



SEPTEMBER 2021

EXERGY

MAGAZINE OF SIME, BIT MESRA

MUST LEARN
SOFTWARE SKILLS
TO EXCEL IN
INDUSTRY 4.0

MACHINES THAT
CHANGED THE
WORLD

SIME EXCLUSIVE
EVENTS AND RESEARCH
PROJECTS

THE FLYING CARS

DATA SCIENCE ROADMAP

RESEARCH
PROJECTS AND
ACHIEVEMENTS

INNOVATE, INCULCATE AND INSPIRE

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I am immensely pleased to go through the first edition of 'Exergy' by Society for Industrial Management and Engineering (SIME). A magazine is not just a periodical focusing on certain articles of interest but is like a curated documentation to take a glance at the events conducted, research published and all other activities done by our enthusiastic students in an ongoing semester within their domain.

Once again, I extend my heartfelt congratulations to the whole editorial team of SIME and to every contributor for the successful publication of their very first magazine.

Prof. Anand Kr. Sinha
(Dean of Student Affairs)

It gives me immense pleasure to know that the Society for Industrial Management and Engineering (SIME) is going to publish the very first edition of their magazine 'Exergy'. It is a very well-thought-out initiative. The title emanates positive vibes that would surely motivate the readers to derive maximum energy from its content. This magazine stands as an excellent digital platform to showcase the events of the society and the creative writing skills of its members on the latest technological developments while justifying its title. Congratulations to the team behind this publication, the editorial members, and the contributors for their hard work and commitment. I wish great success to the magazine and hope it is well appreciated by its readers.

-Dr. L.N. Pattanaik
Faculty Advisor

Since the beginning, the Society for Industrial Management and Engineering has firmly stuck to the motto of 'Innovate, Inculcate, Inspire'. This magazine is a part of that very objective of inspiring the student community and fostering in them an awareness of the dynamic industries, through various amazing columns.

I still remember my early days in the society, when the members were assigned technical tasks, like learning trending industrial concepts and software skills. It may have felt tedious then, but now when I look back, I could see how crucial it has been in helping me develop an industrial aptitude. My journey here isn't limited to just individual textbook learnings, it has been a lot more enriching than that. I, along with my mates at SIME, was involved in an interesting survey of 200+ professionals who were leading the industry at various fronts. We conducted a lot of events, workshops, interviews and worked upon technical articles as well. This magazine is the result of all those insightful experiences that were gained in those months.

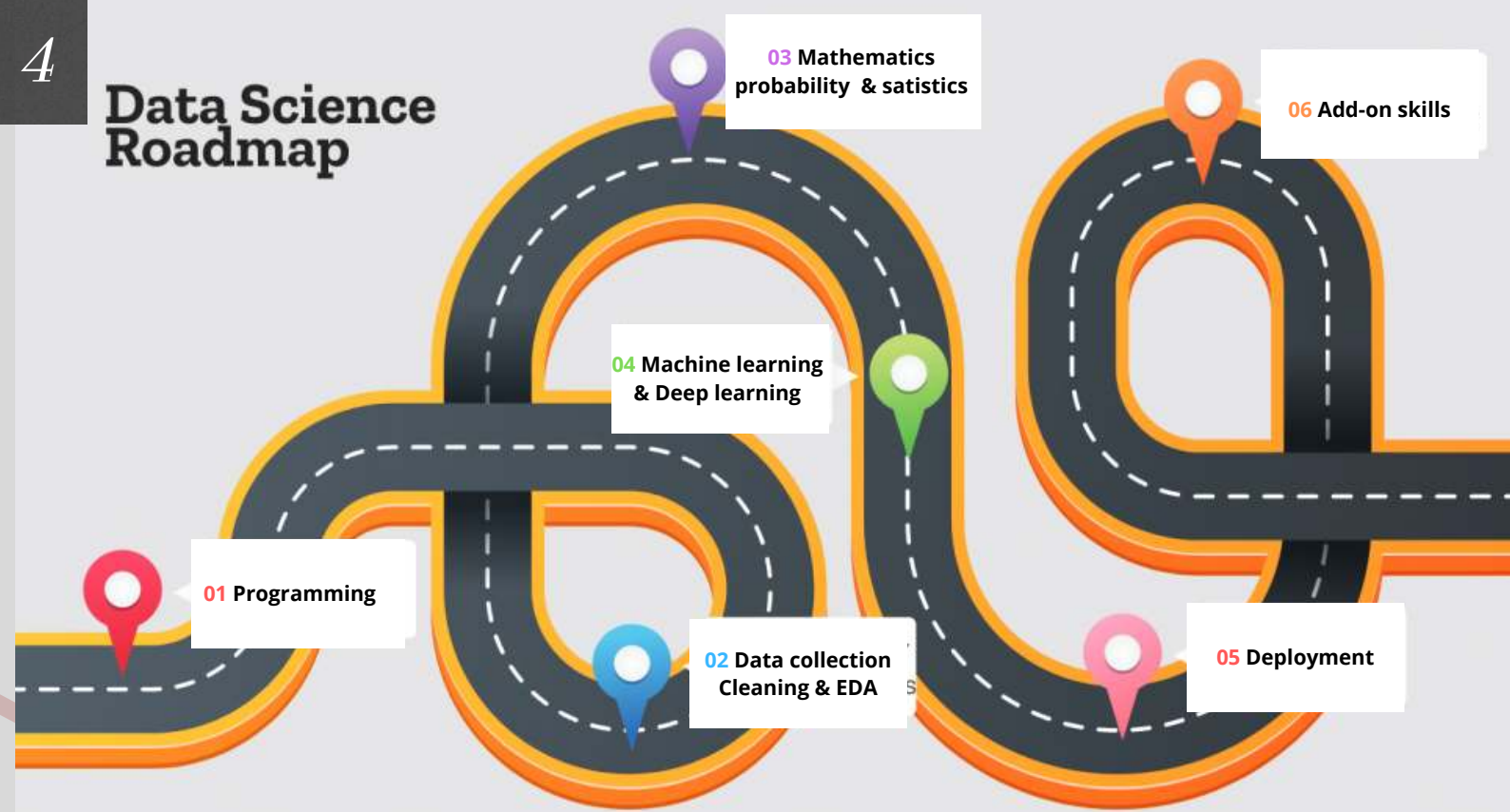
Be it taking new responsibilities, making new connections, or handling the juniors (the toughest!), each one of them has helped me in evolving myself. It thrills me to be working with such brilliant minds here, who have been instrumental for the society's general operations and the formation of the very first edition of Exergy. I would like to express my gratitude to each of those hard-working members whose collective efforts have created a first-of-its-kind content.

