SRIJAN

INTELLIGENT EXPRESSIONS

ABOUT
SRIJAN

Srijan is the annual magazine of Department of Computer Science, University of Delhi. It is launched every year at Sankalan.

Srijan literally translates to "creation." In the context of this magazine, it is the creation of ideas, design, and models in the realm of computer science and technology.

Srijan started with an aim to capture the tremendous advancements in technology and lay out a bigger picture in a few words. Since then, we have been trying to highlight the technological breakthroughs that flabbergasted us over the past year and what lies ahead. Srijan aims at giving a complete roundup of the emerging tech and research in the field of computer science.

Writing is not the only activity that employs creativity. Keeping that in mind, the magazine contains poems. Moreover, not being limited to a pen, the magazine offers space for featuring sketches, giving the option of showcasing individuality with a brush, as well. It also contains glimpses of annual activities held at DUCS.

This year, Srijan is kept open to all technologies around the world. Due to the advancements in different tech fields such as Artificial Intelligence, Machine Learning, Networking and more, the magazine speaks of all the current development in computer science around the world.

Department of Computer Science takes immense pleasure to announce Volume-9 of Srijan successfully, with all new enthusiasm and zeal towards a new era of computer science.

FROM THE
HEAD'S DESK

Prof. Vasudha Bhatnagar
Head of Department

The excitement in the arena of IT touches youngsters much faster than the seniors and experienced. The current hot favourite is Artificial Intelligence, lovingly called AI.

This issue of Srijan covers topics ranging from Artificially Conscious Machines, GANs, Screen Addiction, SlowLoris Attacks to Automatic Quandary. Innovative uses of AI aim to improve the quality of human existence in various walks of life.

Today AI seems to pervade humanity to such an extent that its creators are now wary of the creation. Stalwarts like Stephan Hawkings and Elon Musk have raised serious concerns about the potential risk of AI to human civilization. Responsible use of AI is the "awakening" call that no computer scientist can afford to ignore.

Kudos to the authors and the editorial team for compiling this issue. I sincerely hope that in future also Srijan will cover contemporary topics for its readers.

THE **SRIJAN** TEAM 2019

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FOREWORD

The Editorial team of DUCS is delighted to present the ninth edition of the Annual Tech Magazine - 'SRIJAN'.

All around us, Innovation keeps transcending expectations every day. There are no frontiers to its scope. There's always room for enhancement, refinement, update. To scale beyond what we have achieved so far. To develop new methods of analysis. To solve problems that seem unattainable.

Keeping the ever-expanding sphere of technology in mind, we've tried to keep the content - boundless, imaginative and inquisitive.

The reader has a choice from an extensive list of sections. From the latest hot topics - GANs, Air taxis, Artificially conscious machines to the topics that require a level-headed discussion - Fake news, Automated quandary, the magazine tries to capture all aspects of the modern world of technology.

Get ready to dive into a blended world of curiosity, ideas and insight. We hope you like it.

- The SRIJAN Team

CONTENTS

AIR TAXI

ELEVATING THE FUTURE OF URBAN MOBILITY

Ronak Aggarwal
MSC I Year

Recently, Uber has selected India among 5 global locations outside USA for launching UBER ELEVATE. Yes, this seems to be a dream but fortunately, this is the reality. UBER has taken a wise decsion by choosing India because of its growing population and congestion on roads in metro cities. As a starting step, Uber Air will start its test flights in Dallas-Fort and Los Angeles in 2020 with commercial flights proposed to be starting in 2023. India, Japan, Australia, France and Brazil are the nominated countries for the third international destination for Uber Air flights. "For these air taxis, cities with high population, where traffic congestion is to the extent that travelling a distance of 10-15 kilometers will take an hour, are the ideal one." In India, New Delhi and Bangalore are the most suitable cities for these urban taxis.

WHAT AIR CRAFT UBER AIR WILL USE ?

Helicopters are costly and noisy. Thus, Uber is planning to use eVTOL aircraft. eVTOL aircrafts are special kind of aircrafts having the following features that makes Uber to choose them:
1. eVTOL aircrafts run on battery, thus making them environment friendly.
2. eVTOL can take off and land vertically, thus not needing a runway.
3. eVTOL can fly huge distance, once it is fully charged.

WHAT WOULD BE THE PRICING ?

For a regular commute, prices might be prohibitive in beginning. But due to the comfort and high facilities provided by Uber, number of commuters can still be a very large number. In cities like New Delhi, Uber can surely generate a large revenue through these air taxis.

WHAT ARE THE MAJOR CHALLENGES?

Since, this is the first ever concept Uber is launching in India, there are many challenges at the moment. Some of these challenges are:
1. Type of aircraft is still to be finalized (though eVTOL seems to be the final one), it could be a winged model, or something that works like a drone.
2. Battery is another challenge, battery should sustain a charge for at least 100-km flight.
3. Sky port locations is a major impediment where the aircraft will take off, land, can be charged and maintained. Central locations in cities are the preeminent ones as commuters are likely to travel through those locations more likely, thus, it will have a huge cost implication

WILL IT REALLY HELP CUT CONGESTION ?

The main aim of air taxis is to convert transportation from surface to sky. The new concept is to provide mobility via air. It is a new node based facility where each node is connected to other nodes in the same city. For example, travelling from Gurugram to Connaught Place will just take 10 min, thus saving at least two hours every day for a regular commuter. We can just hope that by 2023 we will be flying away to our relatives' houses via a quick and hassle free ride, instead of taking a six hour drive on the highway.

To conclude, India is growing in technology with time. If successful, 2023 will see a new regime of urban transport where reaching from source to destination will take negligible time without any hustle of traffic jams. Now, the major challenge that lies ahead for India is to make this proposed transportation system a success.

THE **FAKE NEWS** MESS

Ashita Diwan
MSC II Year

The social media has indeed made the world a global village. But there are other facets of it as well. We have no control over the content that is being circulated on social media and as well as on the traditional media. With the advent of technology and in this era of digitization, the proliferation of fake news has become facile. Have you ever pondered and made an effort to check the authenticity of the news before sharing it with other people? The answer is 'No.' Most people are prompted to believe whatever they read.

WHERE DOES THE TROUBLE LIE?

Fake news is deliberately created to misinform or deceive readers. It is centered around two notions: mis-information and dis-information. Mis-information is the piece of information that makes false claims while dis-information is spread with the intent of either maligning or glorifying something. There are areas that are closely related to the fake news problem: **Rumor Detection, Truth Discovery, Clickbait Detection, and Spammer and Bot Detection.**

WHY IS IT A MATTER OF CONCERN?

Nowadays, it is quite easy to spread any news and it becomes a sensation in no time. The problem of fake news has been prevalent for several years, but it came into picture predominantly during the 2016 US Elections. Detecting fake news is a challenging task in itself as we cannot differentiate between the fake and authentic news just by reading it.

