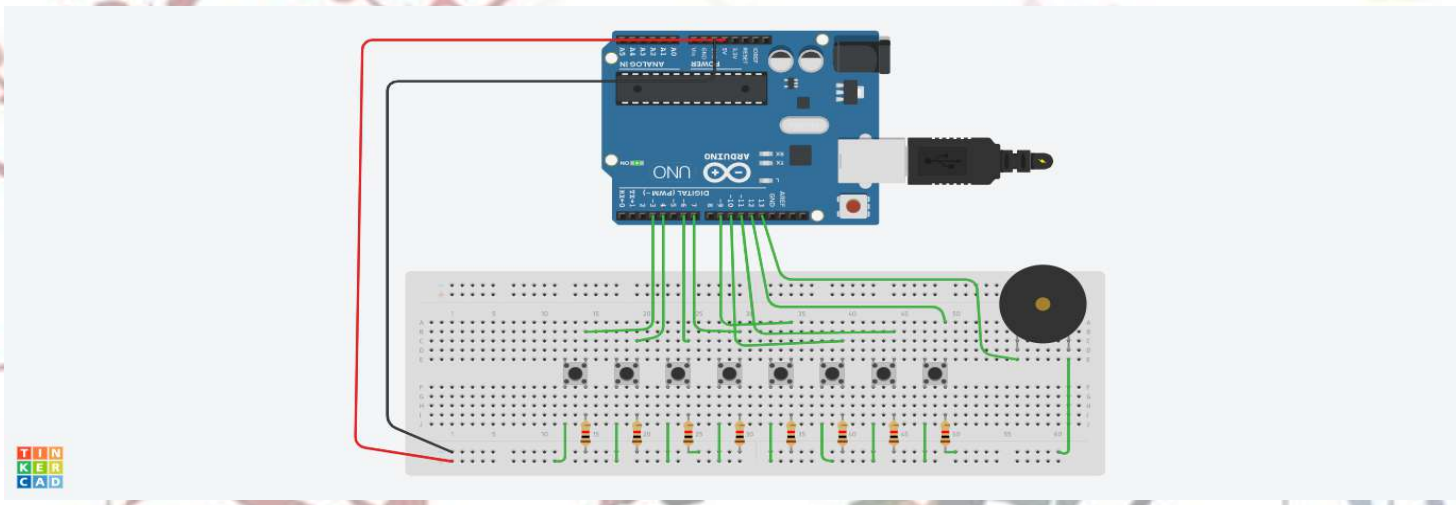
  https://www.tinkercad.com/
- After opening the site go to circuits and after that from the components section search and select the following components
  1. Breadboard
  2. Arduino UNO R3
  3. Piezo buzzer
  4. Push Button
  5. Resistors (click on this and enter 10 kΩ)

  (this is to restrict short circuit)

- Select the number of pushbuttons and resistors according to your choice depending upon the number of keys.

- **After that do the following circuit operation:**
  click on the link to download the circuit diagram:
  https://bit.ly/rajatabha_circuit

note: The push button when pressed will let the current flow through it and will make the pins connected to digital input as HIGH.



- **Then insert the below written basic code in the code blocks there after selecting only texts in simulator:**

```
int ps1 = 3;
int ps2 = 4;
int ps3 = 6;
int ps4 = 7;
int ps5 = 9;
int ps6 = 10;
int ps7 = 11;
int ps8 = 12;

int buzzer = 13;
void setup()
{
```

```
//declare the button pins as input for the arduino
pinMode(ps1,INPUT);
pinMode(ps2,INPUT);
pinMode(ps3,INPUT);
pinMode(ps4,INPUT);
pinMode(ps5,INPUT);
pinMode(ps6,INPUT);
pinMode(ps7,INPUT);
pinMode(ps8,INPUT);
//declare buzzer pin as output that will be given by arduino
pinMode(buzzer,OUTPUT);

}

void loop()
{
int b1 = digitalRead(ps1);//this will take the digital inputs
int b2 = digitalRead(ps2);//i.e. 5V in this case
int b3 = digitalRead(ps3);
int b4 = digitalRead(ps4);
int b5 = digitalRead(ps5);
int b6 = digitalRead(ps6);
int b7 = digitalRead(ps7);
int b8 = digitalRead(ps8);
if( b1 == 1 ){
tone(buzzer,300,100);//tone(sensor _ pin, frequency, duration in ms)
}
if( b2 == 1 ){
tone(buzzer,400,100);
}
if( b3 == 1 ){
tone(buzzer,500,100);
}
```

```
if( b4 == 1 ){
tone(buzzer,600,100);
}
if( b5 == 1 ){
tone(buzzer,700,100);
}
if( b6 == 1 ){
tone(buzzer,800,100);
}
if( b7 == 1 ){
tone(buzzer,900,100);
}
if( b8 == 1 ){
tone(buzzer,1000,100);
}
delay(10);
}
```

note: The digitalRead() and digitalWrite() are used for taking input and giving output respectively in the arduino eco-system. The push buttons are here working as the input source for the arduino. You can change the frequency of the buzzer by using tone() and play music accordingly.

- **So, after this you are almost done with the piano click on start simulation and if there is any error debug it. Henceforth, you are ready with the piano.**

Now click and enjoy different tunes of the piano!!!!

Rajatabha Chakraborty
3rd Year

India's Indigenous Made Microchip: "SHAKTI"

What is SHAKTI?

SHAKTI is India's first homemade microchip set and an open-source initiative under RISE group at IIT-Madras. The word "SHAKTI" means power. It is based on the RISC-V architecture and has 3 cores:

- E-class: It will be used for embedded applications and fields like IOT and robotics
- C-class: It will be used for mobile applications and can run up to 1.5Ghz. C class processors are already being fabricated. One is done by INTEL, 22nm named 'RISECREEK' and the other is Indian made 'RIMO', 180nm (a bit bigger, but still not bad). It will find applications in India's Defence needs
- I-class: It is a performance-oriented core (currently in development) and can run up to 2.5Ghz.

How SHAKTI is different?

Shakti is based on the RISC-V architecture. It is open-source and not proprietary unlike INTEL and AMD. INTEL and AMD use the Von Neuman architecture while SHAKTI uses Harvard architecture. CDDC (India's supercomputer manufacturer) also comes as it's Indian competition. They are also making their own processors. But as revealed from sources, they would not be made public and will be used for their internal purposes only. So, SHAKTI sneaks past them as well.

Advantages of SHAKTI over others:

The main advantage when compared with other chip manufacturers lies in the fact that it is open-source. So, anyone can develop upon its design and make their own custom designed chips. For example, if ISRO/DRDO wants

to make a processor that would serve a specific purpose, like for their rocket engines and all, then SHAKTI's open source environment fits in well.

'INCORE' which is the start-up coming up with this initiative of making SHAKTI chips has planned to devote more time in chip designing rather than industrial manufacturing. So, it will be cheaper for the client and licensing would be easier. Also, when it comes to security, it gives a tough competition to INTEL and AMD. In SHAKTI chips, bugs and loopholes are more easier to detect and troubleshoot(thanks to it's open source technology).Since the client will be itself involved in chip making it will have more of a fine control over it and would possess the ability to configure it according to its needs.

SHAKTI is India's Future:

As it will be both manufactured and licensed in India, there comes a trust factor with it. Hence SHAKTI chips can be used in Indian defence systems, NAVIC (which is India's own positioning system) and space projects without worries. This would make ourselves independent and more technologically advanced. They also have a plan of working on a project named 'PARASHAKTI' cores, which will be used in making India's own supercomputers, which will be a great thing for our nation.

Sobhit Das
2nd Year

Electronic Prosthetics and Electronic Skin: The Next Step

Electronic or myoelectric controlled prosthetics have become immensely popular nowadays. It lets the user control their prosthetic limbs with electric signals naturally stimulated by our muscles. Electrodes are attached to specific areas of the body that helps the prosthetic limb receive the signals sent from the brain and move accordingly. Although it has a learning curve, over time it is much more convenient to use than body controlled prosthetics which involves manual controls. Electronic muscles require minimal strength to operate and gives you a more natural control over your movement.

This technology has been there for longer than we would imagine, invented in 1948 by Reinhold Reiter, a student of Munich University. His design of electronic limb consisted of electromyography (EMG) electrodes with an EMG amplifier which in turn ran the motors of the limb. The first clinically available electronic arm was made by Alexander Kobrinski in 1961 and it had its fair share of flaws. It was heavy, with slow movements , weak pinch force and external wiring susceptible to damage as a battery pack which powered it had to be worn on the waist. Over the years, this technology has been developed over time, using lighter materials and advanced equipments to get the closest thing possible to a real human limb . The placement of electrodes vary depending on the level of amputation. Over the last few years, it is safe to say we have come pretty close to accurately controlling the movements, the only missing factor being the sense of touch, until the invention of electronic skin.

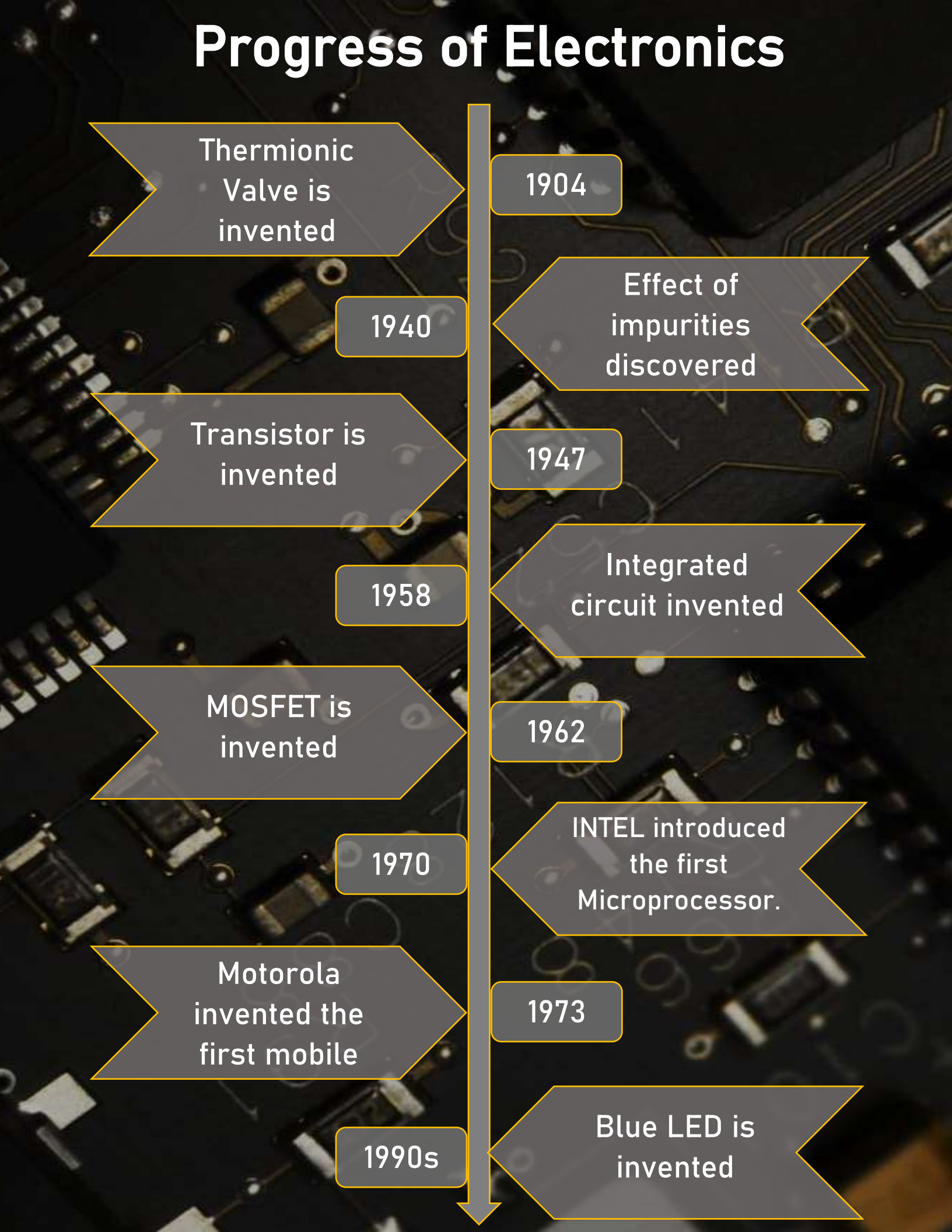
Electronic skin refer to a flexible, stretchable and often self-healing electronics that mimic functionalities of human skin. It is also applicable in

various fields, prosthesis being one of them. Independent groups of researchers have come up with their own versions of electronic skins to suit their applications in their designs. A group of researchers at University Of John Hopkins made a version called e-dermis that is made from layers of fabric embedded with sensors. This was designed to fit over the fingers of their bionic arms sending signals to the nerve ends of the user enabling them to feel pain and pressure at their fingertips. This is achieved by using two layers of sensors, the top layer being more sensitive than the bottom, mimicking the abilities of nociceptors and mechanoreceptors of our skin. They hope to develop this technology and not limit it to fingertips in the future so that the user can feel a range of sensations over broader areas.

The Asynchronous Coded Electronic Skin(ACES) developed by researchers at the National University Of Singapore is extremely responsive(1000 times faster than human sensory nervous system) and can withstand harsh conditions without being damaged. Their work was first reported on 18 th July 2019.It was designed based on the human sensory nervous system, as the researchers attempted to design something that could potentially perform better and after an year and a half of hard work, they finally succeeded. Using ACES with the transparent , self healing and water-resistant sensor skin layer
developed the same group of researchers, we get a form of self healing electronic skin which will be extremely beneficial for development of prosthetic limbs that enables the sense of touch for the users and will be less susceptible to damage. Several groups of researchers in this field are working hard everyday, getting closer and closer to the next breakthrough, and perhaps, to a future where bionic arms and prosthetics do not limit their users in any way anymore and give them the edge instead.

Soumya Biswas
2nd Year

Progress of Electronics



SCIENCE AND TECHNOLOGY

Another World Another Dream

Generation Y is pretty excited about Interstellar (the Nolan movie!) and human beings have toiled to find a second Earth since time immemorial. So, the good news is here - NASA's Transiting Exoplanet Survey Satellite (TESS) has discovered its first Earth-size planet in its star's habitable zone. Rigorous analysis has revealed range of distances where physical conditions may be optimum thus allowing the presence of liquid water on the surface. Scientists have confirmed the find, called TOI 700 d, using NASA's *Spitzer Space Telescope* and have modelled the planet's potential environments to record future observations.