'Decrease in Exergy Principle' states that all the real processes see a decrease in their exergy. Likewise, this magazine is going to reduce its exergy to enhance yours.

Happy binge-reading!

Rishi Raj Barnwal
President
SIME, BIT Mesra

Data Science Roadmap



Why Data Science?

Why should anyone do Data Science without knowing what it is? If you are planning a career in DS just because it is "the sexiest job of the 21st century", then you must reconsider your options. You need to understand 'WHY?' you want to learn Data Science in the first place. You need to set a goal for yourself. Do you have to learn it because you are passionate about it, to build an academic project, to make a career out of it, whatever you set is fine. Just be clear about your goals. This will enable you to set the right pace and attitude towards learning any new skill.

What is Data Science?

Data science is an interdisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data, and apply knowledge and actionable insights from data across a broad range of application domains (according to Wikipedia). To be concise we use DS to analyze any data to extract insights from the data and solve complex business problems. I recommend reading articles or seeing videos that explain the essence of the job of a Data Scientist on a daily basis.

Recommended article -

Roles of a Data Scientist by Sequoia Capital.

Recommended video -

Data Science explained in 5 minutes.

Now let's discuss the skill set required to break into the Data Science realm.

1.Programming

To analyze, visualize or manipulate data in any way we need to understand how data is structured and basic algorithms. For this we need to first learn the basics of a programming language like Python, R, Julia, Java or any other.

Recommended Language - Python. Python is the most in-demand language for Data Science roles. Moreover, it is easier to learn and apply.

Topics to know in Python :-

- Data Structures and Algorithms
- OOPs (Object Oriented Programming)

Resources:-

- [Learn the basics of Python](#)
- [Data Structures and Algorithms in Python](#)

Projects :-

- Tic-Tac-Toe
- Hangman

[Estimated time 2-3 Months]

2. Data Collection, Cleaning & EDA

Majority of work of a Data Scientist is to collect and clean the data. we need to transform data into a more clean format so we can analyze it and perform algorithms on, it. we need to perform Exploratory Data Analysis(EDA) which is analyzing the cleaned data to summarize its main characteristics, handling outliers and univariate and multivariate analysis.

Topics to know :-

- Web Scraping
- Databases
- APIs
- Data manipulation and cleaning
- Data Visualization
- Develop dashboards

Resources :-

- [Web Scraping Basics](#)
- [SQL](#)
- [NumPy, Pandas & Data Visualization](#)
- [PowerBI](#)

Projects :-

- Web Scraping sports data or stock prices.
- Using [Twitter API](#) to extract data and clean data.
- Make data visualizations of the data collected
- Dashboards using PowerBI

[Estimated time 3-4 Months]

3. Mathematics, Probability and Statistics

Mathematics is the grandmother of Data Science and Machine Learning. Mathematics forms the backbone of every algorithm, library and tool we use in Data Science. Hence, it is essential to understand the Mathematics behind it.

Topics to know :-

- Linear Algebra and Multivariate Calculus
- Probability
- Statistics

Resources:-

- [Linear Algebra and Calculus](#)
- [Probability](#)
- [Statistics](#)

[Estimated time 2-3 months]

4. Machine Learning and Deep Learning

Now comes the most awaited and exciting part of this article. Machine Learning and Deep Learning algorithms will be used to analyze, predict and solve problems we were trying to answer using the data.

Topics to know :-

- Supervised Learning
- Unsupervised Learning

- Overfitting and Underfitting
- Artificial Neural Networks
- Conventional Neural Networks
- Recurrent Neural Networks
- Scikit-learn, PyTorch, Tensorflow or Keras
- Recommended - Scikit-learn + Tensorflow.

Resources:-

- [Hands-On Machine Learning](#)
- [Scikit Tutorial](#)
- [Deep Learning Tutorial](#) by fast.ai

Projects :

- Disease prediction
- Fake news detection
- Music recommender
- Sentiment analyzer
- Colourizing

[Estimated time 5-6 Months]

5. Deployment

After making such wonderful projects solving complex problems we don't want our projects to die in the Jupyter Notebook itself. Now, we need to learn the basics of web development and cloud computing technologies.

Topics to know :-

- Website Development, Git, Heroku

Resources:-

- [HTML](#)
- [CSS](#)
- [Git and GitHub](#)
- [Flask](#)
- [How to deploy](#) (using flask)

Projects:-

- Responsive Website
- Deploy your ML model

[Estimated time 4-5 months]

6. Add-on Skills

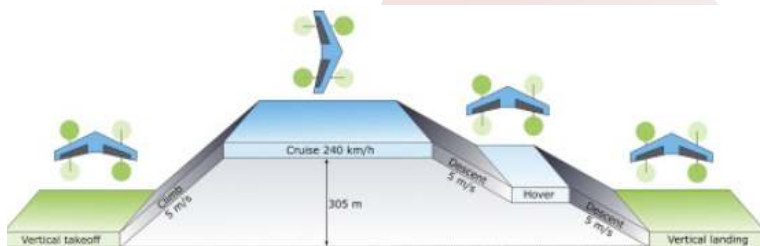
To put the cherry on the cake one should look to gain domain knowledge of the sector you want to work in. Honing your communication skills won't be a bad thing to do ever. After all, a data scientist is supposed to communicate the insights drawn from the data.

Career Opportunities

By successfully adding value to business models by obtaining meaningful insights from large piles of data, data science jobs have witnessed a promising growth over the past few years. There are plenty of competitive analytical companies in India which have shown tremendous growth globally across the multiple industries using the emerging data science.

The Flying Cars

Motor vehicles powered by internal combustion engines emerged in the late 1800s, which led a revolution in public and personnel transportation. In the present world the entire globe is connected through a vast infrastructure of routes which are traversed by a fleet of cars, trains, trucks, planes, and ships. This Mass transportation led to the globalization of economies, helped companies to ease supply chain management and brought high quality of lifestyle among peoples. But this mass transportation based on the use of fossil fuels are facing problems like meeting growing demand for convenient passenger mobility while reducing congestion, alleviating emissions, improving safety, growing urban populations, land space limitations, and high infrastructure development costs. As countries need to spend huge amounts on building infrastructure like roads, bridges, highways, and ports to keep up with current projected growth (according to one report the world will spend 18.7 trillion dollars between 2016 and 2030 on such infrastructure). Such challenges for the future of ground-based transportation can be solved by the concept of flying cars. Flying cars are no longer confined to the realm of fiction, but are in active development today.