The dissemination of this false information poses potential threats to the world as they tend to polarize the opinions of society. Fake News is often spread by the political parties to entice the voters in their favor by maligning their rivals. As reported by the Institute of Defense Studies and Analyses (IDSA), about 18 fake news stories stirred mob lynching in India that claimed the lives of 23 individuals in 2018. Looking at its repercussions, it is necessary that we monitor the circulation of such falsified information before its impact on the society turns grim.

CURBING THE MENACE AND THE CHALLENGES

The need of the hour is to develop an automated method to detect fake news which will enable millions to receive news stories that are accurate, authentic and reliable. But how can we identify the real news from this clutter of fake news?

In this battle against fake news, researchers and organizations are trying to devise Artificial Intelligence driven methodologies that can help detect the false information. Many fact-checking websites and extensions like Politifact, Media Bias Fact Check, Snopes, etc. do exist but the problem with them is that the facts can be validated only if external sources are available. Thus, fact-checking tools are not reliable for just published news stories.

In recent times, most of the research on fake news detection is being focused on the use of Natural Language Processing techniques for analyzing the textual features of the news. Using these features, machine learning and deep learning algorithms are applied for classification. Sentiment analysis, Psycholinguistic features and network-based methods are being used extensively in this direction. However, the efficacy of such models still remains contentious.

There is a lack of good quality data that clearly demarcates between legit and false stories which can be used for training our models. Also, the nuances of human language cannot be easily dealt by the machines. Therefore, it is challenging for our models to predict with 100% accuracy whether the news is fake or authentic. An exclusive technology-led solution might not suffice in eradicating the fake news problem. Thus, an interdisciplinary effort is required to stop the spread of fake news.

Stance-based Fake News Detection Pipeline
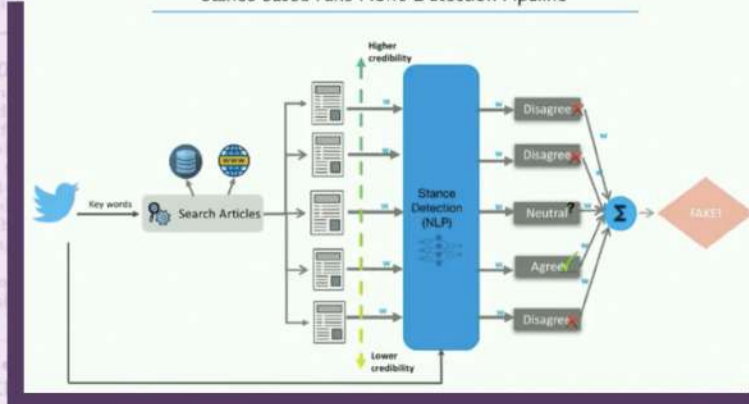
GENERATIVE ADVERSARIAL NETWORKS

GANs

Saurabh Yadav
MSC I Year

Before starting the article let us try to examine these two images. Is there any discrepancy in these images?

The obvious answer that comes to or mind is no! However, you would be amazed to know that the people in these images do not exist. These images are generated by GANs.

The idea of GANs was proposed by Ian Goodfellow in 2014. He is a renowned researcher in the Deep Learning Community and is currently working at OpenAI. Till 2014, GANs were incapable of producing such realistic images, instead, they were far from accurate. Through the years, improvements in algorithms have led us to the point where we might never be able to distinguish between an image of a real person and an image generated by a GAN.

WHY ARE THESE GANS SO GOOD?
So, unlike any ordinary neural network, GANs consist of two neural networks working opposite each other where each tries to be better than the other.

Think it of as a thief who once visits a gallery and sees a beautiful painting worth thousands of dollars. He tries to fake it but the gallery has a genius detective who can identify fake paintings in an instant. What does the thief do? He goes home and makes the painting every night, improving every day, to the point where the genius detective cannot recognize the difference between the original painting and the fake one. The thief goes to the gallery and replaces the original painting with his own, making loads of money in the process. In case of GANs, the thief resembles the neural network called **generator** and the genius detective is called **discriminator**.

Generative adversarial networks (conceptual)
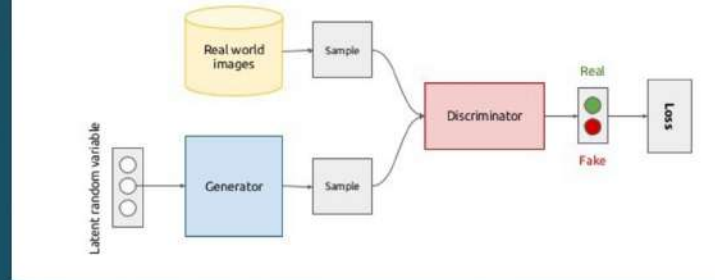
The generator is assigned with the task of designing natural looking images, similar to the original ones so that the discriminator can be easily fooled. The generator is given some random noises which it tries to incorporate into making new images, similar to the original one. Then, both original and fake images are sent to the discriminator for checking.

Are GANs flawless yet?

Certainly not. They have improved throughout the years but they still have some problems - symmetry cannot be seen in faces, background of faces may be inappropriate, distinguishable hair etc.

GANs are yet not capable of understanding the image orientation, or other features that can be easily recognized by human eyes. They just try to mimic the image and in doing so, end up giving a distorted image at times. GANs cannot differentiate between foreground and background which in turn makes it difficult to convert a 3D image to 2D. On top of all these shortcomings, the training process may also take quite a lot of time and resources. There are a lot of inappropriate usages of GANs, as well. For example:

1. Face2Face, a model presented at CVPR 2016 can transfer visually plausible facial expressions from a source video to a target video. Using this model, anyone can forge the footage of a country's president and use it inappropriately for their personal benefit.
2. PassGAN, which was proposed by Briland Hitaj, Paolo Gasti, Giuseppe Ateniese and Fernando Perez-Cruz in their paper. This project was developed to crack passwords. It performed twice as well as "John the ripper" and had a very promising result as compared to the contemporary password cracking tools.

Misuse of all technology exists and therefore there are many more examples to support the statement written above. Let them not let us deter from the fact that GANs look promising, if not promising - compelling. GANs are better now from the ones in 2014 but still, there's a long way ahead. We are yet to see a ground-breaking result in this field!

ARTIFICIALLY CONSCIOUS
MACHINES

Saurabh Yadav
MSC I Year

WHAT IS CONSCIOUSNESS?

Is it same as having the ability to think, or is it like having a soul? Are plants conscious? These are some general questions which arise after reading the title. Defining consciousness in words is cumbersome.