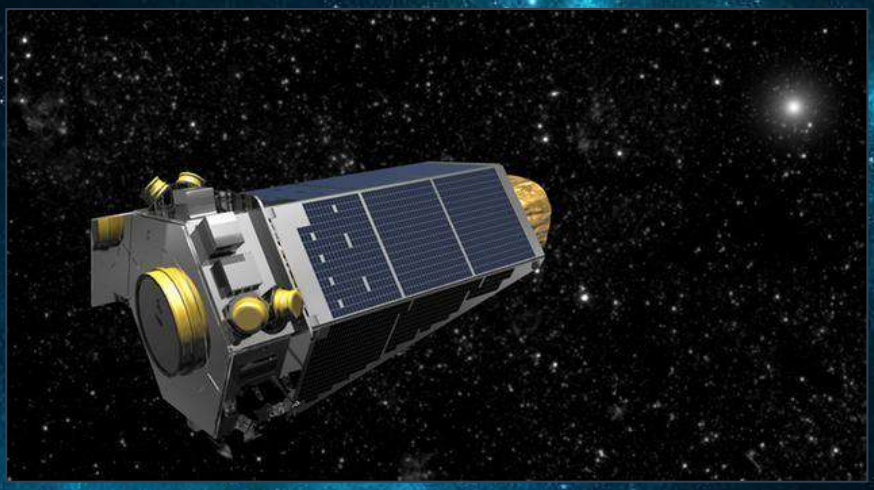
TESS monitors large swaths of the sky, called sectors, for 27 days at a time. This long observation allows the satellite to track changes in stellar brightness caused by an orbiting planet crossing in front of its star from perspective of Earth. This incident is called transit. Initially the star TOI 700 was said to be something similar to the Sun, but later this error was identified. Thus, according to the latest report, TOI 700 is a small, cool M dwarf star located 101.5 light-years away in the southern constellation Dorado. It is roughly 40% of the Sun's mass and size and about half its surface temperature. Among other planets (TOI 700 a and TOI 700 b), TOI 700 d, the outermost known planet in the system, is the really intriguing one. It is just 20% larger than Earth and completes one orbit every 37 days. The alien world receives 86% of the stellar energy that Earth gets from the sun, putting TOI 700 d in the habitable zone. All three planets are tidally locked (same as the chemistry between Earth and Moon), although no sign of life has been discovered yet. Eleven months of data shows that there are no flares from the star and thus the planet has been declared safe. So now we don't have to fear any apocalypse, be it nuclear explosion or alien attack; we can escape this world like they do in sci-fi space movies!

Adrija Mondal
4th Year

Kepler Telescope:
The Most Powerful Telescope

On March 7, 2009, the National Aeronautics and Space Administration (NASA) launched the Kepler telescope. This NASA telescope revolves around the Sun. Its job is to find other planets that resemble the Earth, similar to the Sun but different from it. The Kepler telescope keeps an eye on Earth-size planets orbiting other stars. It was considered the most powerful telescope in the history of mankind.

Kepler telescope was launched by NASA only to search for other planets like Earth. However, after 9 years of operation, the fuel control system of this telescope was reduced, after which NASA announced to retire it on October 30, 2018.



However, even before the telescope retired, NASA scientists had managed to gather all the necessary information. Kepler telescope was produced at a cost of $ 600 million. It was named 'Kepler' in honor of the astrologer (astronomer) Johannes Kepler. The telescope was active in space from 2009 to 2018 and during this time, it observed more than 5 lakh stars. It played a revolutionary role in the discovery of around 2,681 planets.

HS Shiva Shankaran
3rd Year

Is Time Travel Possible In Our Universe?

What if you could easily go back to your childhood? You'll be able to get a simple and easy life again, or if you could jump twenty years later in future and you don't have to worry about your career. How would it feel then? But is it really possible? Time travel can answer the above questions. Travelling through time has been one of the most popular science fiction topics for decades. The most valuable thing in human life is time. One of the most common explanations of 'TIME' is -" Time is the interval between two events".

Basically, we are familiar with the three dimensions of space since childhood. These dimensions are length, width and height and also we can move along these dimensions. Then according to Einstein's theory, time is the concept of fourth dimension, but it is not possible to change a position along this fourth dimension. Actually, we live in a four dimensional universe described by the fabric of space-time or a 3+1 dimensional universe, where we have three spatial plus one time dimension. However, there are generally three ways for time travel.

1. Black Hole:
Now let's see how time travel is possible through the black hole.
We know black hole is a miserable state of the stars. It pulls each object toward itself. Its gravitational force is so high that once an object moves within its limit, it is no longer possible to bring it back. As a result, even light cannot pass through it. As for an experiment, if you travel around a black hole with one spacecraft and if another spacecraft is travelling around the earth. If this experiment takes place then we will see that age of the black hole traveller will be half the age of the person orbiting the earth. This proves that time really moves slowly toward the gravitational field. But what if we revolve around a black hole with an infinite gravitational force. If someone manages to get around the black hole, still this will be impossible since we need more speed than the speed of light because light cannot escape the gravitational pull of a black hole.

2. Through Wormhole:

According to modern theories of scientists, this proves that time travel is theoretically possible through wormholes. One thing, we need to be aware that the path of space is never flat; it goes in a crooked way. So, when light travels through space, it is faced to move in a curved path through this curved space. But in addition to this winding road, there is another short road. This shortcut is called a wormhole. So, you will take less time comparatively to travel through space.

Despite so much, there are many problems associated with wormholes -
a) The size of the wormholes are too small. So, it is almost impossible for scientists to find these.
b) Even if we somehow manage to increase the size of wormhole, it will not be possible to cross it due it's very high resistance.

3. The speed of light:

One of the most fascinating things in physics is the behaviour and speed of light. Speed of light is a topic of discussion since Newton's era and still it is the controversial topic. Let's get back to the point. Theoretically, if an object moves at the speed of light, it becomes interacts with space-time. Einstein believes time travel to the future is totally possible by travelling at speed of light. According to his special relativity formula:

$$t=t'\sqrt{\{1-(v^2/c^2)\}}$$

where, **t'= dilated time**
t = stationary time
v = velocity
c = speed of light

This formula implies that if you travel a certain number of times faster than light then you will definitely travel through time. Now, suppose you have a twin sister. So, if you start a journey in a spaceship at the speed of light and return to this earth after a few years, you will see that you are about 22 times younger than your twin sister.

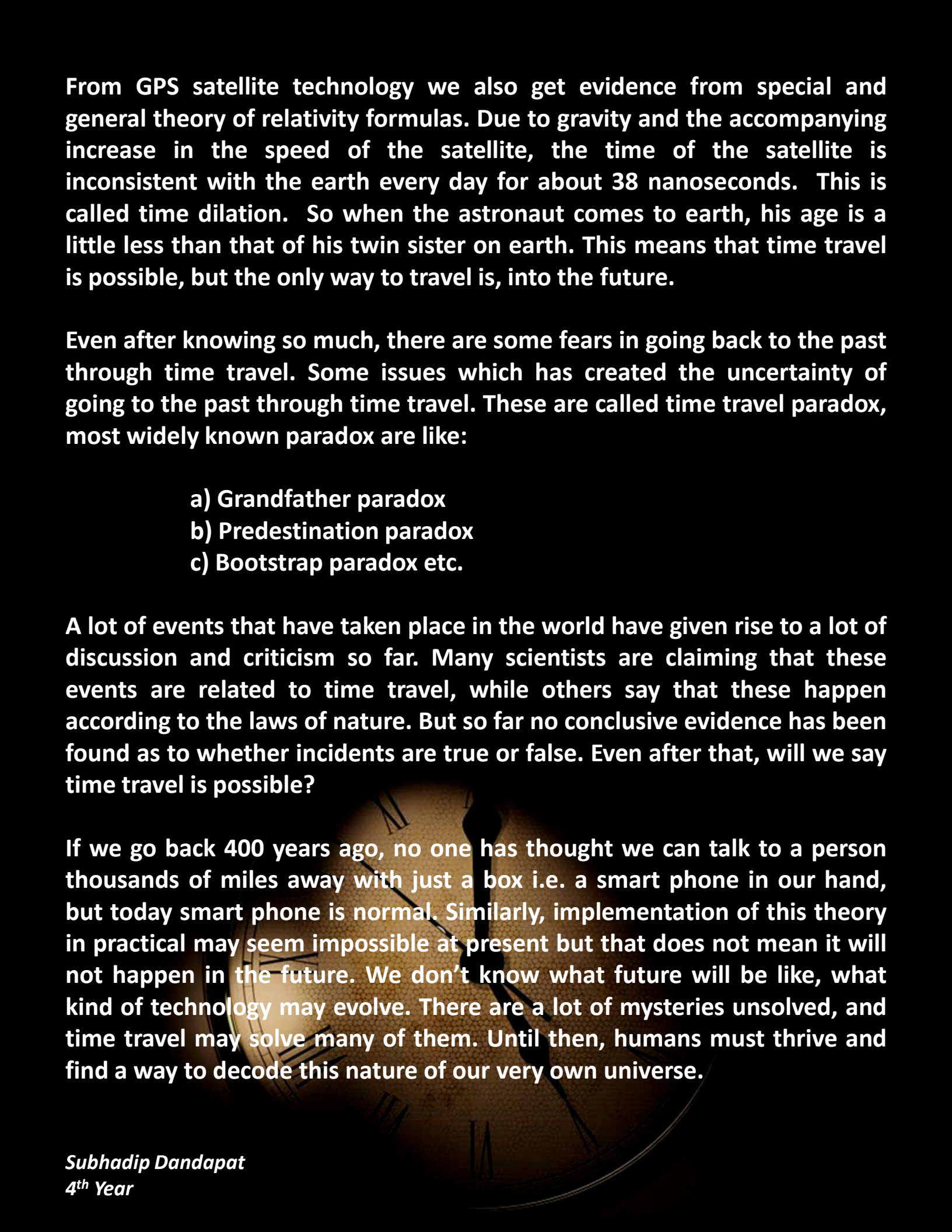
From GPS satellite technology we also get evidence from special and general theory of relativity formulas. Due to gravity and the accompanying increase in the speed of the satellite, the time of the satellite is inconsistent with the earth every day for about 38 nanoseconds. This is called time dilation. So when the astronaut comes to earth, his age is a little less than that of his twin sister on earth. This means that time travel is possible, but the only way to travel is, into the future.

Even after knowing so much, there are some fears in going back to the past through time travel. Some issues which has created the uncertainty of going to the past through time travel. These are called time travel paradox, most widely known paradox are like:

a) Grandfather paradox
b) Predestination paradox
c) Bootstrap paradox etc.

A lot of events that have taken place in the world have given rise to a lot of discussion and criticism so far. Many scientists are claiming that these events are related to time travel, while others say that these happen according to the laws of nature. But so far no conclusive evidence has been found as to whether incidents are true or false. Even after that, will we say time travel is possible?

If we go back 400 years ago, no one has thought we can talk to a person thousands of miles away with just a box i.e. a smart phone in our hand, but today smart phone is normal. Similarly, implementation of this theory in practical may seem impossible at present but that does not mean it will not happen in the future. We don't know what future will be like, what kind of technology may evolve. There are a lot of mysteries unsolved, and time travel may solve many of them. Until then, humans must thrive and find a way to decode this nature of our very own universe.



Subhadip Dandapat
4th Year

Security In The Digital World

Cyber security is a very big issue in our modern society. Large amounts of data are stored and transferred electronically and much of the data is sensitive, be it financial or banking information, personal details, passwords, etc. As such, the threat of digital breaches has become a big factor.

In recent times, the most common attacks are in the form of various scams that prey on less informed people, convincing them to give up various confidential details - in most cases, robbing their bank accounts digitally. These take many forms like popup ads on browsers to false messages, disguising as companies such as PAYTM and other banks. Due to the recent India-China feud, it was also expected that there will be cyber attacks from Chinese hackers. People have been told not to pay attention to any calls or texts asking for their personal details, because the most successful way to avoid such violations is to spread awareness.

Information security is also compromised in other ways. Various mobile apps collect data in the background with and at times, without the consent of the user. Such apps are often identified by the developer community and stopped, but the damage is already done at that point. Phishing is another such way but this takes place through the web. It involves a fake website, mail or form asking users for sensitive personal info, which are then sent away to be stored and the user is redirected to the original website, thus remaining unaware of what just happened. Another way is malware, commonly in disguise of “free” apps, which stay in the machines even after the original app is uninstalled.

Not only individuals, but also large companies and enterprise apps are susceptible to breaches. For example the recent case of twitter, one of the social media giants, got many of its accounts hacked and that too of influential brands and people and carried out a bitcoin based fraud. The posts even had positive reviews from other hacked accounts which in turn

boosted their credibility in the eyes of other users. Therefore, an unprecedented bit coin scam occurred. So if such large companies are getting breached, question stands that are we ever truly safe from such attacks?