The use of aerial vehicle systems is a way to use aerospace for personnel transport. Common types of aerial vehicle systems include the quadrotor (quadcopter) and helicopter systems. As it is not practically possible to build airplane runways and helipads on every corner, so aerial vehicle systems like a helicopter, mini aircraft cannot be used, realizing this Vertical take-off and landing (VTOL) aerial vehicle systems are a better choice. Due to high durability and maneuverability in real-life applications, Vertical take-off and landing (VTOL) aerial vehicle systems are a better choice. The quadrotor system is a typical example of a VTOL aircraft. Aerial vehicle systems find practical applications in both civilian and military applications.

The Flying Taxi



German Company Volocopter performed the first flight of its electric air taxi in France for 3 minutes with no passengers on board. It flew a 500 meters route and speeded up to 30km/hr and soared 30 meters high along the airfield. It has a luggage compartment and a capacity of two people onboard. The flight will be fully automated over a period of time. In 2024 customers will be able to book their flights using dedicated smartphone apps.

Motorsport in the Sky

Airspeeder MK3 is the first electric flying race car that has taken flight in Australia.

It is a four-meter-long multi-copter craft based on the formula cars. It has a greater thrust-to-weight ratio than an F-15 Fighter plane. The pilots will remotely race on augmented reality sky tracks visible to an audience watching via digital stream. The company is aiming to hold races with these futuristic vehicles later in the year. The successful execution of these flights means that the first aerial Grand Prix using the craft should take place in 2021 at three soon-to-be-revealed international locations.

“Flying cars will not only redefine how we travel but they will also change the face of racing games.”



3D PRINTED HOUSE

India's first 3D printed house built by TVASTA Manufacturing Solutions Pvt. Ltd. The house has a built-up area of 600 square feet. It has a bedroom, a hall, and a kitchen. It is designed by using software and printed by using concrete 3D printing technology.

It is made up of a mix that is based on ordinary Portland cement, which has a lower water-cement ratio.

Though concrete is the primary material typically used in construction projects, it cannot be recycled and requires a lot of energy to mix and transport.

“Using this technology, a new house can be made in just five days against five or six months. It can also reduce the cost by around 30% and the life of the building can exceed 50 years. The process of 3D printing houses is more efficient in terms of energy and material usage when compared to traditional construction. 3D printing houses generate less waste as they use only the required amount of material to build structures



So, the team aims to use technology to print the house using Portland cement that can “overcome the pitfalls of conventional construction.”

TVASTA is an IIT M Alumni start-up founded by Adithya, Vidyashankar, and Parivarthan. It was their final year project that led to seeing TVASTA, as a company that had capabilities to deliver world-class industrial 3d printing solutions. The centre of innovation was to build innovative products using 3d printing and spreading awareness about the technology. Now the team has rapidly expanded into a diverse team of engineers and researchers working on machine design, software development, electrical engineering, and material science.

The Seven Machines that Changed the World

Think of the modern marvels which had made our lives so much easier, think about how centuries ago someone under the light of a burning candle made it possible, think about how many times that one device went through re-engineering". Here we present you with some of the inventions which had shaped the working of various machines that we use today and how without these machines we were not even closer to printing a single text on paper.

1. Gutenberg's Printing Press

Printing was a strenuous task before the printing press was invented. Scribes were used to produce multiple copies of the same text, this was time consuming and expensive only the rich and powerful could own books. Newer ideas were suppressed easily as there was no way of disseminating them faster.

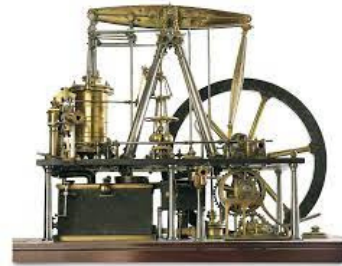


The printing press invented by Johannes Gutenberg. This invention fueled what we today call the Renaissance. Europe became a hotspot of new ideas and inventions began disseminating their work, with time more and more people were able to buy books and read them. The hegemony of the church began to decline as people began questioning various aspects of religion, ideas of Martin Luther began the protestant reformation. Britain led the Industrial Revolution as they had adopted protestantism hence were more open minded towards newer ideas. In a pre-Reformation Europe, this would have allowed those interests to petition the Church to suppress these

innovations as dangerous to the existing religious and social order. The role of the printing press in bringing about such far reaching changes truly represents the power of collective knowledge and novel ideas.

2. Steam Engine

World needed a machine that could provide work remotely by consuming easily available resources (at the time of development) like fossil fuel and water.



This led to the initial development by Hero of Alexandria followed by Thomas Newcomen and finally successfully developed by James Watt with improvements that made the machine much more efficient for wide industrial use. This invention found a widespread application during the industrial revolution by powering the transportation both in railways and waterways. Steam became a major source of power and cities started developing near the steam power plants. Even today, the livelihood of mankind is very dependent on the Steam Engine.

3. Telegraph

Developed in the 1830s and 1840s by Samuel Morse (1791-1872) and other inventors, the telegraph revolutionized long-distance communication. The electric telegraph transformed how wars were fought and won and how journalists and newspapers conducted business. Rather than taking weeks to be delivered by horse-and-carriage mail carts, pieces of news could be exchanged between telegraph stations almost instantly. The telegraph also had a profound economic effect, allowing money to be "wired" across great distances. It was the first time in history that information could be transferred instantaneously. It played a major role in the U.S civil war as it allowed generals and the President to have more immediate

contact with the battlefield, giving leaders, both military and otherwise, a more active role.



It was the beginning of a revolution in communication which will go on to inspire generations of inventors to bring the world closer using information to forge it into a single interconnected whole.

4. The Dynamo

In 1876, Charles F. Brush developed the most dependable generator of the time. Dynamos were the first electrical generators that were capable of providing electricity to the industries and were the basis for many other electric-power conversion devices, including electric motors, alternators, and rotary converters. This invention had a huge impact on the Industrial Revolution as it directly led to the first major industrial use of electricity. The electricity generated by the Dynamo was in turn used to power machines, such as used to manufacture mechanized fabrics and hardware (such as nuts and bolts). In addition to this, the dynamos were able to provide a steady power supply that led to the emergence of power grids that could efficiently and effectively distribute electricity in different sectors of the industry resulting in faster and more cost-effective production. Dynamos are still being used in some low power applications. Hand-turned dynamos are utilized in clock radios, portable lamps, and other manually operated devices to re-energize the batteries.

5. Camera

History of cameras dates back to the 11th century when Camera Obscura was developed. The machine found its mainstream industrial application after the development of Photographic Camera. At the early stages, the camera gained popularity from its applicability in enhancing information exchange across the world. In industry, it was being popularly used for micromotion studies to understand the scope of improvement of worker's motion.