According to Dr. Harry H. Porter III, there are roughly three meanings of consciousness: First, conscious means to be awake. A person who is asleep or in a coma is said to be unconscious. Second, the word conscious is often used to mean thinking the way an average human thinks. Third, being conscious means being aware of your self and your own thoughts.

ARTIFICIAL CONSCIOUSNESS

So, what does it mean to have artificial consciousness? How can we artificially create consciousness if we do not have a precise definition of it?

An artificially conscious machine could be a machine that possesses the ability to act as a human and be self-aware of its existence. This ability can aptly be referred to as machine consciousness or synthetic consciousness.

Hypothetically, let's think of a machine that can indulge in long conversations, listen to music, have hobbies, embroil in disputes, feel emotions, do mathematics etc. These characteristics come naturally to a normal human but for a machine, these simplistic tasks are as difficult as the problem of intergalactic travel for humans.

A COMPARISON

Today, there are more than 10 million machines(robots) on earth and this number will multiply further in the future. All of these machines excel in their respective tasks. However, the number of machines that can truly understand a piece of text, like this very article is stigmatizing. From SHAKEY (so named because of its tendency to tremble during operation), ELIZA to OpenWorm and Sophia, the world seems to be on a space rocket to achieve better AI machines. Researchers in the past decade have shown some promising results in the field of AI but still, machines are far from achieving Human Level Artificial Intelligence (HMLI).

Nick Bostrom in his book, Superintelligence: Paths, Dangers, Strategies has discussed the ways to reach HMLI, it's after effects and challenges. The idea of a truly conscious machine still remains far from reality. Some may argue that Neural Networks have promising results to present but do they even employ real intelligence or are they just making simple statistical pattern observation? Neural networks are said to emulate the networks of neurons present in our brains. If we assume that someday we will have enough processing power to develop a system capable enough to actually run an artificial brain, even then will it have thoughts like the ones we have while eating delicious food or, would it just be a fancy elaboration of a simple dot product of vectors matching the labeled output?

WHEN THEY ARE HERE

Nils Nilsson has devoted a long time working on problems in search, planning, knowledge representation, and robotics.

When asked about arrival dates for HLMI, he offered the following opinion:
10% chance: 2030
50% chance: 2050
90% chance: 2100

Let us be extremely optimistic and believe that we will soon develop a machine intelligent enough to pass the Turing Test. But what next?
We have been raised in an era where Sci-Fi movies have gone extra miles to showcase what it would be like to actually have an HMLI around. But wait. Don't all these movies show that such a machine is going to end humanity; often referred to as the inevitable "singularity"? All of them present a scenario where such a machine becomes self-aware or rather in attempts of making a sense of reality, tries to kill its own maker. From 2001: A Space Odyssey, where HAL (Heuristically programmed Algorithmic computer) gets confused about the orders that were given to it and kills the whole crew of the spaceship to Ex-Machina where Ava becomes self-aware ("acquires consciousness") and kills its own maker; we are repeatedly shown the same fate. But these are just fictions, right? Or is there a probability that we are going to

CONCLUSION

We do not know what a conscious machine is going to be like. We can only wonder at this point of time.
Will it be the case that we may not be able to guess if the person sitting in front of us in a coffee shop is a machine or a human? Will the machine perceive itself as more evolved? Will it possess the ability to comprehend the true meaning of its existence? (A question that even we ask ourselves) None of these questions have a definite answer today. We don't know what exactly future beholds for us and we might be able to seek answers to these questions in the coming years.

HOW TOR WORKS ?

Abhinav
MSc I Year

Before we jump into its working, let us know what exactly is TOR. It's an open source browser that is used to surf the web but here's the catch, it does all this anonymously.

TOR(The Onion Router) browser uses the concept of onion routing which was developed by the US Navy and it's quite different from virtual private networks. What it basically does is that it bounces the connection between multiple routers so that it becomes very hard to track and can provide anonymity easily. Onion routing comes out as our savior because sometimes, we don't want people to know that we have accessed something! While most of the communication that we do is more or less based on the client-server architecture, TOR provides us the ability to stay completely anonymous.

Now, let's see how do these bounces or hops work. The onion routing bounces the connection multiple times with encryption between each hop with different keys from the sender(TOR user) to receiver(the server), and the last node on the path of hops actually communicates with the server(kind of a level one proxy) on behalf of the TOR user. It seems that it is communicating with an intermediate node which is nothing but a TOR client, just to confuse people about what's going on the route from one end to another end.

The beauty of onion routing is that on the network no-one knows anything about the connection path, from where the packet came and where it was sent. Also, it uses asymmetric encryption techniques like AES, and the keys with each node are K1, K2 and K3, which are exchanged using Diffie Hellman algorithm. Just as there are layers in onion, here each layer has an encryption key. The message sent from the TOR client is encrypted thrice with K1, K2, K3. Entry guard can peel the layer 1 with Key K1, and middle node can peel the encryption layer with K2 and so on. The data bus at the last Exit relay that the message is not encrypted anymore because it is nothing but a request for something to the server, therefore, it must not be encrypted. Then, the destination(the server) replies to the message and the reverse process happens from K3 to K2 to K1, and the response can only be opened from the TOR client from which the original request came because it has the key K1.

There can be hundreds of nodes between the ends where each node can belong to different countries also. But the main point is that on each node, the exit and TOR client both must be using SSL because that is the only part which is not encrypted.

With all this encryption going on, this browser is definitely not the fastest! But it does what it's designed to do, to make you anonymous and it does it pretty well!
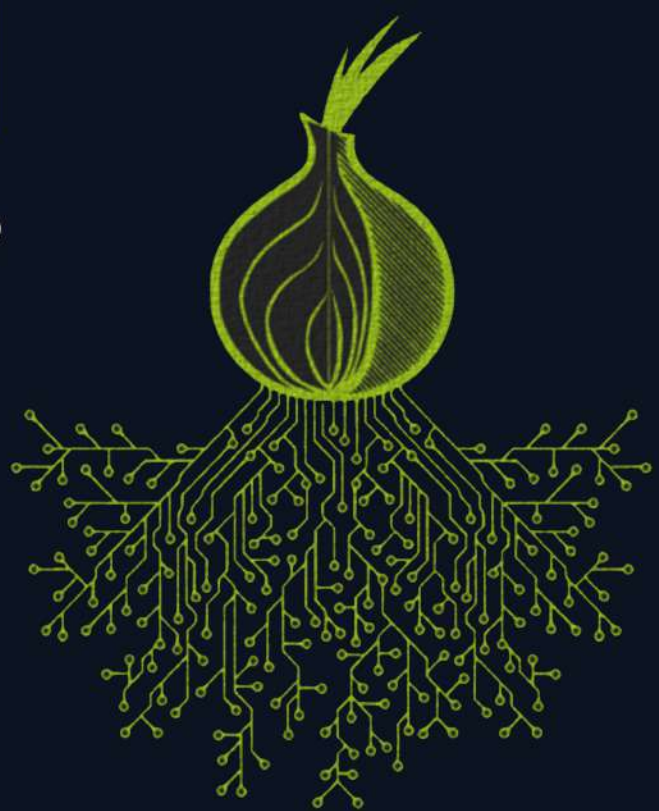
SHOWING **MY WORLD**
TO A 9-YEAR OLD

Deepti Sharma
MSC II Year

ClearText. Pendown. Turtle move Forward. Remember these commands from the elementary class "programming" language that you learned in your school? It was always a moment of delight to be able to use LOGO for developing programs. A feeling of superiority filled you in with every output. But, that was a decade ago. If we look back and compare it to what students are learning today, being amazed would be an understatement.