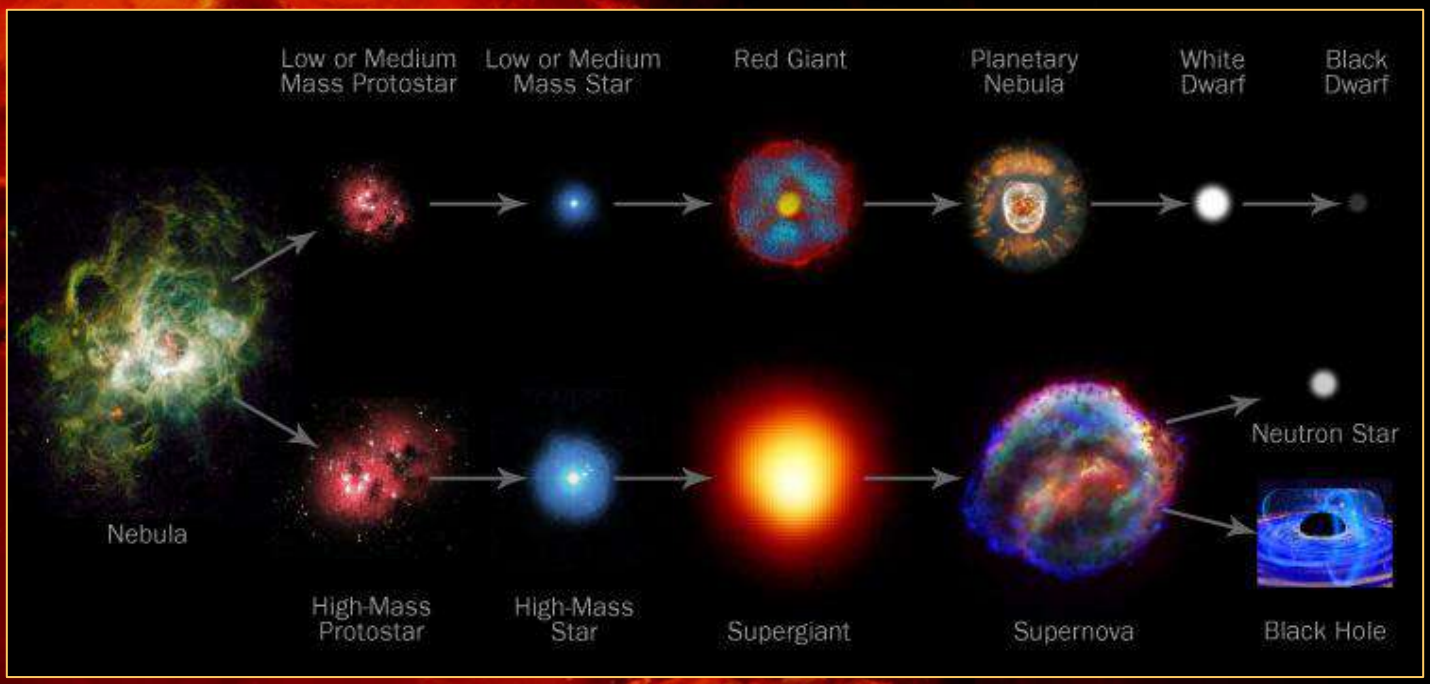
Thus, nowadays the developer and companies spend a lot of time and money in making their services secure and ironclad. Security researchers are hired to find out flaws in the apps or sites. However, if they fail in the face of a breach attempt, the only thing that can save our data is how aware you are. Knowing which messages to trust and not trusting the various “get rich quick” messages that a person receives can go a long way in blocking these breaches. Hence, spreading awareness about such messages and scams can help in reducing the risk of cyber attacks and theft of sensitive data.

Soumyadeep Bhattacharya
3rd Year

Death Of Stars

Astronomers believe that molecular clouds, dense clouds of gas located primarily in the spiral arms of galaxies are the birthplace of stars. Dense regions in the clouds collapse and form "protostars". Initially, the gravitational energy of the collapsing star is the source of its energy. Once the star contracts enough that its central core can burn hydrogen to helium, it becomes a "main sequence" star..

Several billion years after its life starts, a star will die. How the star dies, however, depends on what type of star it is. Main sequence stars are stars, like our Sun, that fuse hydrogen atoms together to make helium atoms in their cores. When the core runs out of hydrogen fuel, it will contract under the weight of gravity. However, some hydrogen fusion will occur in the upper layers. As the core contracts, it heats up. This heats the upper layers, causing them to expand. As the outer layers expand, the radius of the star will increase and it will become a red giant.

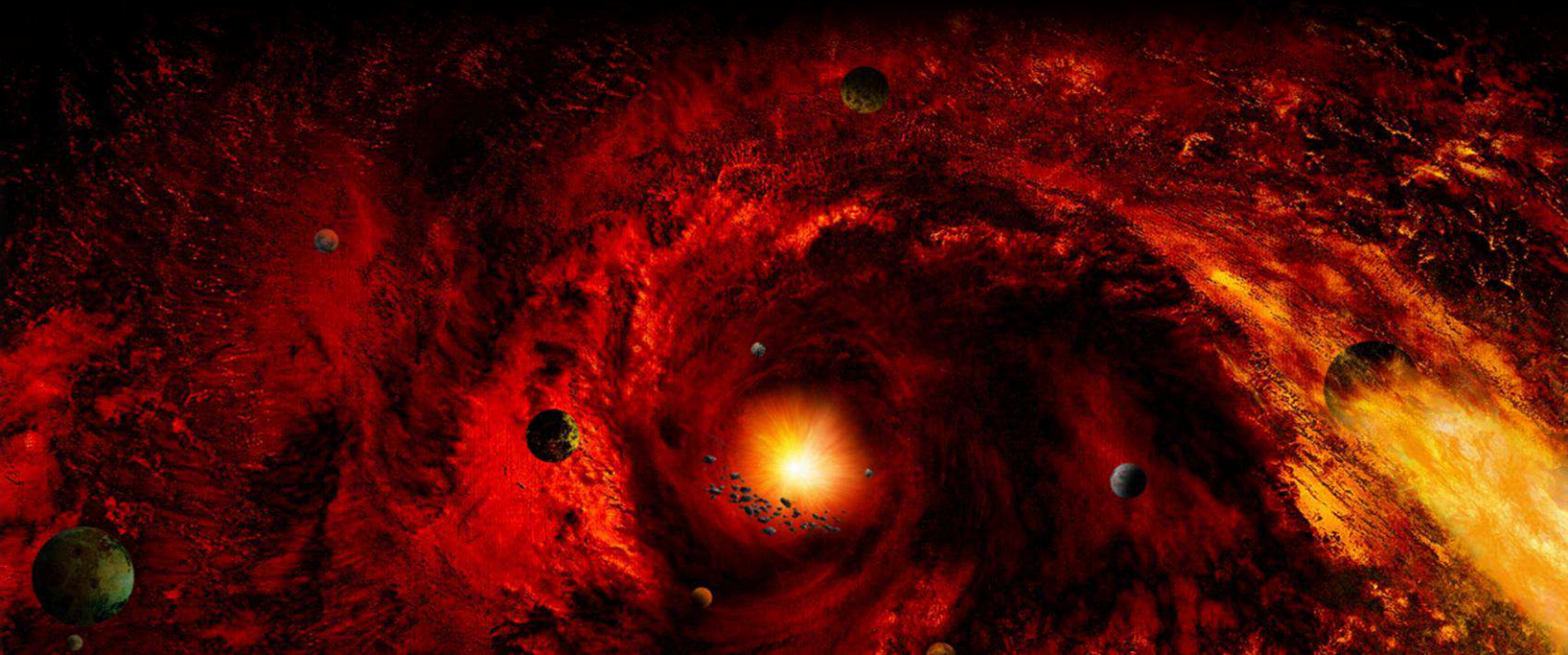


The radius of the red giant sun will be just beyond Earth's orbit. At some point after this, the core will become hot enough to cause the helium to fuse into carbon. When the helium fuel runs out, the core will expand and

cool. The upper layers will expand and eject material that will collect around the dying star to form a planetary nebula. Finally, the core will cool into a white dwarf and then eventually into a black dwarf. This entire process will take a few billion years. When the cores of stars, more massive than the Sun, runs out of hydrogen, these stars fuse helium into carbon just like the sun. However, after the helium is gone, their mass is enough to fuse carbon into heavier elements such as oxygen, neon, silicon, magnesium, sulphur and iron.

Once the core has turned to iron, it can burn no longer. The star collapses by its own gravity and the iron core heats up. The core becomes so tightly packed that protons and electrons merge to form neutrons. In less than a second, the iron core, which is about the size of Earth, shrinks to a neutron core with a radius of about 6 miles (10 kilometers). The outer layers of the star fall inward on the neutron core, thereby crushing it further. The core heats to billions of degrees and explodes (supernova), thereby releasing large amounts of energy and material into space. The shock wave from the supernova can initiate star formation in other interstellar clouds. The remains of the core can form a neutron star or a black hole depending upon the mass of the original star.

Granthana Maulik
4th Year



India in Space

The Aryabhatta satellite was launched.

1975

Chandrayan 1, India's first mission to moon.

2008

ISRO launched PSLV C21.

2012

Successful launching of Mars Orbiter Mission.

2013

India reached Mars on its first attempt.

2014

India launches 104 satellites together.

2017

India's attempt at reaching moon's south pole.

2019

Successful launch of GSAT-30.

2020

DISCOVERING THE WRITER IN YOU

Prose

Envy: Is It Really Evil?

Believe it or not with the exception of a handful of people, everyone has felt jealous of someone at some point in his or her life. This feeling of envy is often looked upon as a nasty quality in a person. But actually, it might not be as bad as you think.

First let's try to understand what makes us green with envy. Every person living on this planet is unique in his or her own way. And it seems like being unique is probably the most important aspect of life in the 21st century. If you are a cut above the rest you might receive more attention than others. What we do forget is that there are other aspects that are important too like your skills and efficiency. And this is where it all begins.

In order to prove themselves to be different from the rest, people often try to do things that are perhaps not best suited for them. A lot of individuals doing the same type of task often unknowingly enter into competition. And the rule of any competition is that *everyone cannot come first* (Although the concept of coming first or last may not exist in the particular scenario). This is where jealousy kicks in.

It so happens that *even* if you have achieved something significantly special, you would try to compare your achievements with your friend's work and gains. If you find that you have gained more than your friend, you feel satisfied. If on the other hand, your friend gets the better position, then you might feel all your happiness fade away. And it's not a very good feeling, to say the least. Those are the *pangs of jealousy.*

So what happens next? Well, you might want to work harder for your next test and get the upper hand. If you decide to take the competition as a friendly game, jealousy can actually help you to work harder and stay focussed. This can push you to perform better and you might become a better individual in the process. As it forces you to press on against your challenges, you might actually fall in love with whatever you're doing. Once that happens your growing interest for the job shall keep you moving and you might start performing better, not to prove yourself to the world, but to feel the joy of successfully completing a task and learning more on your new field-of-interest.

Now imagine that instead of only you, everyone follows the same course Everyone shall develop interest in their jobs. Over time, the productivity and efficiency of the society shall increase. And as this occurs, a team-spirit shall get developed. You shall start helping and pulling each other up instead of drawing satisfaction out of other's under-performance.

Quite surprisingly though, things might unfold in a very different way. Believe it or not, a lot of people actually believe that there are *two ways to success*: (i) *Work hard yourself* (ii) *Create problems for others*. And for most of the people, the second option is way easier than the first. Often people tend to distract others by intentionally giving wrong advice. Such

people try to avoid helping others thinking that this might give them an advantage. They might develop fake personalities in order to thwart their teammates. Now imagine if an entire team behaves in this manner,everyone shall be selfishly engaged in cheating others, and they in turn might get cheated themselves some day. As a result, the team loses out. No one succeeds by cheating others.

Most of us see *Envy* as something immoral, even shady. What we fail to realize is that envy is in the nature of us human beings. It can give rise to competition which might open doorways for new discoveries, inventions and can ultimately help us proceed. However, it should be kept in mind that our envy should not predominate our sense of morals and fellow-feeling. If we are able to treat jealousy like a propellant and use it in a controlled way, it can be beneficial. However, if left uncontrolled this fuel can become really dangerous for our vehicle of progress.

Sagnik Mukherjee
2nd year

The Wonders Of Science

It all began ages and ages ago when the savage and barbaric man by chance created fire by striking two pieces of flint. Suddenly, he could do a lot many things. He could cook his food instead of eating it raw, heat water, keep animals and beasts away and melt metals. Then, as if destiny was kind one day, he discovered the wonderful wheel. After it, there was no looking back. Man marched forward on the road to civilization and development with confidence and power. The first thing that Man learnt to do was to conquer nature. He can now sail the vast oceans, fly in the air, travel underground, extract precious stones, metals, minerals and other useful products and do a lot more things.

With the passage of time, science took larger and bolder strides. There is practically nothing left untouched by science in this universe. Man has mastered all the elements of nature- land, sea, air and even space. Nothing is impossible or too far or beyond reach or hurdle for science. Knowledge has turned out to be man's greatest asset in mastering and conquering the nature. Science is basically the quest and thirst for knowledge and the curiosity of man to know things beyond his reach that has resulted in his becoming the lord this planet. His never-ending pursuit to unearth the reason behind every phenomenon has resulted in endless discoveries and inventions which have proved to be the greatest stepping stones in the progress of mankind. All the inventions like Telephone, Aeroplane, Mobile phones, Computers, Artificial Intelligence, Automobiles etc have changed man's life forever. Science in the field of health and medicine are nothing but wonders and miracles of science. Who can forget the making of the first clone, or the birth of the first test tube baby, or the first heart-transplant or the separation of two physically linked twins?

Technology is on a rise every day. Each new day brings better technology with it. But we should learn to use our knowledge constructively. Only constructive use of science can guarantee the continuation of mankind on this earth. Moreover, it is the man who is the generator, creator and inventor of all this knowledge and technology. However, we should be warned of becoming slaves to our own creations and inventions. Only then can science be a blessing and a miracle. Science, if used for the betterment of mankind and society, can bring about changes in our lives by making it better, comfortable and worthwhile.

Soumya Sinha
2nd year

Making Of The First Sci-fi Film: The Techniques

A group of scientists decided to go to the moon so they made a rocket and landed on the Moon's surface filled with mushrooms and some peculiar plants. While exploring, some native aliens attacked on them but somehow they managed to escape and celebrated after they had returned back to the earth.

O what a rubbish story, isn't it? But do you know it was the basic story of the first sci-fi film ever made. Guess the year… it was 1902.

Shocked! The name of the film was 'A Trip to the Moon' and the duration was 9 minutes. Yes, nowadays, even a short film has more duration than 'A trip to the moon.' But it was 1902 when Lumiere Brothers were making films of maximum 1 to 2 minutes. So, with respect to that time when the length of a film was counted in seconds 'A Trip to the Moon' was surely the greatest achievement.

Georges Melies was the French illusionist. He had a deep knowledge on stage magic. So, he saw the camera as a device which could make illusion if it was used properly.

In 1902 he started to experiment with camera movement to create the illusion of a character changing size and when he gained success, he plotted a story based on Jules Verne's 'From the Earth to the Moon' and H.G.Wells' 'The first Men in the Moon'. Thus the journey of the first sci-fi film was begun.

Due to mechanically operated scenery, these 9 minutes cost 3 months and Melies had a greenhouse like studio with glass walls to let in as much as sunlight possible. He shooted scenes in brightest hours of the day. So, it's clear that the making of 'A Trip to the Moon' was not so easy.