Today, the camera is one of the core components of the industry as it finds its application in automation, machine vision, quality inspection, deep space scientific studies, surveillance and a lot more. At a personal level, cameras have become a basic necessity of humans for information exchange and communication.

6. Babbage's Analytical Engine

The very famous Analytical Engine of Charles Babbage that wasn't completely constructed but the idea shook the world. Generally known as the world's first computer, this beauty had general purpose computational features and was the first device ever in the history of mankind to be regarded as Turing complete. Operational structure of Babbage's mechanical computer is similar to the computers that dominated the world later in the third industrial revolution.

7. Spinning Jenny

In the 1770s, James Hargreaves invented the Spinning Jenny which brought a notable change to the destiny of the textile industry. Prior to this, weaving was done at home and the cotton producers had a tough time meeting the demand for textiles as each spinner could produce only one spool of thread at a time. But the invention of Spinning jenny took the cotton out of home into the workshops, and was no longer a 'Cottage Industry'.

The machine comprises eight spindles onto which the thread was spun from a corresponding set of rovings. Now the operator could spin 8 threads at once just by turning a single wheel. Hence the machine was able to do the work which would otherwise require 8 manual laborers together. Hargreaves' invention not only decreased the need for labor but also saved money in the transportation of raw materials and finished products. Due to which the cost of making fabric got reduced and the textile became more obtainable to a number of people.

The spinning jenny was widely used in the cotton industry until about 1810 when the spinning mule replaced it. However, it had a significant impact on the industrialization of the textile industry as it became a source of inspiration for many upcoming inventions.

Medium Articles

SPARK



SIME has its very own Medium Publication 'Spark', which is an excellent archive of insightful content covering wide-varying fields under the industrial umbrella. This section presents to you a few excerpts of those published articles, so read on!

1. ACHIEVERS' ARCHIVE

Achievers' Archive is a separate series of the society in which we provide our audience exclusive interviews of our senior team members who either got placed or got an internship in their dream companies and we also upload personal interviews of our team members who achieve something notable.

Questions to Achievers and their replies:

SIME: *What was the selection procedure for your company? Is there any particular advice you would like to give your juniors while preparing for PI?*

Achiever: Initial shortlisting is that which every company does. Sometimes it is based upon the GPA or sometimes they will ask you for a resume. Most of the companies go with GPA only, I had applied for Axis Bank, and there I was not able to clear the initial shortlisting round. Why? Because they remove all the people whose GPA was less than 8.5 GPA, sometimes these things can also happen, but you can easily clear the initial shortlisting round in most cases. Then you will have either an aptitude round or technical round. In DRL, I had a technical round and in ITC I had an aptitude round, so it depends upon the company what they want but mostly either aptitude or technical or mixed so work on both as that will help you.

Then some of the companies will also conduct GD and some will not but most of the core companies will take GD.

SIME: *Apart from CGPA, what other skills one should incur to make a strong CV/Resume?*

Achiever: If you want to impress your HR then you don't need to put skills just write those like what you did in Pantheon and Bitotsav he/she shall be happy but if you want to impress your technical people just put some good project either 1,2,3 or if you have one project only they will ask you from them so just try to convince them as much as you can. They will be more than happy and HR people will be happy with all your extracurricular activities that this person is capable of doing like team management and leadership management, etc. If you want to ace the questions of the technical people you must have a proper grip of your papers and if you talk about consultancy you should have a proper grip on consultancy systems. They will not look at your resume, they will go through that and point out some points from that. So if you want to have a positive influence on the technical people, try to work on projects and if you want to Impress your HR, work on extracurricular activities.

SIME: *What projects and competitions have you worked/participated in during your college years and how they helped in your placement and internship?*

Achiever— Since I'm not interested in Engineering research papers I didn't opt for any project under any of my Professors. I was more interested in the core part than the research part because research is something else than the core part. We participated in the Coimbatore "Formula Bharat", National competition for all the formula student teams in India.

SPARK

2. Five Must Learn Software Skills to Excel in the Fourth Industrial Software

Excel, SQL, and tableau- (These software's are very much essential in data analytics)

1. Excel organizes raw data into a readable format that makes it easier to extract actionable insights, calculations, and also big data can be studied and visualized more carefully.

SQL is used as the medium of communication with the help of a relational database management system. It also analyses the data by the data analysts, retrieves and updates the data records which are encompassed inside the database, and is also commonly used for storing structured data. Its main advantages are Speed and Well-defined standards.

Tableau - Tableau helps in simplifying raw data in a very easily understandable format, Data analysis is very fast with Tableau tools and the visualizations created are in the form of dashboards and worksheets, the best feature is data Blending, real-time analysis, and Collaboration of data. These three software's are made for data analytics

You can learn these at or from various courses Coursera.



www.excelerateclasses.com available on Udemy and

2. Matlab or MATrix

performance language for

computation, visualization, and programming

also capable of developing, testing, verifying, and exploring various algorithms.

This software can be learned from Mathworks, Coursera, MatLab youtube channel, etc.

Laboratory is a high-

Technical Computing. It integrates in an easy manner. Matlab is

3. Python is a high-level, interpreted and general-purpose programming language, it has simple syntax, high readability, platform independence which makes it a valuable language for software and web development, AI, ML and processing big data.

This software can be learned from NPTEL, Youtube channels like freeCodecamp.org.

4. MS-Office is a software package of different productivity, business and office related work like documentation, presentation, graphic presentation, data management, etc. MS office is generally used in industries for a smooth-running system, higher productivity, better team communication, better data and files management, financial management, better security. It is one of the most important and frequently used applications in industries.

5. Computer-aided design (CAD) Computer-aided design is the use of computers to aid in the creation, modification, analysis, or optimization of a design. Mostly engineers and designers use cad software for 2-D and 3-D modeling.

There are several CAD software packages available like SolidWorks, Catia, Autocad, Altair Inspire.

This software can be learned from various platforms like Coursera, YouTube channel, etc.

3. The Amazon Phenomena

Amazon is a multinational, industry swallowing monster, big as an elephant and as agile as a rat. In the early '90s the internet was a very new technology, and many people were starting to have a sense of its potential and the role it can play in the future. And everyone was enthusiastic about the dot com company listed on the stock market. Most dot-com companies spent heavily to harness network effects to build market share or mind share as fast as possible, using the mottos "get big fast" and "get large or get lost". Jeff Bezos working in the financial sector was aware of the traffic these companies were attracting. For the first time in his career, he was witnessing growth rates as high as 2300% and was contemplating building something of his own and creating a space for himself in this booming industry.