The younger generation of today has platforms like CodeHS, a web-based teaching curriculum developed by two Stanford students, Jeremy and Zach, which offers various courses based on Python, JavaScript and even Augmented Reality(AR).

Those days are not far when a 9-year-old kid will have to study about or get familiarised with topics such as machine learning, artificial intelligence, and data mining to say the least. Prepping for the future, here are two terms that can be explained to children using simplistic examples :

1. Machine Learning / Artificial Intelligence

If you were a pokemon fan, you definitely remember the pokemon detection device used by Pikachu's trainer Ashley. He used to click a picture and the device would instantaneously recognize a Pikachu and its layout details. That very device is the best example of machine learning.

How do you recognize a person? By remembering their features : names, complexion, the color of eyes, height etc. The next time you see them, you are able to recognize them immediately from this past knowledge. Machine Learning is the same concept. This time, however, the machines are trying to remember and recognize things, exactly what our pokemon detection device follows. The Machine remembers the yellow color, two ears, black stripes, big oval black eyes and the red dots on the cheek, promptly recognizing a Pikachu when it sees one. Not only a Pikachu, but it can also remember and recognize all kinds of pokemon by learning on their features.

2. Blockchain Technology

Chit Games were always the best part of the recess, recalling the scores of the previous day - the worst. However, there was always this one sweet person in every group who would keep track of all the scores in the back of their notebook. And one another person who would never agree with the kept record. They would accuse the others of cheating.

Solution? Some of us would also start keeping track of the scores. But then, on some occasion, the gang leader would demand to change the score because it was their best friend's birthday. All of us have faced this unfair scenario. Haven't we? Result- everybody had to waste the last page of their notebook in keeping track of the scores so that no change would go undetected.

Extending this to adulthood, imagine if someone manages to alter data that's crucial, like a bank balance. To safeguard against this, blockchain technology uses the same concept as above. Everyone has a copy of all the transactions. There-fore, no one is able to hack and alter the balance of any other person. It cannot be reflected back to so many people.

> We've just managed to show how one can involve a 9-year-old into the said "complex" world of computer science. No concepts are hard to follow. Learning can always be made fun and inclusive. To conclude, we have actually learned something when we can explain composite ideas in easy and intuitive ways.

DIGITAL
CENTRALIZATION

Satyam Shivankur
MCA I Year

Gone are the days when life without Internet was actually possible for all of us. There was a time when we used to question the credibility of the Internet. But today one can't even imagine his/her life without a 5.5-inch rectangular case which we call a smartphone and probably, they should not. Wherever we go, we find ourselves surrounded by a vast number of gadgets. From a smartphone with a digital assistant to a smart TV with digital streaming platforms like Netflix or Amazon Prime, smart devices have taken over almost every aspect of our lives.

Now the question that has been arising in the minds of tech giants in recent years: What now? The answer is a newly born term: Digital Centralization. It is a way of developing a smarter living by a feature of connecting all the devices so that everything works in sync, enabling you to have access to all the functionalities even when you have few devices available.

Imagine yourself going out somewhere visiting an old friend. On the way, the thought of whether you switched off the lights and locked all the doors and windows starts to haunt you. However, the comfort that technology provides us with everyday gives you enough confidence to not be worried for long. You pull out your smartphone, open the smart lock app and check the status of your door. In case they were unlocked, you still remain calm and composed for you can remotely lock them using the app and go back to your day as usual.

Have you ever wondered what it would be like if our walls were able to differentiate between a human's touch and appliances? Fascinating, isn't it? In the foreseeable future, thinking about the plastic switches on our walls that control different appliances will fill us with nostalgia. "Smart" walls are in the early stages of conception. These startling walls have a lot of potential. They will be able to monitor activity in a room, adjust the temperature and even provide alerts when an appliance is turned off. Surprisingly, it can also track people wearing electronic devices by detecting their EM signature.

Well, this is not all. Digital Centralization can also be used to complement our business activities. We are glued to our smartphones, tablets or laptops for our business pursuits, even when we work from homes. This capability will further provide us with the ability to host virtual meetings and do possibly everything that can be done in the office without any interruption. Data Centralization also aids in coordination. Individuals who are authorized will have access to the infomation seamlessly, without it being duplicated. This results in happier customers, and an increase in revenue. For a smooth-running data center, less chaotic work and more time to achieve other goals, all organizations should consider Data Centralization.

If all this is achieved, technology will indeed be a game-changer in almost every sector.

SCREEN ADDICTION
CAUSE AND CONTROL

Swapnil Gupta
M.Sc II Year

Hello! Take your eyes off this magazine and look around for a moment. What do you observe? You will see people using their phones, laptops or other electronic gadgets, with their eyes fixated on their screens. The world is at our fingertips. Everything is accessible by a couple of taps on our gadgets. But, despite the advantages that these devices offer, the time expended on them results in major side effects.

Content provided by social media and entertainment apps/sites is virtually indefinite, consumption of which is making us procrastinators and addicted. From binge-watching our favorite shows to working on a project, most of our time is spent sitting before a screen. This is the precise definition of "Screen addiction". It is becoming predominant with each passing moment; with the internet being easily and economically available to all. We have already reached a point where we have acknowledged its normalcy and blissfully ignored the humongous problem it is becoming.

Nowadays, we do not even try to remember things that are trivial. All we need to do is whip up our phones or laptops and do a quick search to get all the answers we need, or probably reach out to people using messaging apps like Facebook Messenger or WhatsApp to figure out minor inconveniences. As convenient as this sounds, we end up becoming lazier with every search query.

The trouble is real.

In a recent report from Taiwan, a woman who made extreme use of her phone on maximum brightness was found to have 500 holes in her cornea. Furthermore, in Australia, in a recent survey conducted by Huawei, it was found that running out of battery is a subject of strain for people.

How do we control this menace?