The set was made of cardboard and canvas. Melies had invented an awesome technique to shoot the pseudo tracking shot. Instead of moving his heavy camera towards the actor, Melies set a pulley operated chair upon a rail fitted ramp, placed the actor on the chair and pulled him towards the camera. This trick captured the face to a greater degree than the moving camera did.

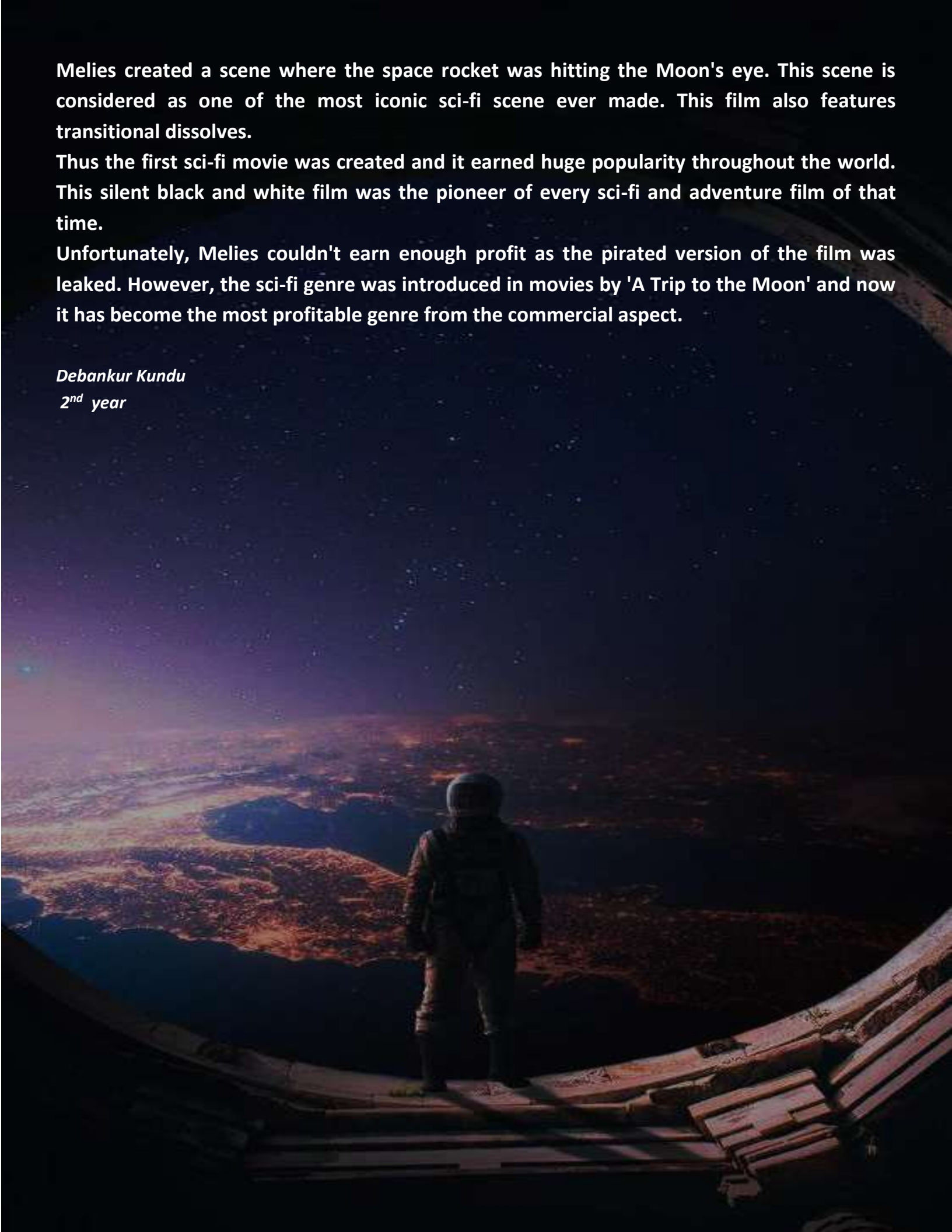
Many special effects in a trip to the moon was created using the substitution splice technique. The camera operators stopped filming long enough for something on screen to be altered added or taken away. Melies carefully spliced the resulting shots together to create apparently magical effects. Like remember the scene of transformation of the astronomical telescope into stools. Other effects were created using stage machinery and pyrotechnics.

Melies created a scene where the space rocket was hitting the Moon's eye. This scene is considered as one of the most iconic sci-fi scene ever made. This film also features transitional dissolves.

Thus the first sci-fi movie was created and it earned huge popularity throughout the world. This silent black and white film was the pioneer of every sci-fi and adventure film of that time.

Unfortunately, Melies couldn't earn enough profit as the pirated version of the film was leaked. However, the sci-fi genre was introduced in movies by 'A Trip to the Moon' and now it has become the most profitable genre from the commercial aspect.

Debankur Kundu
2nd year



Nothing Fancy!

A lot of time has passed since I first caught a glimpse of him in the metro. He did not resemble someone you would call handsome neither did he look like a part of the attractive community, but he sure was unique, in his own way. He was with his squad perhaps, cracking jokes and laughing while I was busy struggling to get myself a corner to stand in. Our eyes met for a few, glorious seconds before both of us turned away. Well, that happened quite often since I boarded the metro from Esplanade. His incredibly charming nature is what caught my attention. The way he was carrying himself, the way he spoke and his frequent stares at me out of the corner of his eyes. Weirdly enough, it did not make me feel uncomfortable, instead, it felt inexplicably comforting. He was not really tall but enough for a girl like me to feel short. He didn't really maintain his body but his arms and chest had a flex which was capable of making you feel protected and safe. He had everything normal about himself and showed nothing fancy which may attract a girl. That day, it didn't take much time to reach my destination and as I moved on, it became a distant memory, fading away from the back of my mind, quietly, slowly but surely.

However, Fortune seemed to have other plans: I came across him last month, out of the blue. As usual, I (read: the alone-and-clumsy-me) was carrying some books home from College Street. I was rummaging through my backpack to find my purse. Beads of perspiration were trickling down my forehead, making sure not to enter my eyes yet I could feel my face heating up from the worry. I felt like crying. I could apprehend the footsteps of a certain someone approaching me. I still don't understand why but I felt as if the person was smiling at me and it turned out to be. Initially I was of the opinion that perhaps he was just looking at someone else and grinning. However, the situation had changed its course. He walked up to me and handed me a tissue to wipe of the sweat. I couldn't recall if I had known or seen him earlier. But seeing him carrying my purse in hand relived me so much. I restrained myself from hugging him tightly with joy.

"Here is your purse. It had fallen down there," he said pointing somewhere I trailed through.

"Thanks a ton."

Hey, why do you feel so familiar? Have we met before?"

"No, not exactly. Just that we are accustomed to each other's faces, since our last meet in a metro."

"Oh yeah!" I exclaimed, realising how awkward the situation was becoming.

"Would you like to have coffee?" I was already drooling over him now, to some extent and the proposal became quite hard for me to reject. We went to The Coffee House and gossiped over coffee and cutlet. Initially, I was feeling weird with him but as time passed, I recognised him as memories of my school days came rushing back to mind: he was one of my classmates. His profile no longer looks the same, a live example of drastic change. Therefore, it became difficult for me to recognise my old friend from the good old days of school-life. He used to be an employee of a Bangalore-based software company. While we were walking

out of the coffee house, I noticed the sky, it was painted in shades of orange and red while faint traces of pink highlighted the margins, brightening the pinkish glow of my sky, all deity yet calm and for some reason, I felt the warmth emitted by the glow, on my cheeks. Perhaps a bit of the shades had flown into me.

People were busy capturing moments of the aesthetic sky while I was busy giggling with him. It was time for us to part ways and call it a day when I realised the essence of moments. Strange, isn't it? We try to capture them through modern technologies so that we can look at them whenever we want, only to fill our memory of gadgets and then end up buying new SD cards. We are so busy capturing moments that we forget to live through them and then flaunt on social medias with deep, dark captions. Although I'm saying these words now, I am no exception to the captivity of the tech-world but now, as the days are passing by, I feel an extreme urge to live through them. I do not know if I'll be alive the next moment but I don't want to die with the regret of not living through them. You must be wondering: what happened with that guy? Maybe I was too engrossed in my own thoughts to hear him say goodbye and depart. When I came to my senses, reality slapped me across my face and I only saw the road getting deserted and the cars honking. Everyone busy in their own worlds and timeline, struggling to survive. In the same way, most of you will just read and find nothing extra-ordinary about this writing. Nothing such will attract you just because of the fact that it's simple and there's nothing fancy to catch your attention. But these are the moments. Some of you have just read it and for some, it'll just remain at the back of your mind unconsciously.

Anisha Pal
2nd year

Automation: Boon or Risk

Throughout human history, we have seen that every individual has a role to perform in the human society. Some people raise crops to produce food-grains. Some people work in factories to produce goods. Others might perform their duty to protect the society and rule out chaos. Human society has had this division of labour ever since the first humans gave up their nomadic life and settled down. Every person at that time was employed in some way or the other. Today the world has changed drastically, with the need for better goods, service and more people to work. But still we have this burning problem of unemployment. There are a lot of reasons for that, like poor quality of education and lack of infrastructure. One more reason is automation. So what exactly is automation?

In simple terms, automation is the process where *a machine is used to perform a specific task instead of a person*. These machines can be used in factories to mass manufacture certain items. They are highly efficient, accurate and they don't need wages or take leaves. They can work as long as they have electrical power. In short, they are excellent for the production systems. But there are problems that accompany automation.

Suppose it takes 10 men to plough a plot of land. The owner of the field has to pay those extra 9 men and *the peasants get a chance to earn some money*. But if the farmer starts using a tractor he would need only himself to complete the task. The farmer would have to pay less for the same job and he would make a better profit. Also the tractor is a lot faster than peasants, so it would save a lot of time. All this would result in the lowering of the price of crops as the farmer would have to spend less to make the same amount of profit. But this would also have a downside. The peasants would lose the chance to make some money and would be thrown into poverty.

This is the case in factories as well. As more and more machines replace humans, more and more workers are laid off and far less vacancies are created each year. Robots are taking up the job of doctors in critical surgeries. Electronic gadgets are becoming smarter and mechanisation of various processes has led to the decrease of production costs, increase of profits and the production of high quality goods. All this is good for the consumers as they can get the goods for less money. But as the *workforce comes from the consumers themselves*, laying off workers means *throwing the consumers into poverty*, so much so that they are unable to buy even the cheapest goods. Thus companies mechanise their factories even more, making the production cost even lower and throwing more workers and their families into poverty. And this cycle repeats.

Now comes the obvious question: Is automation bad for human society?

There is no simple answer. It's true that machines, especially the smart ones, require a lot of maintenance for their upkeep which might *give rise to many new jobs*. But that's nothing

compared to the *thousands of jobs that a single machine can eat away*. Making and using tools is one of the features that has set a line of distinction between us and the rest of the animal kingdom. *So automation is important and perhaps even inevitable.* But its use depends on us. If we use robots, not to replace humans, but to work alongside them, then it can be beneficial. There are always some things which we humans cannot do, for example, working in radioactive environments, low oxygen levels, zero gravity, extreme temperatures and pressures, and other hostile situations. Robots can do those jobs quite effectively. But the sudden replacement of all road vehicles with driverless cars is perhaps not the right step to take. It might reduce the number of car accidents drastically but it can also throw a billion drivers out of business. If one part of the society gets poor, all of a sudden, then other parts of the society might crumble too.

We humans are much like those tiny six-legged insects: Ants. Like ants, we humans, work together and try to survive. And like ants, we always like to keep busy. Even when we are not doing our designated jobs, we try to do something or the other, regardless of whether it is useful or not. And those seemingly useless exercises are actually necessary for us, as they keep us happy. *Afterall we are not machines*, so we need breaks, not always to sleep but often to refresh our minds. Maybe that is why we are losing against machines. Perhaps a day will come when the last man shall lose his job to a machine.

Or maybe that day might never come. Humans are incredibly great at solving puzzles. It's just that our brains are made that way. We are able to find solutions to new problems, while machines still need help from a programmer. They have to go a long way before they can defeat the greatest species on Earth, and maybe they never will. Machines might get smart, but never as smart as we are, at least not in the near future. The problem of unemployment is a growing one in today's world. But like all problems, we humans shall find a way to pass this challenge, pretty soon.

Sagnik Mukherjee
2nd year

Hitman

“So you think Philip’s ghost wants to tell you something or is just plain haunting you?” I croaked in a voice, turned raspy from all these years of incessant smoking.

She sat across me, her slender arms crossed and placed daintily on her lap. Her good looks stemmed mainly from the fact that she’d clearly avoided a lifetime of hard work. I probably would have been equally attractive twenty-five years ago had my twin passions been vanity and stupidity.

“No,” she spoke timidly, “it’s nothing like that.” She looked up at me with wide eyes that had been conditioned to elicit sympathy. I noticed.
“It’s just…” she bit her lip. “It’s just that Philip has been gone a month – but I don’t think that he’s *gone* gone, you know? I want to know if I should put him behind me, or…” She shed a tear. “It started out small. A whisper here and there and noises around the house. Not a big deal, you know? I thought it was all in my mind due to the trauma.” She looked around despite the fact that no one was there besides the two of us.

“But then,” she breathed, flushing slightly pink, “ Since a week or so I’ve been hearing a sudden banging on my bedroom door in the middle of the night and at other odd hours when I’m home alone. It would go away whenever I got up and started searching for the source of the noise. At other times the piano would be playing on its own and the stairways would creak”

“What makes you think it’s your dead husband?” I pressed her, crushing my cigarette and lighting a new one.
She looked up at me in desperation. “It just *feels* like him. Does that make any sense?” She bit her lip again. I noticed. “But the worst thing was last night. That’s what made me decide that it was time to talk with a… *professional.*”
God, her little pauses and cute blushing were irritating.
“Explain,” I ordered cavalierly.
What was her name? Sophie? She seemed like a Sophie.
“Last night-”, she spoke.
I coughed. Reality set back in. “Listen, Sophie-”
“It’s Anne-Samantha.” Her eyes got wide. “When I’m alone in bed, I hear breathing. *Only* when I’m alone. It’s unmistakable. The breathing comes from the other side of the room.”
I gave her an unblinking, fixed stare. She returned it.
I finally turned away when a lump of ash fell from my cigarette onto the table. “Here,” I offered, pouring a cup of tea from the pot. “Drink this.”
She took it obediently, blew on it, then took a sip and winced.