In 1994 he started an online bookstore called Amazon.com from his garage and the seed funding was from his dad, who paid him \$245,573 after Bezos explained what the internet was. Amazon went public in 1996 and didn't make any significant profit initially for 4 -5 years. In 2001, the dot-com bubble burst destroyed many companies in the process, but Amazon survived and moved forward beyond the tech crash to become a huge player in online sales. The company finally turned its first profit in 2001. The profit margin, though extremely modest, proved to skeptics that Bezos' unconventional business model could succeed. As of now, amazon.com is one of the most valuable mega-cap companies on the NASDAQ exchange and have more than 68% portion in the e-commerce business. The company's price-to-earnings ratio was 116.25 in 2019. As a standard of comparison, Apple had a price-to-earnings ratio of 29.41.

Amazon's core philosophy led the company to be a multi-billion dollar company and made significant profits and remarkable growth. Amazon's philosophy revolves around customers, as they always say, "Obsess about customers, not competitors." Bezos has emphasized this repeatedly in all his speeches, some way or the other, and he ends up talking about the customer. It gives a solid vision for the company. Whenever it gets lost or has to make an important call, the single most important criteria also align with customer interests. A customer is not merely a person who buys from you once but one who is obsessed with buying from you. He would become an asset far better than any of The company's buildings, profits, or employees can be. Amazon is building their customer base on excellent service, reasonable prices, and innovation, all geared to accomplish one goal "How to give the customer the best buying experience they ever had." Efficiency in operations,

money flow management and other business practices makes Amazon so tight on its margin of error. One of the reasons why Amazon is so effective at innovation is because it's agile and experiments with new trends and technologies. Experimentation converts ideas into products, services, and even new business models. Amazon has a wide variety of technology and services, catapulting Amazon to the forefronts of innovation: PRIME, PRIME AIR, ALEXA, KINDLE, AND AWS.

To learn about more such ground-breaking researches, or just industry-related articles in general, tune in to our Medium Publication using the link below :

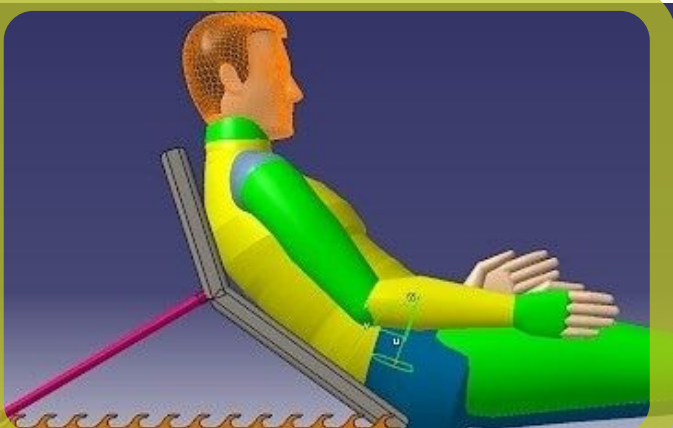
<https://medium.com/spark-by-sime>

SIME Lab Tales

Enjoy the ride through some of the interesting developments in our lab!

1. Problem of Vegetable Sellers and Bangle Makers Solved!

This product design and prototyping project was led by the senior researcher **Utkarsh**. He has designed an Ergonomic Ground Chair to solve the problem of small-scale industry workers who spend most of their work hours sitting on ground without any structural support to their back. The problem was identified and a very innovative design of ground chair was developed that is economical, space efficient, mechanically stiff and most importantly ergonomic. The product has been designed to support a wide range of user anthropometry and software as well as paper analysis has been properly carried out. As the name suggests, the chair can be put on the ground and can be reclined as desired by the user. There is a provision of adjusting the recline by using the easily operable slot system on the lower frame. The product is still in its pre-prototyping phase and will be manufactured once the COVID situation settles down.



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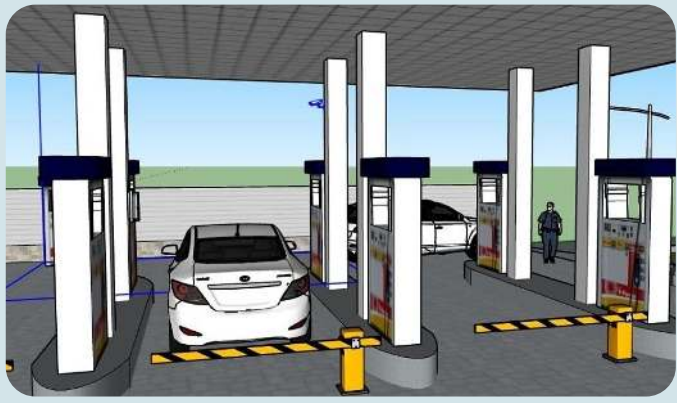
The magazine brings the column of SIME Lab Tales to showcase some of the major technological developments that have occurred at Society for Industrial Management and Engineering, BIT Mesra during the academic calendar 2020-21 by the society members.

Project Achievement : Awarded second prize in Institute Innovation Contest 2020 that was organized by Institute Innovation Council (a Ministry of Education, GoI Initiative), BIT Mesra.

2. Fuel Retail Industry Problems Troubleshot by SIME Members

This project was led by **Shivansh Goyal** with his teammates **Rumi Bharti** and **Utkarsh** at the Society for Industrial Management and Engineering.

The project was regarding the modification of fuel stations to make the operation possible with minimal touchpoints in times of pandemic. The calculations done in the project show that the operation will become cost-efficient under 3 years of the initiation. Apart from this, the team also brought a very interesting solution for fulfilling the power demand of Electric Vehicle Fuel Station by using renewable energy sources like wind and solar energy. The team developed the concept of a hybrid model that exploits the energy from both wind and solar sources. They developed a robust Business Plan for both their solutions after proper market study and customer survey.



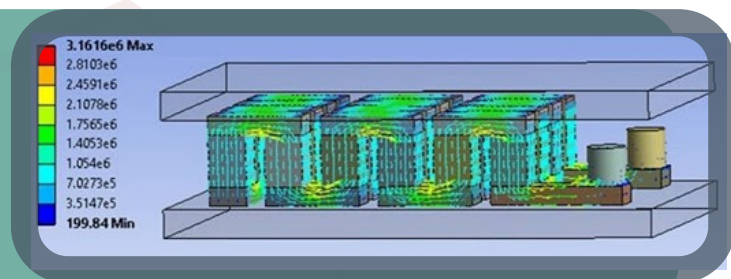
Project Achievement : Awarded second prize in Campus Innovathon 2020 that was organized by Gilbarco Veeder Root, India that saw participation in thousands from all over the country. Shivansh Goyal was also awarded with the title of 'The Best Presenter' in this competition.