On an individual level, self-control is first and foremost in controlling screen addiction or any addiction whatsoever. To stop the urge to touch gadgets, turn off all the useless notification alerts, use the do not disturb mode, and set some ground rules for phone usage. Replace the time spent on using phones with some other activity, such as reading.

App makers and operating system developers are also taking measures to counter this problem. For instance, Google has been providing statistical data on app usage to users so that they can track their usage and observe their behavior. YouTube has added a feature which enables the users to see how much time they spend using the app. Also, the latest version of Android will be launching an app called "Digital Wellbeing", which will remind users to take breaks from the screen. For older versions of Android and IOS, there are third-party apps available which can be used to prevent phone addiction.

Restraint is the key.

Modern technology has provided us with a wide range of gadgets that have opened a seamless world of information and entertainment. However, their misuse and overuse are leading to various health and psychological problems. It is, therefore, up to us to use technology in ways that benefit us.

AUTOMATED QUANDARY
## INDIAN ECONOMY VS TECHNOLOGY

Mohammad Adib
MSC II Year

AUTOMATION AROUND US

India has made massive advances in the field of digitization. We are on the path of progress in all respects and dimensions, brought to us through landmark campaigns like Make in India and Digital India. Online and automated services are now available in virtually every industry, be it service providing or commodity producing. Getting licenses to run a company or filing GST or just working on the assembly lines during manufacturing has become a cakewalk. For customers, the process is hassle-free and saves a lot of money by cutting the links with the so-called 'middlemen.'

THE OTHER REALITY

However, if we look over the intricacies, there is another facet of it. This era of digitization has resulted in many people losing their jobs, owing to the ease of work that has been brought by the machines. How did this change happen? People were once part of a flourishing local handloom and carpentry, producing ethnic clothes among other things. They were hardworking and were earning enough to lead their livelihoods well. All changed when the government eased its policy to attract MNCs for foreign investments and technology. This brought a two-dimensional change. On one hand, a US-based company brought its automatic power loom which produced clothes in multiples of what was earlier produced by workers. All this was done in lesser time, human and capital resources. Quality too was comparable to what was being produced earlier. The owner and management of the cloth factory were grateful and satisfied.
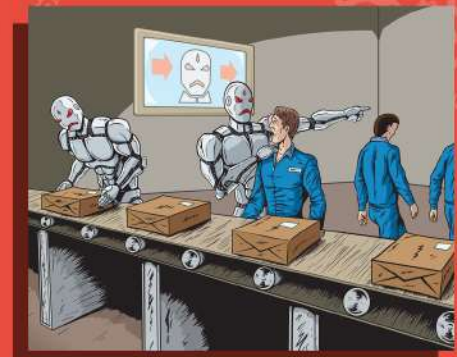
THE DUALISM

The other dimension of the change is the object of importance - Are technological advancements a boon or a bane? Are the devices that we depend on so much, and the online services we make use of every day, a hurdle in our nation's progress?

For those who say no, the critics will quote the industrial unemployment rates. The positions which were once taken by citizens are now taken by bots or an automated mechanical arm. For those who say yes, the supporters will put forward the growth in GDP which primarily is because of the computing and technology sector. The reduction in losses were a result of 'under the table' expenses and easy transactions, which improved India's ease of doing business. Therefore, for

WHERE DOES THE TROUBLE LIE?

India, on one hand, faced a range of troubles while going digital whereas countries like China and USA didn't face any such issues, obviously except some slowdown or recession which is an unavoidable trough in the sinusoidal curve of any economy.

A nation has three working sectors consuming its workforce, namely, primary or agricultural sector, commodity producing sector, and the third, tertiary or services sector. There is a smooth, focused shift from primary sector to tertiary sector in a country. In other words, a new nation generally starts as a primary sector dependent economy, moves to a secondary sector focused one and finally to a tertiary sector. An example being - The US.

India in the 1980s was a primary sector economy, while by the 21st century we saw a direct jump to tertiary sector, skipping the secondary sector which is considered the largest job-creating sector in a developing country. But now, when the authorities woke up to these developments, they tried to absorb workforce by relaxing industrial norms and allowing exploitation of resources to create employment in this commodities production sector. To this again, automation and mechanical solutions came as a nightmare for the blue collared. This might suggest authorities to slow down their endeavours towards digitization or tertiary sector. However, such a step should not be taken, because the same thing which takes away jobs actually contributes much more to the national income than what the industries could in the near times. We may lag behind in the race of growth on a global scale.

Amends

The main problem, as believed by various scholars is of the workforce and population is the lack of education. About only 4% of the Indian population is graduate (excluding the factors like technical education or skill). The rest is largely unskilled and lacks a credible education, thus obviously people are unable to get into the growing white-collar sector. Providing education and skill-training to people in the working age group is considered to be an all-inclusive solution. A worker turned into a skilful power loom operator can contribute much more, earn more and therefore sustain with dignity.

However, preservation of culture and skill are of importance as well. Such automation and mechanical advancements should not be at the cost of the skilful artisans and producers. To sum up, automation should mean hands-free, not hands-less.

DEBUNKING THE FABRICATED -

AI

Swati Gautam
MSC I Year

ARTIFICIAL INTELLIGENCE

If you're in touch with the real world, you must have heard of this term. And if you do know, you must be fascinated by it. After all, the words say it all - intelligence that isn't natural, one that has been constructed.

A simple google search will come up with hundreds of articles, images, books, media, movies devoted to it. Nowadays, we see robots thinking, code pouring down a screen and if you're lucky you might as well find " The Terminator " buried somewhere in there.

But is this how we define AI? An omnipotent robot? Or is it just something Hollywood fancies us to buy?

Perhaps, it is easier to connect to an audience via these clichés. But do we need them today? In the age of Alexa, Cortana, face detection in mobile phones and Google Maps, do we really require a false depiction of AI?

Let's understand this in a simple way. We solve problems using our natural intelligence. AI is a machine's ability of analysing and solving problems by "simulating" functions of the human brain.

SOME MYTHS ABOUT AI

Now that we have a formal definition of what it is, let's counter some myths that plague this field.

1. AI == ROBOTS

No. AI is any machine that has the property of exhibiting intelligence, performing tasks that are an essence of human intelligence. Sure, a robot does employ concepts of AI, but the keyword is "employ". A machine that can recognize images is AI, perhaps limited in its scope but nevertheless AI.

2. AI == MACHINE LEARNING

Machine Learning(ML) is a subset of AI. Machine Learning is only a means of achieving AI; a faster, smarter, efficient way. If we had to create a program that recognizes trees from a photo, we could possibly write it in code. How long would it take? Well, long enough to cause a headache. So, instead of writing complex rules and specifications to achieve a goal, we make use of ML. Machine learning is "training" an algorithm so that it learns the objective. Training involves feeding it a huge amount of data so that it adjusts, improves and eventually learns.