“Too hot?” I asked sharply.
“Too bitter,” she responded coolly.
“Too bad,” I finished. “Drink the whole cup if you want to see what’s on the other side.”
She sipped as I spoke. “You’ve told me that Philip’s been gone a month. You’re brokenhearted, but you can’t move on if he’s still here. The shock was terrible, wasn’t it? A hit-and-run while he was crossing the street right in front of your own home. The worst moments of your life were sprinting through the house, knowing what was outside before you saw it. The hope was the worst, because you *knew* that your husband’s broken body would be lying in the street. You found him in a gory heap just beyond your front yard, and the future you’d imagined drained away like blood through your fingers. And it was in that exact moment, kneeling in the middle of the street at 7:13 p. m., that you realized your life had been permanently changed to a different path of someone else’s choosing.” I took an aggressive puff of the cigarette and pressed forward. “The sun set while you held his already-cooling hand and you realized that this would be the first sunset you’d spend knowing he was dead, and that you would end every day with this thought on your mind from now on.”
She blanched. “I never told you that it was at sunset. I never even said it was a car accident.”
I narrowed my eyes at her. “The guilt was more than you expected, because part of you had actually cared about Philip. Yes, he was old, and *boring,* my God, you would never let him forget it. But he’d felt just so fragile when you crushed his spine with the car that the anger didn’t seem to make sense in the moment.” I blew smoke through my nostrils. “He knew it was you, Sophie. You pulled the car into the driveway and rinsed off the blood so fast that no one even thought to check it for evidence. But *he* knew, and as he lay dying, unable to speak through shattered lungs, he stared at you without hate, malice, or vengeance. It was simple confusion, Sophie. Philip never considered that you did it for the cash. His dying thought was wondering how he’d somehow been a bad husband, and he felt guilty for not knowing why.”
Her cup of tea was empty.
“I was so careful,” she whispered in a pitch that was just below the ‘only dogs can hear it’ threshold.
I rolled my eyes. “No you weren’t, Sweetie. People are just stupid, and that’s the only reason you’ve gotten away with everything so far. Really, putting $619,138 cash in a briefcase is just *asking* for trouble.”
Her jaw hung in shock. “How could you possibly have known?”
I blew one last long stream of smoke from the cigarette. “If I were in your shoes, Sweetie, I’d be much more worried about how much poisonous oleander you just had with your tea.”
She slammed her hands on the table and grabbed the edges so hard that the empty cup rattled in its saucer. *“What did you do to me?”*
“Make peace with whatever god or devil awaits your heart,” I answered flatly. Then I turned to look across the sun porch at the ghost only I could see.
Philip was a disgusting mess. His shattered spine had no hope of holding his torso rigid, so every limp limb flopped at unholy angles. Black blood oozed from his white lips and nose.

His intestines protruded from his stomach and the coils hung to the ground like sausage links.
He stared at his young widow.

"How long… when will it start?" She asked in utter petrification.
"In just a second, Sweetie," I quipped casually.
Philip grunted. He wasn't much for talking.
"Oh, and one last thing, Sugar." I leaned forward and gently rested my palms on the tabletop. "Philip wants to let you know that dying really hurts."
She froze. Behind her, despite lacking a mouth, I could swear that Philip was smiling.
The convulsing started then, but it didn't stop for a long time.
Do you have any idea how far mouth foam can spray when a dying woman just won't stop thrashing?
I almost felt bad for her when I realized how hard she was trying to cry.
That's a really difficult task, though, when your throat is closing up.
That's when Philip sauntered over to her jittering body, knelt down, and gently grazed his dead fingertips across her cheek. He looked passionately into her eyes, and for just a moment, I think she looked back.
Then she was gone.
The ghost-corpse took in the sight for a few moments before I interrupted him with a forced clearing of my throat.
"A-*hem.*" He glanced up at me with his lone functioning eye. It was damp. "I *do* appreciate your clear instructions on how to locate the briefcase. If everything is as promised, the bill will be settled."
He grunted and waved his limp, floppy arm at the body of his dead wife.
"Her? I'll leave her in the backyard of your house. I snuck an oleander plant into the garden during one of my nightly visits. They're not uncommon here in Alabama, and they will explain her 'accidental' death nicely." I wrinkled my nose. "And I have to say, I'll be grateful to stop sneaking into your house each night to spook this murderous little witch and I hate crawling through windows. I'm not twenty anymore, you know." I took in a deep breath of nicotine-laced air.
He grunted again, dangling his unresponsive arm above the dead woman once more.
I dropped her body unceremoniously on the yard of her house and took a puff to catch my breath. Well, Sophie simply stared into the cobalt blue sky.
I plopped myself down on an outdoor chair and took in the surroundings.
Sophie's backyard was a destination unto itself. Dogwood flowers mingled freely with magnolias, and stately oak trees flanked the edges of a yard dotted with willows. I breathed in the moment. "Truly one of the finest yards in Alabama, Sophie," I offered, glancing in contempt at the tongue lolling out of her mouth. "I've laid you to rest right next to the beautiful oleanders that I used to poison your tea."
I pinched the butt and slipped the cigarette into my pocket to avoid leaving any traceable evidence before forcing my creaking bones out of the chair.

With effort, I stepped over her body and headed for the gate, wondering just how much she would rot in the Southern sun before the neighbors complained about the smell. Monday mornings are really wearing on me more than they once did.

I noticed Philip hovering around.
"Hmmm?" I asked in genuine curiosity as I approached the corpse. "There's something more?"
He shook more eagerly, spraying a fine mist of ghost blood onto the woman's purple face.
"Oh, my," I whispered.
I bent down and pried a ring from the woman's rubbery hand.
"There must be two dozen diamonds on this!" I sang.
"Yes, thank you very much, I *do* accept tips for a job well done, you gentleman, you."
This time I *know* Philip was smiling.
And I was, too.

My name is Sky, and I'm a hitman for ghosts that only I can see.

Samriddhi Pal Chowdhury
2nd year


Poetry

The Graveyard

When I was a little boy,
Pointing at the hills hidden in the mist I would ask,
'What lies beyond those mountains, father? '.
'A graveyard' ,he would always reply with a smile.
I was a child, I believed my father.

When I grew up, I met many learned men
Who convinced me that beyond those mountains,
Was not a graveyard but a city full of life,
A city where darkness had lost its meaning,
Where buildings were as tall as the mountains.

Years later I crossed the mountain myself,
And laughed at my foolish old father,
For there indeed was the biggest city I had ever seen.
Drawn like a moth to the bright lights of the city of unknown,
I decided never to go back.

It was only when I was older
And the bright lights had started to fade,
I realised I had climbed over a mountain,
To live in a concrete graveyard,
Where feelings were buried in the ground,
And tombstones were shaped like buildings.

When my son was a little boy,
Pointing at the skyline hidden in the smoke, he had asked,
'What lies beyond those buildings, father? '
'A garden' I had replied with a smile.

Tathagata Pal
2nd year

Stand For Peace

What has happened to the world God made?
It's a question that ruins my head.

No time for brotherhood; no time for peace.
Slowly, slowly its colours fade.

Arguments and fights lead to war.
Anger and grudge lead relations far.
Where is the use of the magical words - thank you, please and sorry?
To put an end to the countless worry.

Conversations and talks with grandparents and parents
Deepened the relationships ever so strong.
Where is the love and respect they need?
Have the technologies replaced these seeds?

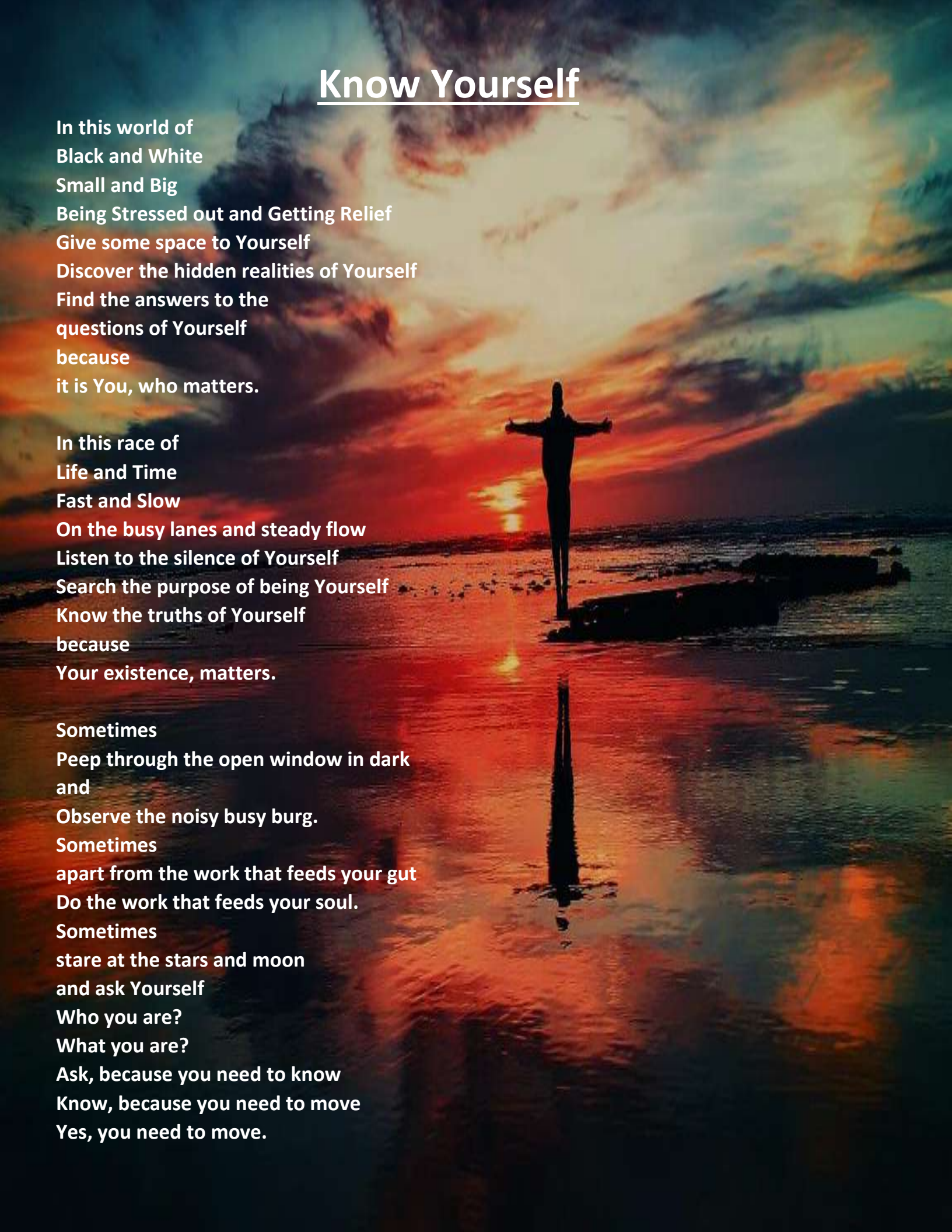
The beauty of nature is no longer wanted.
The smiles of the children are no longer needed.
Then where, where is this world heading to?
I haven't yet discovered the slightest clue.

Who are you? Who am I?
Just a creation of God.
To praise him and exalt him,
And to help one another in need.

Let's be honest, let's be committed
Towards our duties with one another
Let's do our part before the time is out of control after all,
What does it profit a man if he gains the whole world and loses his soul?

Gaurav Kumar
3rd year

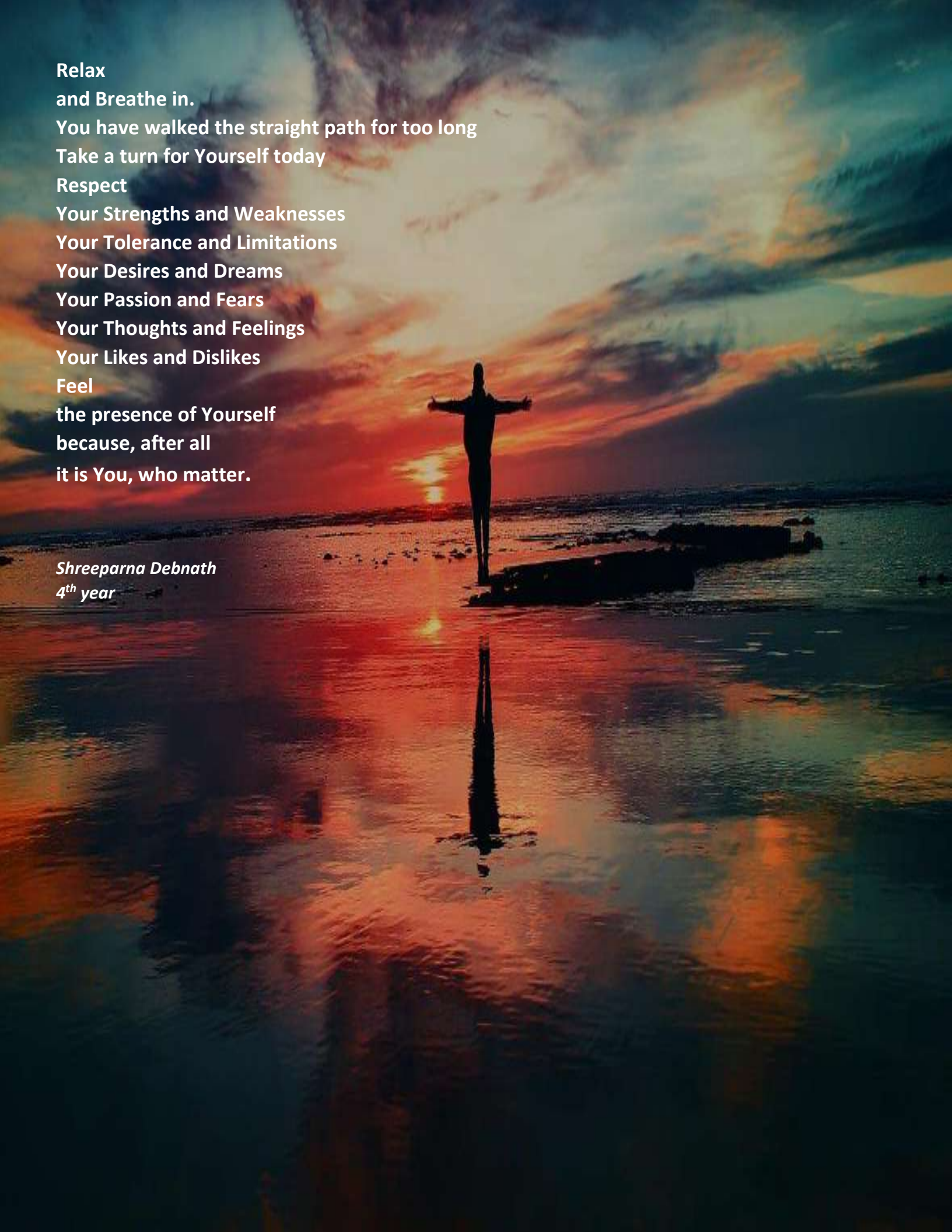
Know Yourself



In this world of
Black and White
Small and Big
Being Stressed out and Getting Relief
Give some space to Yourself
Discover the hidden realities of Yourself
Find the answers to the
questions of Yourself
because
it is You, who matters.