3. Groundbreaking Innovation in Automobile Energy Recovery System

This project was led by **Ishan Kashyap** - a senior researcher at the society.

The project is regarding the Recovery and utilization of waste heat energy from an IC Engine equipped Automobile.

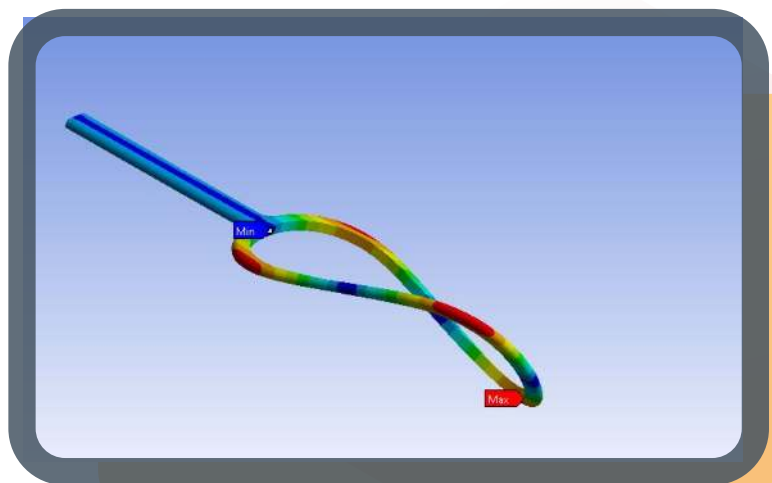
About 60% of the total energy of the fuel is lost in form of heat and the project aims to create an effective system that can recover almost 50%-60% of that lost heat energy and store in form of electrical energy in batteries which can be used to power other systems such as AC, lights, etc this method when merged with Kinetic energy recovery system, can be utilized in Hybrid Vehicles and could increase the range of a hybrid vehicle by almost 40%.



Project Achievement : Published in Weentech Proceedings in Energy (2021), Page 11-23, International conference on Innovative Development and Engineering Applications

4. Tennis Racket Design Being Re-Engineered!

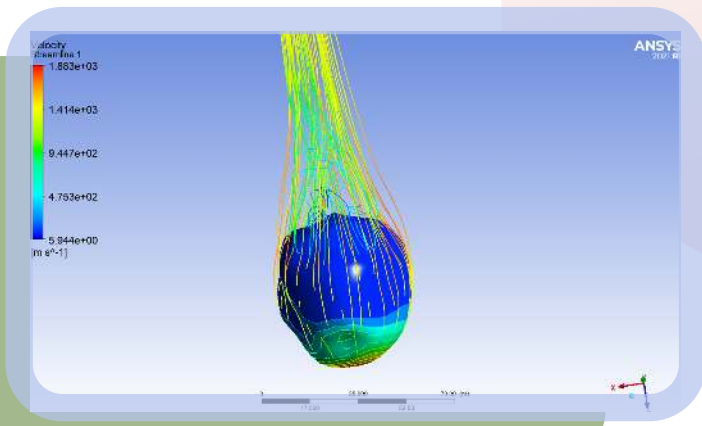
A team of senior researchers at SIME, BIT Mesra are analysing the vibrational aspect of tennis racket design. Rackets are subjected to a very high variation in impact load, angle of strike, velocity and more which makes it a very interesting component to analyse and optimize it's design that shall be stiff, light and should provide an exceptional 'feel' to the player.



In the picture, you see one of the modal shapes of a fundamental model of tennis racket design. Based on the analysis, design will be further modified and correlation between various factors and racket behaviour will be worked upon.

5. Engineering behind a Falling Asteroid Analyzed

This short project was completed by a team of senior researchers at SIME. The project focuses on the analysis of an asteroid entering our atmosphere using various factors such as temperature distribution, pressure distribution, velocity analysis, and density variation.



Such analysis can help in analysing the true mass, volume, and speed of the asteroid with which it entered the planet's atmosphere.

6. Lean Six Sigma Analysis of a Call Center

“Machine Learning techniques were used by a team of senior researchers at society to analyse the behaviour of customers calling a call center based on the time duration of the call.

This was part of a lean six sigma project in which they were trying to understand the underlying root cause behind the falling rating of a call centre (data provided by Institute of Business and Industrial Statistics of the University of Amsterdam). They found out a correlation of 0.7 between the time duration of a call and whether a customer hung up the call in between or the problem was solved. The analysis suggested that call duration needs to be further analysed and employees should be trained to conclude the call in a certain time frame.

7. Development a Mobile Drug Recommender System for COVID-19

This project was led by **Srijan Jha** - a Junior researcher at the Society for Industrial Management and Engineering.



The primary aim of the project is to develop an android application that would assist a patient in getting drug prescriptions based on what symptoms the patient is suffering from COVID-19. Recommender systems are among the many solutions used to obtain valid information. When searching for an item, users obtain a list of recommended results that may match their preferences. Several recommender systems for healthcare have been developed, the challenges recorded so far are that most of them are web-based. This project focuses on the design and development of a mobile recommender system for COVID-19. The main objective of this project was to design a mobile application system for patients that will be able to suggest or recommend drugs based on a listed symptom and to design a recommender algorithm that uses evolving rules using collaborative filtering modeling technique.

SIME MENTORSHIP AND TRAINING PROGRAM

SIME being a diverse club is solely committed to inculcate industry relevant Knowledge and overall development of all the fellows associated with it. Be it a student from the circuital, core, or student associated with any other college program, there is something for all of them according to their interest.

The research program lies in the foundation of the SIME, and we all know “common facts of today are the products of yesterday’s research “ so to bring out common facts for the future,

SIME has designed a sequentially arranged training and mentorship program which will help its fellow teammates to do so.

This program starts promptly for each of the teammates with their successful entry in SIME after passing the entrance test and interview.



Team members are divided into different groups based on their interests. They learn all the theories and research practices required for the particular area of interest, further validated by tests and quizzes. Successful students are promoted to the level of junior researcher.

At the level of junior researcher, students are fed with training courses, webinars, research papers and are equipped with the required software, which gives them a platform to test their

knowledge in a practical form which makes them ready and capable to initiate research projects according to their interests and choice.

Each researcher is further guided in all possible ways till the completion and publication of research papers by the Research proceedings sub team of society.

Software training done by our researcher this summer

Software’s had a tremendous impact on the world. They made engineering problems easy to solve, and getting a hand on this software helped our researchers excel in their research area of interest.

“

students were also provided with courses on various platforms like Coursera, EDX, NPTEL, Future skill prime, etc.