3. AI CAN WORK WITH ANY VARIETY OF DATA

Certainly, but when your face recognition system says you look like a car, it doesn't take long to dawn upon you that something went amiss. Any AI system needs high-quality information that pertains to the problem at hand; data with some noise (unstructured, meaningless data) is fine but that noise can't be a heavy-metal song, pun intended. AI is a program and a program obviously needs good data.

4. AI WILL RULE OVER THE WORLD

If we go by any conventional science-fiction movie on the matter of AI, yes. In real life, no. Ever since "AI" transcended from academic knowledge to general circulation, it has been fashioned and manipulated. Likening the power of an AI-powered machine to that of a human in power is imaginative but essentially, bizarre.

Today's AI is a snail against what it actually can be. A machine that has intellectual capacity will operate for us. It won't destroy but rather enrich our lives. Semantics cannot be created from syntactic logic. Machines will always require human input and intervention. And the said machines will be smart enough to assess the significance of its creator - us. Maybe there is a threat, but that kind of revolution hasn't happened yet. Besides, if we are capable of recognizing an intimidation that is unreachable today, we are more than proficient of treating it. The hype created by pop culture shouldn't be a hindrance in research, inventiveness and innovation. AI is already a part of our lives. It's time we ask questions that help us comprehend it - what it is, what it is not, what it can be and what impact it will have on our lives.
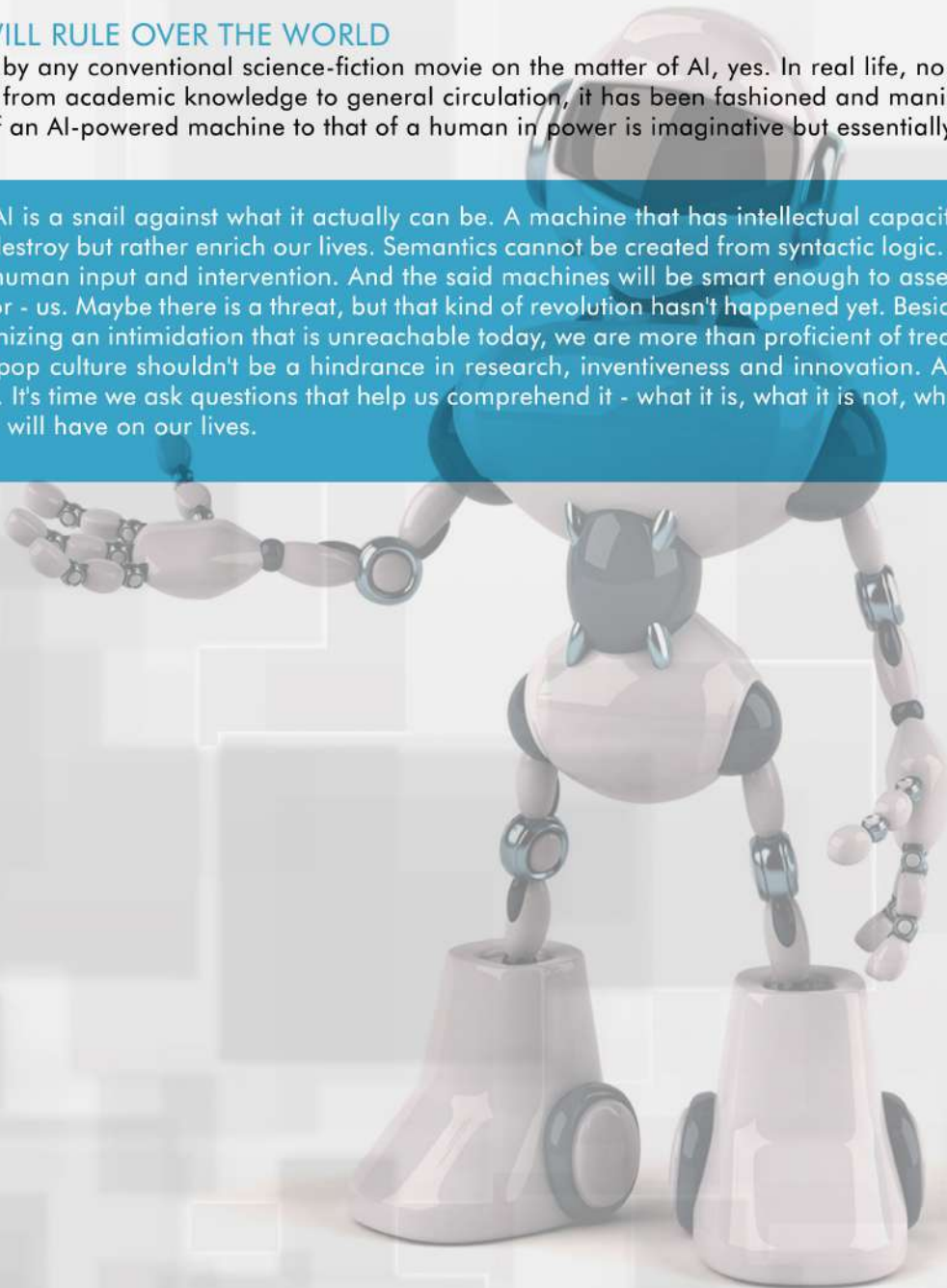
LARGE PRIMES
HOW TO CHECK THEM?

Mayank Kharbanda
MSC I Year

"God may not play dice with the universe, but something strange is going on with the prime numbers."

- PAUL ERDOS

"December 21, 2018 -- The largest known prime number $2^{82589933}$ - 1 has been discovered by The Great Internet Mersenne Prime Search (GIMPS) which has 24,862,048 digits. A computer volunteered by Patrick Laroche from Ocala, Florida made the find on December 7, 2018."

Primes, whole numbers with exactly two factors, have always influenced the mathematical world with their beauty. They have made cryptography an enigma. Large primes are used in encryption to make networks more secure. And who can forget the million-dollar problem of Riemann Hypothesis, which is based on the distribution of primes. Also, there is a sort of joy in finding large prime numbers in society.

The layman's way for checking a number to be prime is, trial division of the number n with 2,3 and odd numbers of the form $6k \pm 1$ (k>=1) less than or equal to $\sqrt{n}$. But, the time complexity for executing this is exponential ($O(2^{n/2})$), to the size of n and is not acceptable for large numbers. Let's compute for a sample. If we assume, a supercomputer can execute 10^{16} iterations in one second and we run this program 24x7x365 hours, it would not have completed till the moment, even if we started at the big-bang to check the primality of largest prime known till date.

The question therefore is, how is the primality of such large numbers checked?
Methods like Fermat's Little Theorem and Miller-Rabin test exist, but there is a slight probability of error associated with them.