In this race of
Life and Time
Fast and Slow
On the busy lanes and steady flow
Listen to the silence of Yourself
Search the purpose of being Yourself
Know the truths of Yourself
because
Your existence, matters.

Sometimes
Peep through the open window in dark
and
Observe the noisy busy burg.
Sometimes
apart from the work that feeds your gut
Do the work that feeds your soul.
Sometimes
stare at the stars and moon
and ask Yourself
Who you are?
What you are?
Ask, because you need to know
Know, because you need to move
Yes, you need to move.



Relax
and Breathe in.
You have walked the straight path for too long
Take a turn for Yourself today
Respect
Your Strengths and Weaknesses
Your Tolerance and Limitations
Your Desires and Dreams
Your Passion and Fears
Your Thoughts and Feelings
Your Likes and Dislikes
Feel
the presence of Yourself
because, after all
it is You, who matter.

Shreeparna Debnath
4th year

World of Detectives

A Satyajit Ray creation, Feluda has been one of the most popular Indian Detectives among readers. Accompanied by his cousin Tapesh and writer friend Lalmohan, Feluda solves cases based on keen observation and superb presense of mind.

This ingenious detective created by Sir Arthur Conan Doyle is undoubtedly the most popular detective globally. Sherlock, along with his assistant Dr. Watson solves cases and catches criminals based on sheer intelligence, observatory skills and vast knowledge in almost every field.

This Saradindu Bandopadhyay creation is probably the uncanniest one in the list as Byomkesh prefers being called *Satyanweshi* (the truth seeker). With little help from friend Ajit and wife Satyabati, he solves cases based on observations and mostly pure instincts.

Agatha Christie's Hercule Poirot is a world-renowned Belgian private detective, unsurpassed in his intelligence and understanding of the criminal mind, respected and admired across the globe. Famous as much for his magnificent moustaches as his little grey cells.


CONTEMPLATIVE
CONTEMPORARY

COVID-19 – A Global Threat

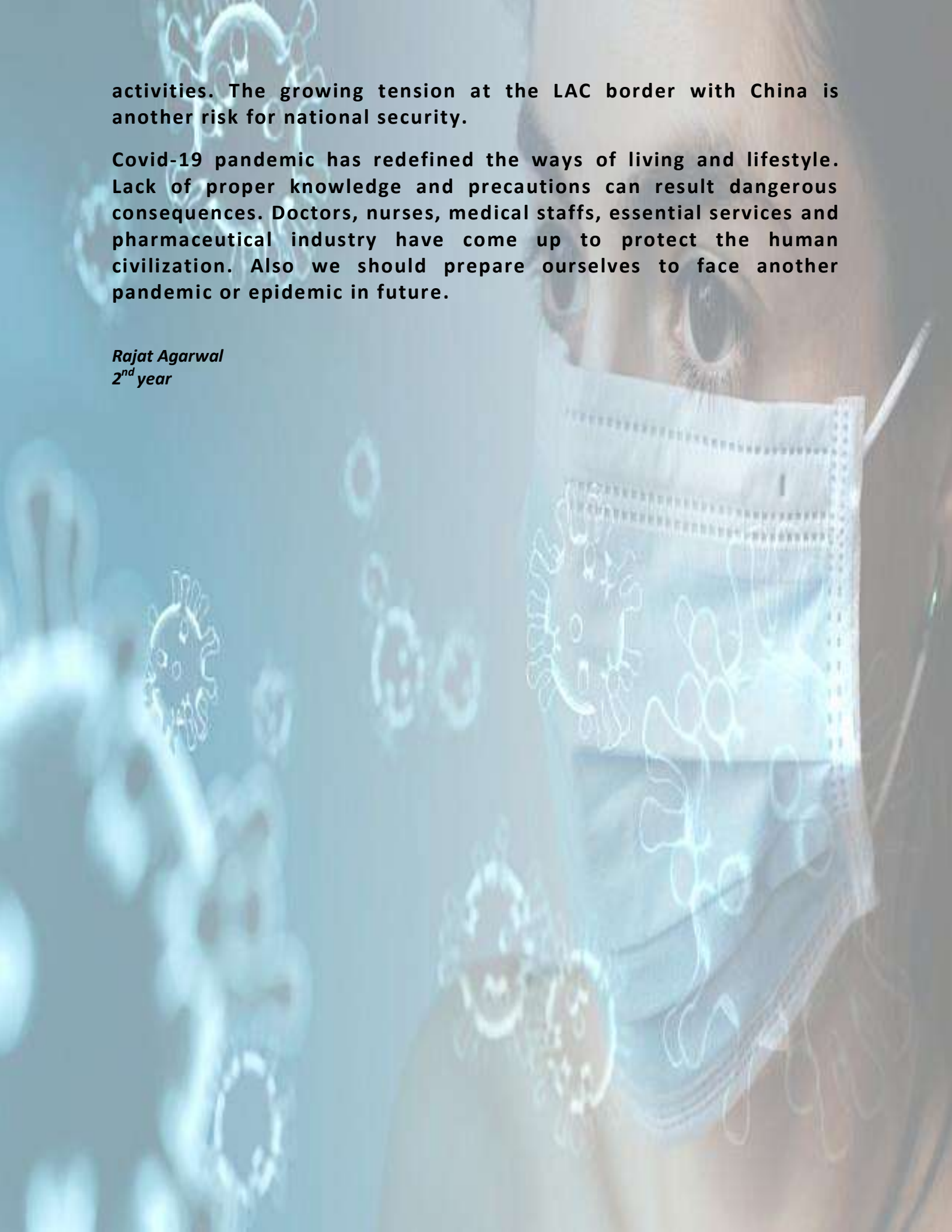
From the past few centuries we have seen many pandemics and epidemics posing a danger to the human civilization. Covid-19 is yet another pandemic as per declared by WHO which has already claimed more than a half-million lives all across the world and counting. Covid-19 is a highly infectious, respiratory disease and it is believed to be originated in the wet market of Wuhan in China.

Growing infections has severely affected the medical facilities. Hospitals are flooded with corona virus patients and it has also made difficult for patients seeking treatment for other problems. Social distancing, wearing masks and sanitizing the most common areas in use have been the best possible ways to remain safe from the deadly virus infection. Majority of the cases reported so far have had no symptoms or very mild symptoms making it really difficult to detect the host and contain the disease.

There's no absolute secure treatment found for Covid-19 till date. Somehow the patients are kept isolated to break the chain and the disorders caused by the virus are treated. Many drugs are under trial and vaccines are under development. Vaccines can induce an immune response against the virus and restrict the infection. Optimistically, it can be said that a vaccine will be available in the near future and mass-produced.

With the growing chaos in the world, India is not an exception. India is one of the fastest growing economy inhabiting more than 1.3 billion people. As the ongoing pandemic has deepened in the country, it has disrupted all economic activities especially in the service sector, paving way towards a recession. Demand has reduced making the business-world static and millions of employees have already lost their jobs. Daily-workers are worst-hit by lockdowns and limited income sources.

The social system has completely changed. Shutting down schools, colleges and universities has imposed a deep concern on the education system of the country and digital learning has somehow managed to replace the traditional way of learning. Mental health has also been affected by a long period of lockdown and part-wise reopening economic activities. It may result in a surge of criminal



activities. The growing tension at the LAC border with China is another risk for national security.

Covid-19 pandemic has redefined the ways of living and lifestyle. Lack of proper knowledge and precautions can result dangerous consequences. Doctors, nurses, medical staffs, essential services and pharmaceutical industry have come up to protect the human civilization. Also we should prepare ourselves to face another pandemic or epidemic in future.

Rajat Agarwal
2nd year

Black Lives Matter

The death of George Floyd while in police custody is not the first and in all probability will not be the last case of police brutality to hit the United States of America. The wave of protests which has occurred under the slogan of "Black Lives Matter" is to stand against racial profiling, police brutality and lack of accountability of the police. African-American people have been receiving police brutality countless times which has led us to believe that there is still a culture of racism among this generation's police force. What is worse is that the protests again are failing to bring change as is evident by the killing of Rayshard Brooks, a 27 year old African American man on the night of June 12,2020, by police officer Garrett Rolfe, two weeks after the killing of George Floyd.

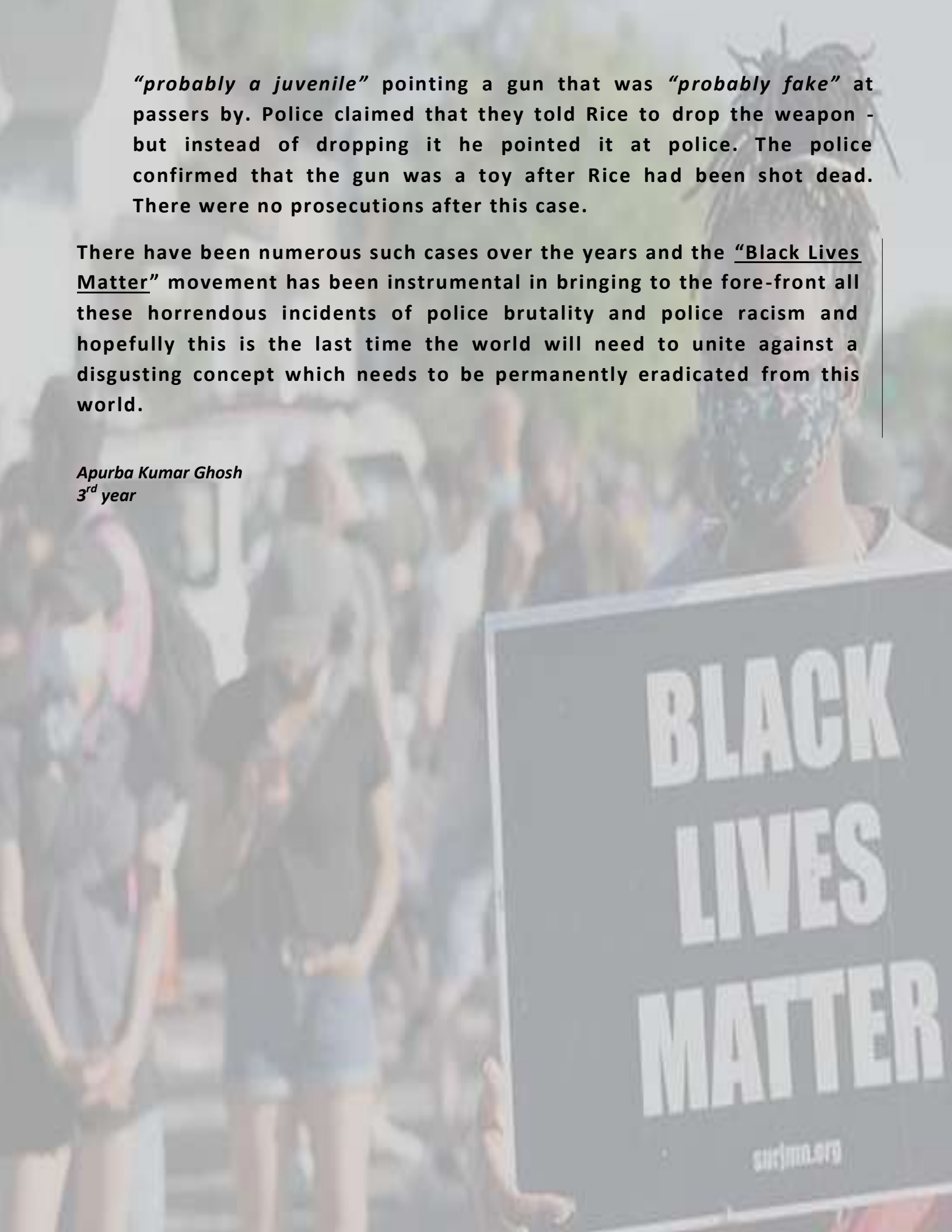
Here are some of the confirmed reports of police brutality in the year 2014.

- **17th July 2014: Eric Garner died after he was wrestled to the ground by a New York police officer on suspicion of illegally selling cigarettes. While in a choke hold, Mr. Garner uttered the words *"I can't breathe"* 11 times. The incident - filmed by a bystander - led to protests across the country. The police officer involved was later fired, but was never prosecuted. It came a year after the Black Lives Matter movement emerged in response to the acquittal of the man who killed teenager Trayvon Martin in Florida.**
- **9th August 2014 : Michael Brown, 18, was killed by a police officer, in Ferguson, Missouri. Brown, who was not armed had stolen a box of cigars. The exact circumstances of the encounter are disputed, but Brown was shot six times, according to autopsy reports. A report by the Department of Justice later concluded that the police force had displayed racial bias against Brown and used excessive force. The officer involved resigned from the force, but was not prosecuted. The incident led to multiple waves of protests and civil unrest in Ferguson, boosting the Black Lives Matter movement further.**
- **22nd November 2014: Tamir Rice, a boy of 12, was shot dead in Cleveland, Ohio by a police officer after reports of a male who was**

"probably a juvenile" **pointing a gun that was** ***"probably fake"*** **at passers by. Police claimed that they told Rice to drop the weapon - but instead of dropping it he pointed it at police. The police confirmed that the gun was a toy after Rice had been shot dead. There were no prosecutions after this case.**

There have been numerous such cases over the years and the "Black Lives Matter" movement has been instrumental in bringing to the fore-front all these horrendous incidents of police brutality and police racism and hopefully this is the last time the world will need to unite against a disgusting concept which needs to be permanently eradicated from this world.