Summer Research Project

The Research Proceedings subteam aims to provide a platform for a diversity of intellectual pursuits from all corners of the society for the enrichment and enhancement of the members. Research proceedings subteam help to showcase society member research thoughts and explore their ideas maintaining research ethics.

Such a goal of society cannot be completed by working on a project.

To provide such technical & engineering management projects to members, the RP team starts the Summer Research Project program. This program is for junior researchers at SIME to work on their interested field, learn software skills and build a project in summer 2021.

The whole Research project is divided into 3 phases:-

Phase -1 consists of choosing a field of research.

Phase -2 consists of gaining software knowledge and skills.

Phase -3 is the project execution phase.

There are ongoing projects like -

- 1) Development of a mobile drug recommender system for covid-19.
- 2) To design a drone that will collect max solar energy through solar cells by using its efficient design and sensors So that it can get extra powered by solar energy during its work of animal husbandry till the sun shines on the field and hence its flight time will increase.
- 3) Finding the best optimal path to a destination from the current location and also to find the best food point in the route which can take orders and serve them in the best time based on live Traffic and time to reach it.

On completion of the project, Junior Researchers (K19) receives perks like -

- 1) A certificate of the completion of the project duly signed by professors.
- 2) Researchers will be eligible to get good recommendations from society if and when they need them.
- 3) Researchers will get a chance to get their papers published in good journals, a feat not achieved by many at the undergrad level.





Anvil

The event had four levels of questions, where each level had a different weightage. Beginning from level 1, the levels had 10%, 20%, 30% and 40% weightage respectively.

The Questions were primarily based on the "basics of mechanics" and "production lab" taught in 1st year so that enthusiasts, irrespective of their year and stream, could participate. The speed of answering the riddles was one of the essential factors for a walkthrough. Only the 1st 3 participants to answer correctly scored. The rest scored 0 even if their answers stood correct. It was a game of gold rush where the one who finds the mine earlier wins. After four days of an exciting quiz session, we got three winners, ending our first-ever event.

It was the very first online event organized by SIME on its social media handles and hence, holds a special place in the list of our events. It challenged the participants to solve riddles based on pictures and a few hints.

Code Industry Challenge

Code Industry Challenge: Season 1 was the first edition of what is going to be SIME's annual intra-college coding challenge for students. It focused on the problems related to industrial operations like sequencing of jobs in the factory, network optimization, transportation problems, game theory, and much more. Participants had to come up with effective solutions to automate the lengthy and tedious calculation process used in operations research and production management. It was a two-day-long affair organized on our social media handles.

As soon as the questions were posted, the participants had to submit their codes within 4 hours, where they had the liberty to use any of the programming languages among C, C++, and Python. Study links were also provided beforehand to the participants, to help them better understand the industrial operation management algorithms. The responses were evaluated solely based on the effectiveness of algorithms and the timing of submission. Every participant surely gave their best and fought for the top positions. It was even more tricky to evaluate such close fights which ended with a tie-breaker between two teams, but the team that submitted their program earlier eventually won the challenge.

Asta-Di-Autos

Watching Bidding Wars on Television is fascinating right? SIME organized a similar event by recreating the affairs of the Bidding War Room. Our event "Asta-Di Autos" invited the participants to enter the bidding arena as automobile tycoons, to buy and make the best vehicle they could using the auctioned parts.

To win this event, every team had to fight through 3 rounds. Round 1 was MCQ based quiz consisting of automobile and aptitude questions, where six teams qualified for the Finals. The Finals further consisted of 2 rounds. The first and the most exciting one was the bidding round, where seven different components with six varieties each were up for auction. These included Chassis, Tyre, Engine, Composite, Suspension, Transmission & Brakes. The teams had a fixed fund of 4,25,000 Tokens each and add-ons were charged with penalties. This was followed by the presentation round, where the teams had to explain the significance and application of the auctioned parts and how they were to be used in the construction of their super-vehicles. After the extravaganza, the teams were rated on how economical their vehicles were, evaluating the strengths, speed, and applicabilities, and the winners were thus decided!

EVENTS

Automobile and IC Engine Workshop

In today's new world, the automobile industry is growing at a fast rate. The demand for automobile experts and employees in these industries has been rising continuously. Observing the necessity of prior basic knowledge of this topic for students who are seeing their career in this industry in the future, the SIME club came up with the workshop on Automobile and IC engines so we can give a basic insight into it.

The main aim of this workshop was to provide a basic understanding of the functioning and design of automobiles and IC. Our experienced seniors took up the workshop session. It was a two-day virtual mode workshop conducted on google meet. Each day was scheduled to hold two well-curated sessions, each of 2 hours on Day 1 and one session of 3 hours on day 2, consisting of theory, live demonstration sessions. Fifty plus participants have attended the workshop.

Our speakers started the first session by elaborating the basics of automobiles and gradually we dig deeper into the concepts. We explained about chassis design, types of chassis (ladder frame chassis, tubular space frame chassis, Monocoque, frame chassis, etc), design optimization of chassis, and factors affecting chassis. After chassis, they go through the suspension unit, explains different terminologies like camber, caster angle, travel, types of suspension tires.

The second session starts with the steering system where they have discussed steering principles, steering mechanism(rack and pinion), power steering concept and they have also covered transmission system concepts(flywheel, clutch, and its types, gearbox, types of transmission, etc.).

In the third and last session, we come up with the topics like breaking units, fuel supply systems, IC engines. In the breaking unit, we explain about different types of brakes (disc brake, drum brake, etc), antilock braking system, power brake and in the fuel supply system and IC engine we cover fuel filter, carburetor, fuel injector, types of IC engine, 4 stroke engine, 2 stroke engine, engine layout and working, engine cooling

PGMFi, VVT-I, MPFi, CRDi, etc. One of the key factors of our workshop was that after the completion of every topic of the session we conducted a quiz for the participants. In addition, after the completion of all sessions, the student who has given maximum right responses in minimum time was awarded the best performer certificate. Certificates were also given to students who have attended all the sessions so that in the future they can add it in their resumes.

The workshop was all focused to give a brief understanding of automobiles, and engine working principles to the participants. This workshop was informative, beneficial, and can act as a base level knowledge for students who are keen and want to pursue their career in the automobile sector in the future.



Workshop Date: 23rd and 24th January 2021

Mode of Conducting: Online

Platform: Google Meet



“

In the academic year, SP-20 SIME had conducted 3 interactive webinars, where one speaker is working on Worly engineering and the rest two speakers were BIT Mesra alumnus, Aditya Singh, and Ishika Priya both of them are the students of the 2017 batch and earned a lot of experience during college as a student.