Lucas-Lehmer test, developed by Édouard Lucas and improved by him and Derrick Henry Lehmer is used to check the primality of special types of numbers known as Mersenne numbers. These are the numbers of the form $2^n - 1$. Under this test, a Mersenne number, $2^n - 1$ is prime, if and only if, n is odd prime and (n-1)th element of the Lucas-Lehmer sequence (given below) is divisible by the number.

The Lucas-Lehmer sequence is given as –

$L(i) = 4$, $i = 1$

$L(i) = (L(i-1))^2 - 2$, $i > 1$

The sequence grows very fast. First few elements of the sequence are 4, 14, 194, 37634, 1416317954,..... So, instead of first calculating the (n-1)th element of the sequence and then checking it's divisibility. We keep on passing just the remainders from ith iteration to (i+1)th, which makes calculation somewhat fast.

Let's check the primality of 2^7-1.
2^7-1 = 127, n = 7
L(1)=4
Incrementing till L(6) by taking remainders from one iteration to next.

4 mod 127 = 4   ...L(1)

4^2-2 mod 127 = 14 mod 127 = 14   ...L(2)

14^2-2 mod 127 = 194 mod 127 = 67   ...L(3)

67^2-2 mod 127 = 4487 mod 127 = 42   ...L(4)

42^2-2 mod 127 = 1762 mod 127 = 111   ...L(5)

111^2-2 mod 127 = 12319 mod 127 = 0   ...L(6)

As L(6) mod 127 equals zero. 127 is a prime number.

This is the main idea behind the construction of GIMPS's algorithm, which is generally used to find large Mersenne primes. GIMPS gives thousands of dollars as prize money for finding large primes to the enthusiasts.

An algorithm for primality checking of all types of numbers is also of theoretical interest known as AKS primality test, founded by IIT Kanpur's professors named Manindra Agrawal, Neeraj Kayal and Nitin Saxena, in 2002. It is a generalization of Fermat's Little Theorem polynomial. It states that a number n is prime if all the coefficients of polynomial $(x - 1)^n - (x^n - 1)$ are divisible by n. This algorithm runs in polynomial time with the size of n. AKS's correctness is based on the generalized Riemann Hypothesis. It is not much used in practice as other fast algorithms also exist which works on a particular type of number.

Some amusing facts :

The largest prime found without using a computer is, $(1/17)*(2^{148}+1)$ (a Proth number). It was found by Aime Ferrier, using a mechanical calculator and Proth's theorem.

The largest prime checked just by hand calculations is 2^{127}-1. It was done by Lucas using his Lucas-Lehmer sequence.

It is difficult (but scientifically possible) to remember all the digits of the largest prime known till date in decimal by humans. But you may remember it in binary!

THE **SLOWLORIS** ATTACK

Abhinav Kumar
MSC I Year

"Slow loris are very slow animals, so slow that you might believe you were watching a video in slow motion!"

Imagine yourself standing in a queue at the checkout of a shop. The person at the checkout can only handle one customer at a time. As casually as you're waiting for your turn to come, you see people cutting in line before you and that too for no reason other than to disrupt the queue being served. They aren't even legitimate customers, they just don't like you. Refuting you service is their only aim. This is known as **Denial of Service(DoS)**

In the world of computer science, DoS attack is a cyber-attack in which the offender renders a network or a machine inaccessible to legitimate requests from a client usually by flooding the server with overwhelming traffic.
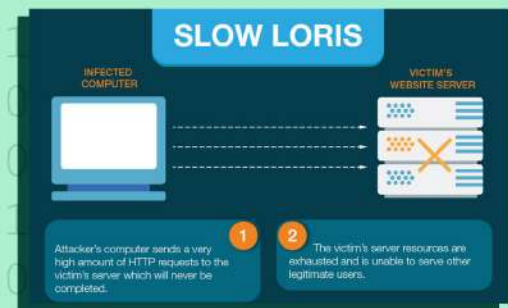
Let's talk about a DoS attack mechanism, famously used by protestors during the 2009 Iranian presidential elections to bring down government-owned websites.

When you open up your web browser and enter a URL, you are basically communicating with a computer(called the server) and making a few GET requests over HTTP. For illustration,

get me **index.html**

The server on receiving this, responds by sending the file, thus marking the end of the conversation. This simple mechanism is what an attacker takes advantage of in the Slowloris attack. Any connection made with the server is allowed to remain idle only for a specific amount of time. The server maintains a connection-timeout header to keep track of this.

Slowloris establishes a connection, requests something from the server and then goes to sleep. The moment the connection exceeds its time-limit and the server is about to break it, the Slowloris attacker sends something more. It could be anything, even a partial request. Its only aim is to tell the server that the connection is still alive. The socket through which the server and the attacker were communicating ends up withheld. Imagine the same scenario with hundreds of sockets! The server will keep on serving these time-consuming requests.

SLOW LORIS

INFECTED COMPUTER

VICTIM'S WEBSITE SERVER

1 Attacker's computer sends a very high amount of HTTP requests to the victim's server which will never be completed.

2 The victim's server resources are exhausted and is unable to serve other legitimate users.

This results in the affected server having its connection pool completely exhausted. As a consequence, it won't be able to serve a legitimate request. This is what makes Slowloris a Denial of Service(DoS) attack. The beauty of this attack is that it only occupies a fraction of bandwidth on the attacker's end. Also, compared to other DoS attacks, Slowloris is very hard to detect because there is nothing wrong with the requests it sends. The server just assumes that the requesters have a really bad internet connection which is a fairly normal occurrence. Apache web is more prone to this attack because it makes a new thread for every new request. Thus, Apache has a limit on the number of concurrent connections it can handle.

The communication will work perfectly fine if requests come and go, but this is precisely what the Slowloris prevents!
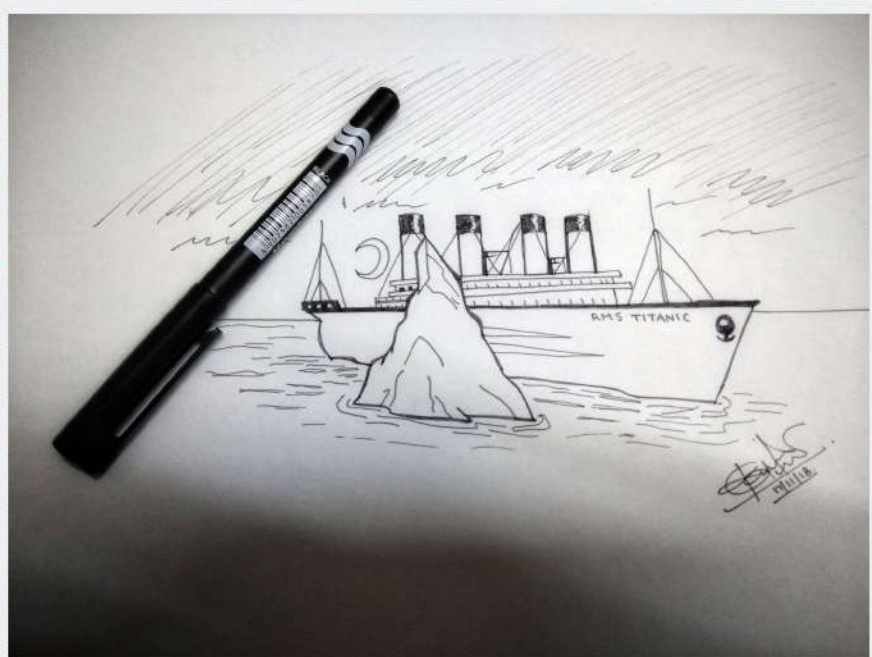
EXPRESSIONS