Apurba Kumar Ghosh
3rd year



Space Phenomena of 2020

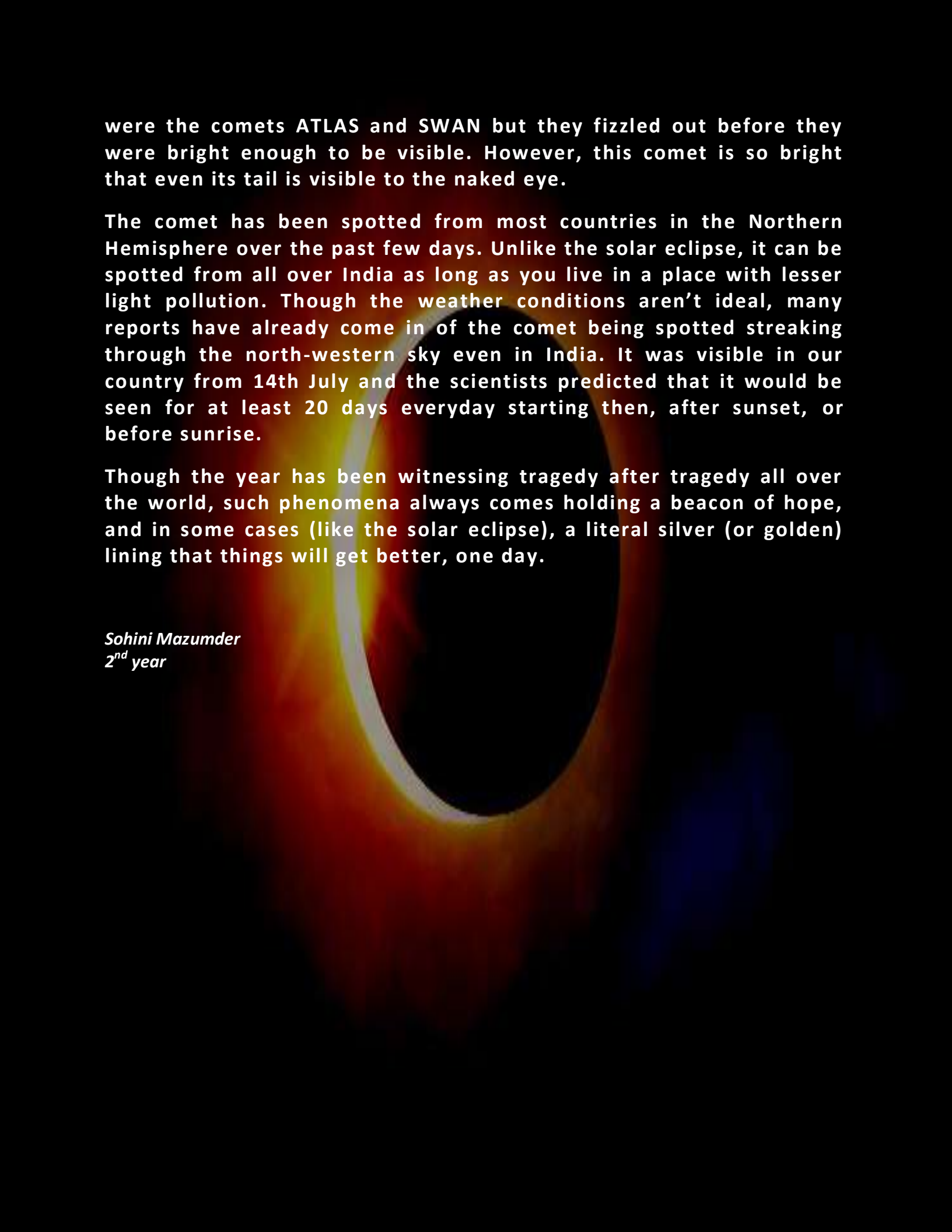
By 10th July 2020, we had already witnessed five of the most spectacular space phenomena. Three eclipses and the visibility of the comet C/2020 F3 (NEOWISE). In this article, let us talk about the annular solar eclipse of 21st June, 2020.

While in orbit, when the Sun, Earth and the Moon come in straight line, the phenomenon is called an eclipse. A solar eclipse occurs when the moon comes directly between the Sun and Earth and thus the silhouette of the Moon can be seen from the Earth as a dark circle slowly moving in front of the Sun. An annular solar eclipse occurs when the Moon is too far away to completely cover the Sun's disk. Such is what happened on the 21st of June, 2020. In many time zones, the eclipse took place on the same day as the June solstice.

The annular phase of this rare solstice solar eclipse was visible from parts of Africa and Asia and if the weather cooperated, people in these areas saw the characteristic "ring of fire". In India, Uttrakhand witnessed the full annular eclipse, while Kolkata got to see a partial eclipse. This was a rare phenomenon, as the next time an annular solar eclipse coincides with a solstice is predicted to be in the year 2039. Even though the path of this eclipse was so long that it spanned across two continents, it was also very narrow. This eclipse had the highest magnitude at the maximum point among all eclipses between 2003 and 2031.

The other spectacularly rare phenomenon observed in the sky during the month of July was the comet C/2020 F3 (NEOWISE). What makes this phenomenon so rare is that, not only has this comet entered our Solar System after 6,800 years, it is also so bright that it can be seen, along with it's tail from all over the Northern Hemisphere with our naked eyes. It has been labeled as one of the brightest comets since Hale-Bopp in 1997.

On 10th July it was closest to Sun, and since it has been moving further away since then, the glare of the Sun only made it brighter. On 22nd July it was the closest to Earth. Due to this, that was the day for prime viewing of the comet in the sky as it was the brightest on that day. The only other comets with potential similar to this comet



were the comets ATLAS and SWAN but they fizzled out before they were bright enough to be visible. However, this comet is so bright that even its tail is visible to the naked eye.

The comet has been spotted from most countries in the Northern Hemisphere over the past few days. Unlike the solar eclipse, it can be spotted from all over India as long as you live in a place with lesser light pollution. Though the weather conditions aren't ideal, many reports have already come in of the comet being spotted streaking through the north-western sky even in India. It was visible in our country from 14th July and the scientists predicted that it would be seen for at least 20 days everyday starting then, after sunset, or before sunrise.

Though the year has been witnessing tragedy after tragedy all over the world, such phenomena always comes holding a beacon of hope, and in some cases (like the solar eclipse), a literal silver (or golden) lining that things will get better, one day.

Sohini Mazumder
2nd year

The New Normal

Post COVID-19 Lockdown, as we start to limp back to the normal, it is no longer normal but the new normal. The Covid-19 pandemic has brought numerous changes in our day to day lives. It has forced usto adapt to the new normal and is redefining our way of living. The "new normal" is:

1. Social Distancing- "*Do Gajkidoori*" is the new mantra against Covid-19 fight i.e., keeping at least 6 feet distance (about 2 arms distance) from other people. Physical distancing is the new norm being enforced from local shops, malls, restaurants to hospitals, workplaces, etc. The annual Lord Jagannath Rath Yatra 2020, Puri was held maintaining social distancing among the Chariot pullers before, during and after the Yatra while curfew was imposed in the city of Puri. The 74th independence day was celebrated on 15th August 2020 all over India maintaining social distancing norms.

2. Masks and Sanitizers- Masks and sanitizers are our constant companions now. Frequent handwashing with soap for 20 second is a must. Greetings with Thermal Screenings at every entrance is a regular sight today.

3. Digital Transformation- Driven by the pandemic, there has been a major revolution in digital activities. Data, AI, technology are playing a key role in this transformation. People are riding the digital highway. Educational institutes have taken the route of online classes and activities to normalize the learning process. Apart from education, this shift in medical sector has led to a better collaboration between doctors and quick dissemination of information.E-commerce has rapidly increased along with digital payments. Reserve Bank of India (RBI) data showed UPI operated by National Payments Corporation India (NPCI) processed 1.23 billion transaction worth Rs. 2.4 lakh crore till 28thJune,the highest recorded in a month.Increase in online ordering of grocery and medicine has been observed. Covid -19 also brought digitization in the judicial system in India. The Supreme Court and High Courts

have resorted to virtual courtrooms through video conferencing technologies. Political parties too have been conducting virtual rallies.

4. Work from Home- It is a major shift from traditional work life. Virtual meetings are being held. Tata Consultancy Services (TCS) and Reliance Industries conducted Annual General Meetings through online modes without the physical presence of members at a common venue. By 2025, TCS is set to allow 75% of its workforce to work from home. Safety first is a priority now. With the gradual resumption of work activities post lockdown,new working models, time flexibility and redesigned spaces are being implemented.

5. Media and Entertainment- With the closure of cinema halls and theatre, Over-the-top (OTT) seems to be the new normal in the entertainment industry. Various films have been released on various digital platforms. Shootings have restarted with strict norms.Ban on mass gathering events has prompted a shift to digital platforms. Music industry has also turned to digital concerts.TV consumption has also increased.

6. Sports- Coronavirus has affected sports and several Indian stadiums have been turned into Covid care centres. The Indian Super League(ISL) final between Chennayin FC and ATK was held behind closed doors on 14th March, 2020.Laliga,Premier League, Bundesliga, England-West Indies Test Series etc are being held behind closed doors. Playing in front of empty stadium is the new reality.

Embracing the "New Normal" with self-sufficiency is the way forward. We have to learn to live with the virus.

Pramita Banerjee
4th year

Trivia Time

1. Lake Superior has an island, which has a lake, which has an island which has a pond which has a boulder. When the pond floods, it becomes largest island in the largest lake on the largest island in the largest lake on the largest island in the largest lake in the world.

2. The temperature of tennis balls affects the way they bounce. This is why Wimbledon tennis balls are kept at 68 degrees Fahrenheit. Not only that, but to make sure the best ones are used, the staff goes through over 50,000 tennis balls.

3. There's a person who managed to actually time travel. His name is Sergei Krikalev, a cosmonaut who has spent 803 days in orbit around the Earth. According to Einstein's theories of relativity, Krikalev has travelled about 0.02 seconds forward in time.

4. The Nuclear bombs detonated in 1945 are the reason why experts can detect fake oil paintings. Isotopes such as strontium-90 and cesium-137 that can be found in oil did not exist in nature before the bombings. So, if a picture contains these isotopes, one can safely assume it was painted after 1945.

5. In 1975, Jack Hetherington and F.D.C. Willard published a paper together in Physical Review Letters, but only one of its authors is human—F.D.C. Willard is a cat. His owner, Hetherington, added the cat as a co-author when he realized that although he was the sole author, he used the plural "we" and "our."

SPORTI-FY

Rise of the NBA- The Dream Team

The 1992 Olympic Basketball team of USA is known as the *Dream Team*. The 1992 Olympics allowed active NBA(professional) players in the team roster for the first time in the history of the Olympics. No one had anticipated the cult following this team would go on to generate and also the meteoric rise of the popularity of basketball in the world this team would bring about. Eleven of the players in the team and three of the coaches would go on to be inducted into the Basketball Hall of Fame.

The team comprised of Michael Jordan, Magic Johnson, Larry Bird, Charles Barkley, John Stockton, Karl Malone, Clyde Drexler, Scotty Pippen, Patrick Ewing, David Robinson, Chris Mullin of the NBA and Christian Laettner, the college representative(one amateur player was included). At the time of the tournament in Larry Bird, Magic Johnson and Michael Jordan, they had Ten NBA championships, Seven NBA Finals MVP awards and nine regular season MVP awards between them over the last thirteen years.

The overwhelming dominance shown by the US team was unprecedented winning all their games by an average of 43.8 points per game. In footballing terms this would be equivalent to Germany winning every game of the 2014 World Cup by an average of 5 goals. The *Dream Team* would be the first team in history to score over 100 points in every game. They finished with an average of 117.3 points per game. Famously before their match against Angola Charles Barkley quipped "I don't know anything about Angola. But Angola's in trouble." They went on to win the game 116-48 going on a 46-1 run once during the game.

Croatia with a young Tony Kukoc was the only team to even put up a fight losing 117-85 in the gold medal game. This was Croatia's first year competing as an independent country after the end of the horrific civil war of independence in Yugoslavia.The 1992 *Dream Team* is considered by most experts as the best team ever in any sport. Sports Illustrated later stated that the Dream Team was "arguably the most dominant squad ever assembled in any sport". *The Dream Team* were as popular at the Olympics as The Beatles or "Johny Cash at Folsom Prison". This team is single handedly responsible for the immense popularity of basketball over the world.

Apurba Kumar Ghosh
3rd Year

Rise Of Riqui Puig

"He is clothed in strength and dignity, and he laughs without the fear of the future."

Andres Iniesta retired from Barcelona about two seasons ago leaving behind a void in the team. A void which is, or rather was almost impossible to fill in. Many replacements were bought and almost all of them failed. However, this time around there is a player rising through the ranks who very much resembles to Iniesta whether it'd be in terms of physical stature or his gameplay.

A player who plays in the same left center midfield spot as the legend, a player who too, is calm and composed on the ball, wonderful in tight spaces, possesses great vision, dribbling and passing ability as well as being quite technically astute. Furthermore, his positioning, game awareness and eye to create chances is the cherry on top.

A classic example of a Spanish midfielder or especially a Barcelona midfielder, comparatively small in stature and height, someone who you'd think you can easily bully on the pitch but they outclass you with their ability on the ball. A complete midfield maestro.

Although, the player has been facing quite a hard time recently given that despite performing consistently well, he hasn't been getting that many chances for the first team itself and has been waiting and waiting to get a consistent string of chances to completely

prove himself but instead he has being looked over for other less enticing options on a number of occasions. Yet, he sticks with the team despite many offers from elsewhere despite the fact that his future here might be in doubt.

The player's behavior however, keeps on contradicting the situation he may possibly be in at this club, but he still keeps moving on and taking advantage of the limited number of chances he is being given over here, smiling, laughing and gelling along with his current teammates, paying no heed to the situation he may be in. He's someone who surely is clothed in strength and dignity at the moment, he's someone who laughs without the fear of the future. He is RIQUE PUIG.