Teamwork and leadership, Emotional intelligence, and tools and technologies. He shared his views and encourage students not to be afraid of the pandemic as the situation will be better soon.

The first webinar was on planning and preparation required to excel industrial sector with speaker Shri Abhay Jha who is working in Worly engineering, Singapore. The webinar was concentrating on the pandemic to opportunity, Preparation, Crisis, Facts, and forecast, Global Intelligence, Critical thinking, Effective communication,



The second webinar was carried with the speaker Aditya Singh he talked about the role of education and training records in securing a placement offer on-campus and how one can process into the same. He explained that sometimes basic things are more useful than academic grades. He encouraged students to not give up soon.

FORMER SUMMER INTERN AT ISWPL

PLACED AT ITC LIMITED

FORMER GMO MANUFACTURING INTERN AT DR REDDY'S

FORMER STUDENT COORDINATOR AT TNP-SARC COORDINATOR

Aditya Singh Chauhan
Guest Speaker

FORMER VICE PRESIDENT, SIME, BIT MESRA

FORMER CAPTAIN, TEAM SR

SIME Society for Industrial Management and Engineering presents

Weekend Tea with Achievers.

SESSION 2.

Ishika Priya
CHEMICAL ENGG.

10th July
Saturday
06:00 PM



Another webinar was conducted with Ishika Priya she is a chemical engineering student at BIT Mesra, placed at Accenture as a data engineering analyst. She shared her experience doing work at Dr. Reddy's laboratory and how she ranked in the top 5 minds over matter. She said some meaningful lines in the session "Do not be afraid of failure because you deserve something better than this".

Me: turns up the power supply

LM234:

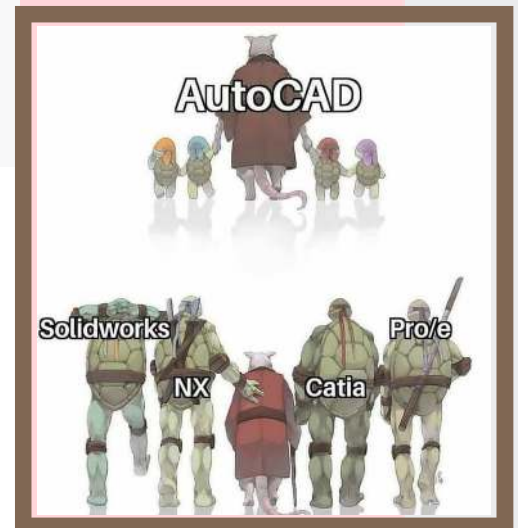
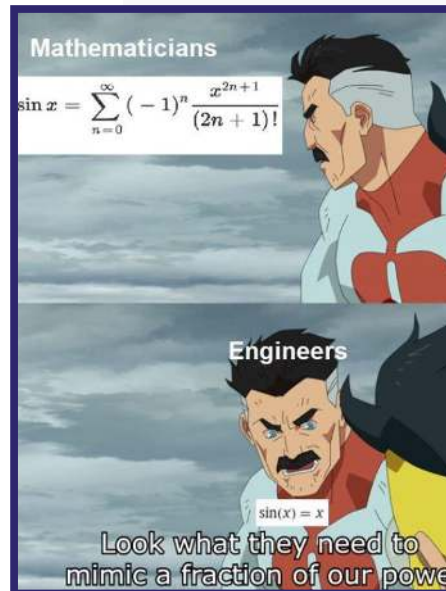


Teacher: How old are you?

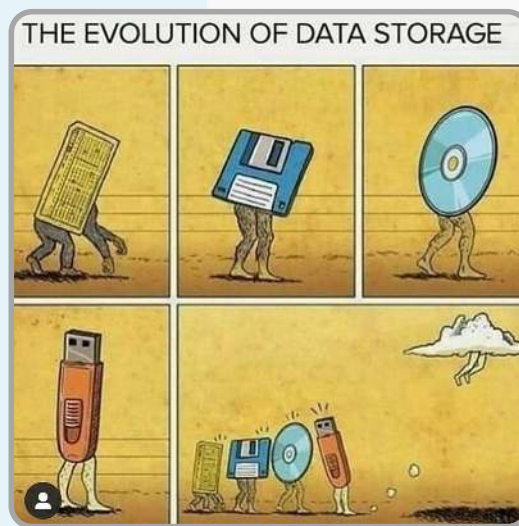
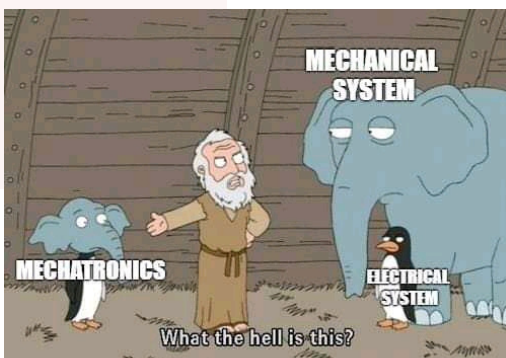
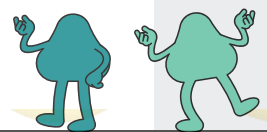
Me: 17

Teacher: Then why did you write 13.8 billion years?

CHNOLOGY_AND_PHYSICS101



MEMIES!



CROSSWORD



ACROSS

5. An anti-friction device that is located between two or more moving parts that allows them to slide against each other.
6. A technology mostly used to manage cryptocurrency which has a great future in the industry 4.0.
9. I am a traditional tool on which metal to be shaped is placed and beaten with a hammer.

DOWN

1. In the 1980s 3D printing was also known as _____prototyping.
2. Data_____uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data.
3. The commercial activity of transporting goods is referred to as what?
4. In the 1980s 3D printing was also known as _____prototyping.
5. _____operation is a process that limits an entire system's capacity to produce at its optimum level that results in clogging productivity, profitability, and growth.
7. _____line divides the manufacturing process of products which are completed in a pre-defined sequence.
8. _____production is a production technique that produces multiple units in a series of steps.

TRIVIA QUESTIONNAIRE

1. How much did the world's first computer weigh?

Answer: _____

2. If a person is sitting on 3000 explosions a minute, what is he doing?

Answer: _____

3. Which of these kitchen appliances were invented by mistake: Fridge, Microwave oven, Stove or Toaster?

Answer: _____

4. What was the first living creature intentionally sent into space?

Answer: _____



Campus Innovathon
(Engineering Track)



BIT, Mesra
Institute Innovation Contest



Finish in Hero Campus Challenge



Paper Published



Innovations Completed



Events Organized

Get In Touch!



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https://bit.ly/Linkedin__Sime



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INNOVATE, INCULCATE AND INSPIRE