SURBHI MITTAL
MSC II YR

TANISHA GROVER
MCA 1 YR

JAIDEEP SAGAR
MSC II YR

RMS TITANIC

VIPIN KUMAR
MCA II YR

JAIDEEP SAGAR
MSC II YR

December 15, 2018

SURBHI MITTAL
MSC II YR

TANISHA GROVER
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VIPIN KUMAR
MCA II YR

If Only

If there would be an ocean,
I'd have crossed it.
But there were eyes
in which I drowned.

If there would be a sky,
I could have touched it.
But there was a soul
I could only sense.

If there would be a mountain,
I could have conquered it.
But there was a person
I want to live.

If there would have words,
I could have said them.
But there were emotions
I could only feel.

Life is short, good moments are few.
But I can only see you as,
A pretty beautiful flower
and a drop of dew.

—Vipin Kumar

MCA II Year

There Was a Time

There was a time when life hit you hard
And the other day you cherished it to the fullet.

There was a time when you presumed that angels are real
And the other day you felt that sometimes monsters win.

There was a time when you were angry, ill mannered, raged
And the other day your heart melted by new born's contact.

There was a time you ran after power
And the other day you felt reassurance in your mother's lap.

There was a time you felt demons inside you
And the other day you were envoy of God.

There was a time you did things intentionally
so that one can feel extactly what you have felt
And the other day you forgave them.

There was a time when you were concerned about others
And the other day you choose yourself over others.

There was a time when you cried it loud
And the other day you killed the pain inside.

There was a time when your friends turned into your foes
And the other day you hug the strangers.

There was a time when you gave up
And the other day you wore an armour and fought like a knight.

Sometimes you ask Sometimes you give
Sometimes you loose sometimes you win
There was a time and there will be
Just hold the breath and dive into it...!!!

— Aditya Thakur
MCA I Year

My Life, My Choice

Life is a roller coaster ride of ups and downs,
You can choose either to be a king or a clown.

The path to your dreams might be full of thrones,
Have courage and live your life the way you want.

A time may come when you're broken or shattered,
When you just have lost your precious battle.

That shall be the time to prove the strength in you,
Don't worry, the potential to face it all is within you.

Neither good nor bad times, for long, shall stay,
So take charge of your life before it's too late.

Arise, awake, act and stop not till you reached the goal,
Else the regret shall later overpower your soul.

You can do anything and everything only if you believe,
Think, work and success will be what you'll achieve.

Not immediately but definitely you'll get it one day,
Have faith, be patient and you'll see success coming your way.

Dreams come true by wanting them from the bottom of your heart,
And giving them everything that you've got.

For thoughts have the power to become reality,
A beautiful reality that is in your hand and not of the almighty.

Everything happening around has a reason behind it,
Just live it, love it, feel it and learn from it.

Break free the chains and live life to the fullest,
Take risk without regrets and give everything your best.

Life, itself, is the greatest blessing,
That God has given us to enjoy everything.

We must be grateful for the experience that come our way,
And to the people who help us to live our life everyday.

—Tanisha Grover

MCA I Year

मुझे मुझसे प्यार हो रहा है।

किसी तस्वीर में नहीं, आईने मे देख शर्मा रही हूँ,
बैठे बैठे खुद के ख्यालों में मुस्कुरा रही हूँ ,
अब मुझमें, मैं मुझसे थोड़ा ज्यादा हो गयी हूँ,
मैं खुद की चाहत मे खो गयी हूँ।
कुछ अनकहा, कुछ अनसुना सा हाल हो रहा हैं,
मुझे मुझसे प्यार हो रहा हैं ||

मैं अपनी ही जुल्फों से खेल लेती हूँ,
मनचाहा तोफा भी खरीद लाती हूँ,
मैं खुद से दिन भर बातें करने लगी हूँ,
मैं खुद को थोड़ा बेहतर समझने लगी हूँ,
वो कहते हैं, मैं तनहाई में गुम हो गयी हूँ,
देखो ! मैं तनहा नहीं,
बस खुद की चाहत में खो गयी हूँ।
कुछ ज्यादा ही खुबसूरत समा हो रहा हैं,
मुझे मुझसे प्यार हो रहा हैं ||

वो चाँद सी बिंदी माथे पर लगी हैं,
आँखो में काजल, होठों पर लाली खिली हैं,
झुमको की झनझन में मन उलझ रहा हैं,
पायल की छनछन में दिल ठुमक रहा हैं ,
नज़र का टीका लगा,
मैं खुद की नजरों से खुद को बचा रही हूँ।
वो कहते हैं, मैं पागलपन की सीमा पार कर गयी हूँ,
देखो ! मैं पागल नहीं,
बस खुद की चाहत में खो गयी हूँ।
खुद के लिए ही करु श्रृंगार, अब ये रोज हो रहा हैं,
मुझे मुझसे प्यार हो रहा हैं ||

अब खुद से इज़हार कर रही हूँ,
खुद के ही इक़रार का इंतजार कर रही हूँ,
मुझे मुझ-सा कोई मिलेगा नहीं,
दिल को समझा रही हूँ।
प्यार भरी मुलाकातों में भी अपनी ही कहती और
सुनती हूँ,
उन खतों पर भी जाना पहचाना पता लिखती हूँ,
मैं खुद की तारिफे,
बार बार खुद को ही पढ़ती हूँ।
वो कहते हैं, मैं नियमों को भूल रही हूँ,

देखा ! मैं भुल्लकड़ नहीं,
बस खुद की चाहत में खो गयी हूँ।
मेरे हर लाल गुलाब पर मेरा हक हो गया हैं,
अब तो तय हैं,
मुझे मुझसे प्यार हो गया हैं ||

-Rajni Dabas
MSC II Year

Farewell 2018

GLIMPSES OF SANKALAN

Sankalan 2018

Freshers 2018

SkIT '18

PANCHAY'18

Skit + Diwali Night

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