Riqui, you are the future, and the future is NOW.

Aryan Verma
2nd Year

Weirdest Rules In Cricket

- A tied super over: As per the latest update, ICC has announced that the rules of super over (boundaries count rule) are being changed. According to new rule, the super over will be repeated untill one team has more runs than the other.

- Captain recalling dismissed batsman: Keeping the spirit of game in mind, a batsman allowed to carry on his batting if the opponent captain allows to do so.

- Penalty in cricket: A side is rewarded 5 runs as penalty in certain cases as when fielding side damages the ball or ball hits the helmet/ cap of fielder/ wk. If any batsman is caught damaging the protected area of the pitch then also on appeal from bowling team they are rewarded with 5 runs.

- No appeal no dismissal: As per ICC rules, 'the fielding team has to appeal for wicket in any kind of dismissal'.

- Time out rule: According to law 31 of ICC, if a batsman takes more than 3 minutes to reach the crease, he may be given out if there is any appeal from fielding side.

- **<u>Aerial stoppage consider as dead ball</u>: If any shot hits the spider cam hanging from stadium roof or in roof itself, the delivery is declared dead even though it has been caught or it goes for a six.**

- **<u>Hitting the ball twice</u>: By this rule, a batsman gets dismissed if the second hit is made intentionally and not to prevent injury.**

- **<u>Mankading</u>: It is considered to be strictly against the spirit of game and this method of getting a player out has been largely criticized.**

Shivam Thakur
2nd Year

Football or COVID-19 - "Il Capitano" Is Always Ready

There may be a debate amongst the readers about whom we are talking about. From being a youth squad product to the Technical Director of the second highest "UEFA Champions League" title holding club A.C Milan ,he is none other than Paolo Cesare Maldini. After just one appearance in debut season in the youth squad, he was made a regular member of the starting XI at right back at the age of 17 being handed the number 3 shirt, which had previously also belonged to his father, Cesare. But he became an icon when switched to the position of leftback. He was not only a part of "The Invincibles" of 1991-92 Serie A season which went unbeaten for a record of 58 league matches but also one of the magicians behind the success of reaching 3 consecutive UCL finals starting from 1992-93 season.

If the Bengali proverb "ভাঙবো তবু মচকাবনা" had a face then it would have been this iconic defender.

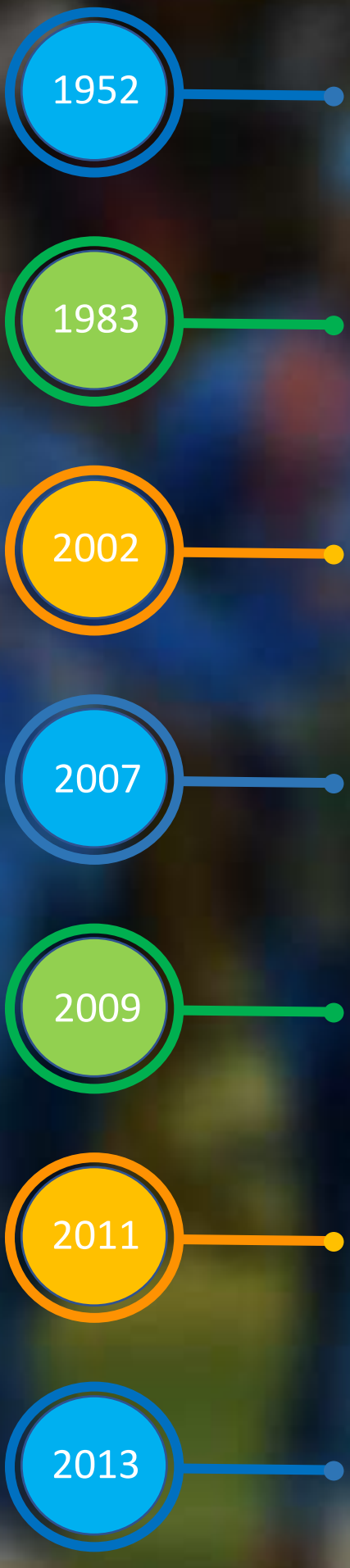
Failing to qualify for European competitions for two consecutive seasons as well as suffering a group stage elimination in 1996-97 Champions League, captaincy was handed to this man after Franco Baresi & Mauro Tassott's retirement. Despite facing difficulties till 2000, the 21st century witnessed again an indomitable Milan side claiming the 2002-03 Champions League title with Maldini as the captain against the mist Juve at Old Trafford. Maldini's contribution helped Milan to keep clean sheet till they won on penalties by 3-2. The Maestro participated in 8 UCL finals during his career including "The Miracle of Istanbul" where his side witnessed a shocking defeat against The Merseyside Reds which he labelled as the worst moment of his career. Two years later he came back strong to compete & win the same title against the same side becoming the oldest ever captain to lift the trophy.

With many records & honours in his pocket in both club & international career, he is still as fresh as old wine. Even the most infectious virus cannot break through the defence of this legend.

His 25 years of service for a single club as a player & then continuation as Director, his patience, confidence and determination to win over anything shows how positivity & self determination can achieve success over any critical situation even if it takes the shape of a pandemic. We also can & will someday win over the current crisis & the world will be enlightened with joy & happiness again.

Saptarsi Sen
4th Year

Achievements of Indian Cricket



1st test victory at Madras vs England

ICC ODI World Cup champions at Lords

Natwest Trophy winner at Lords

1st T20 WC champions at Johannesburg

Became Highest ranked Test team

Won ICC ODI World Cup for the 2nd time

Won ICC Champions Trophy in England


AESTHETICS
OF ART

Shogun Banik (2nd year)

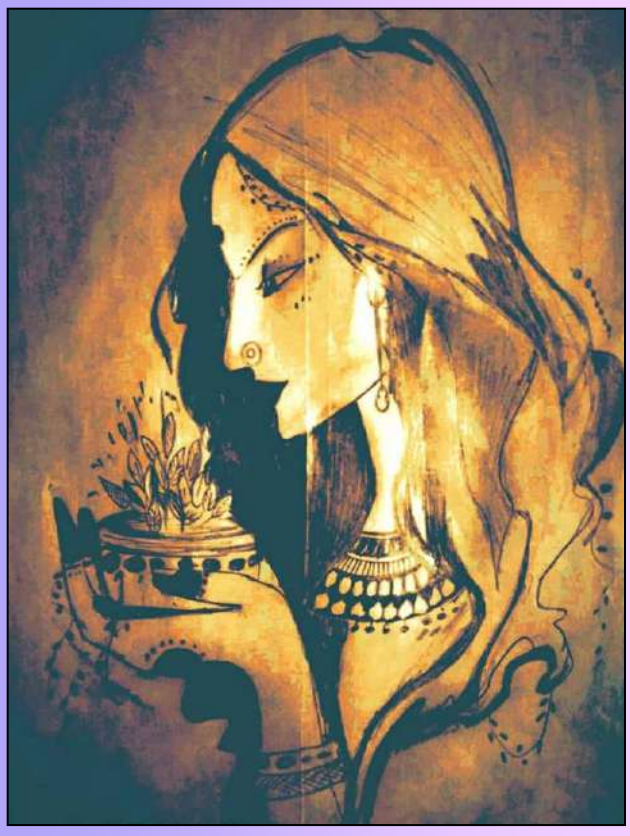
Oindrila Biswas (3rd year)

Sayani Chatterjee (3rd year)

Shruti Mittal (2nd year)

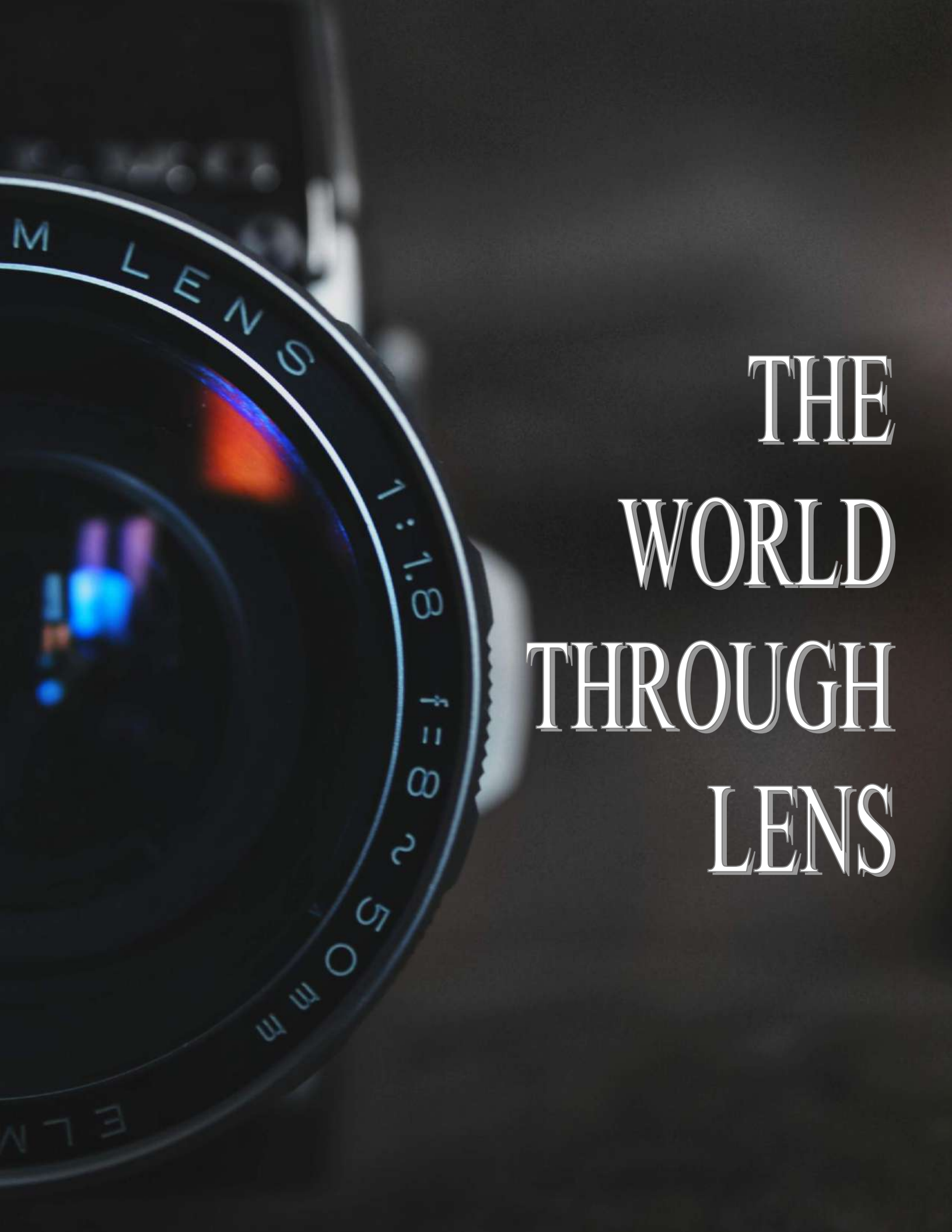
Riya Kundu (2nd year)

Oindrila Biswas (3rd year)



Shivangi (2nd year)

Shogun Banik (2nd year)



THE WORLD THROUGH LENS

"Mother nature"

Soumya Biswas (2nd year)

"Touch of innocence"

Souvik Roy (2nd year)

"Kiss of nature"

Aaheli Maity (2nd year)

"In search of honey"

Tanya Patel (2nd year)

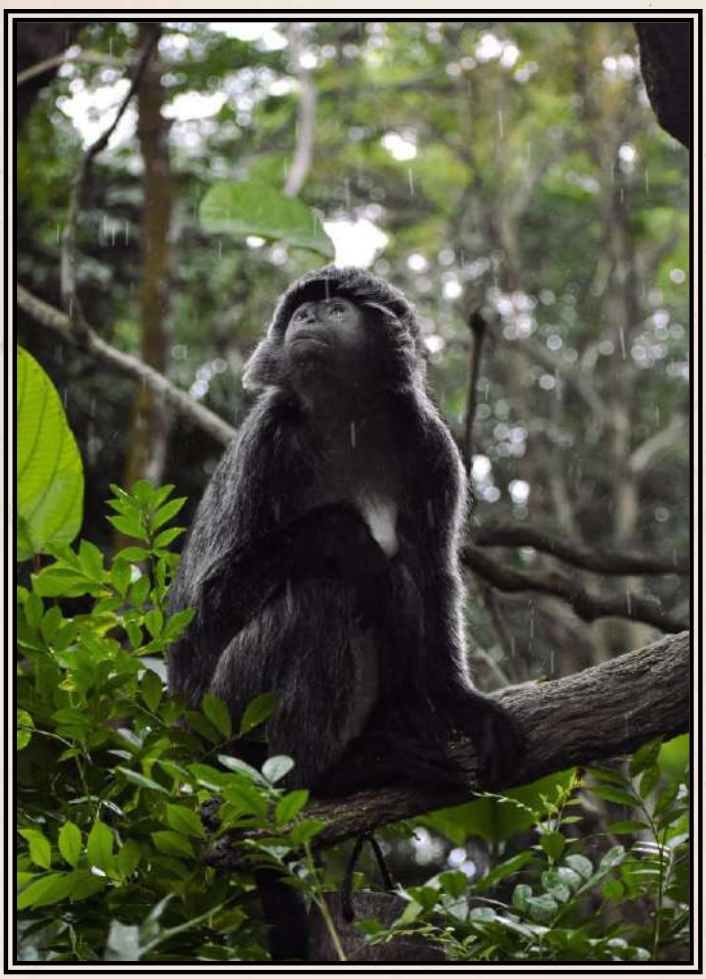
"Pearl drop"

Dipanjan Sarkar (2nd year)

"Skywalkers"

Soumya Sinha (2nd year)

"Black Beauty"



Aaheli Maity (2nd year)

"Bon voyage"

Ankit Kumar (2nd year)

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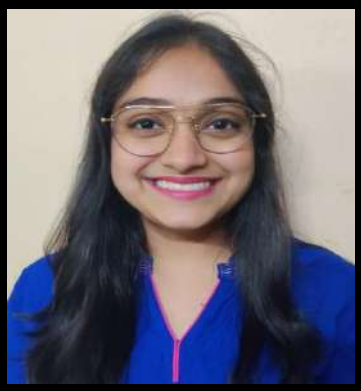

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