SEP
2023

CIVILOHOLIC

BY DEPARTMENT OF CIVIL ENGINEERING

VOLUME
3

DR. B.C. ROY ENGINEERING COLLEGE

DURGAPUR

Editor's Message

Dear Readers,

Its gives us immense pleasure to announce the third edition of our departmental E-magazine '**CIVILOHOLIC**'. We are proud and hopeful that the magazine would surely unfold the most innovative ideas of the students and the faculty members of our organization.

The magazine is to be viewed as a launch pad for the student's creative urges to blossom naturally. As the saying goes, mind like parachute works best when opened. This humble initiative is to set the bored and budding minds free allowing them to roam freely in the realm of imagination and experience. The enthusiastic work of our young writers and experienced faculty members are undoubtedly sufficient to hold the interest and admiration of the readers. We believe that success depends on the power to observe, perceive and explore. The magazine comprises contents related to technical aspects of Civil Engineering as well as poems, photography etc. We are sure that the hard work, positive attitude, continued relentless efforts and inventive ideas exhibited by our students to bring excellence to this treasure of trove would surely stir the mind of the readers.

The herculean task of editing this magazine would not have been possible without the sincere support of *Prof.* **Koyndrik Bhattacharjee,** *Prof.* **Anupam Biswas** and the editorial team of 3rd year students **Shubhasis Paul, Rethik Das & Subir Ghosh**. It is a fine thing to have the ability but the ability to discover ability in others is the true test. I am thankful to all my co-editors who dipped in the turbulent water of the magazine and sailed it to the shore of publication. I am thankful to our *Head of the Department* **Dr. Sanjay Sengupta**, to give me the opportunity to be the editor of this magazine. Also I am thankful ***to Dr. Sanjay S. Pawar (Principal), Dr. K. M. Hossain (Vice-Principal)*** for their continuous support. I heartily wish all the readers my best wishes and hope this magazine will enjoy your critical acclaim and prove itself best.

SHUBHASIS PAUL
Chief Editor, Civiloholic
4th Year Student, Civil Engineering
DR. B.C. ROY ENGINEERING COLLEGE, DURGAPUR

OVERVIEW OF CIVIL ENGINEERING DEPARTMENT

VISION

To transform the department into a global center of learning through synergic application of understanding, creativity, innovation and discipline.

MISSION

Our core mission is to educate, inside and outside the classroom to achieve excellence in education and train the leaders of tomorrow.

Our undergraduate degree programmed aims to provide a great platform for learning by offering variety of subject choices covering broad/frontier areas of civil engineering.

OVERVIEW

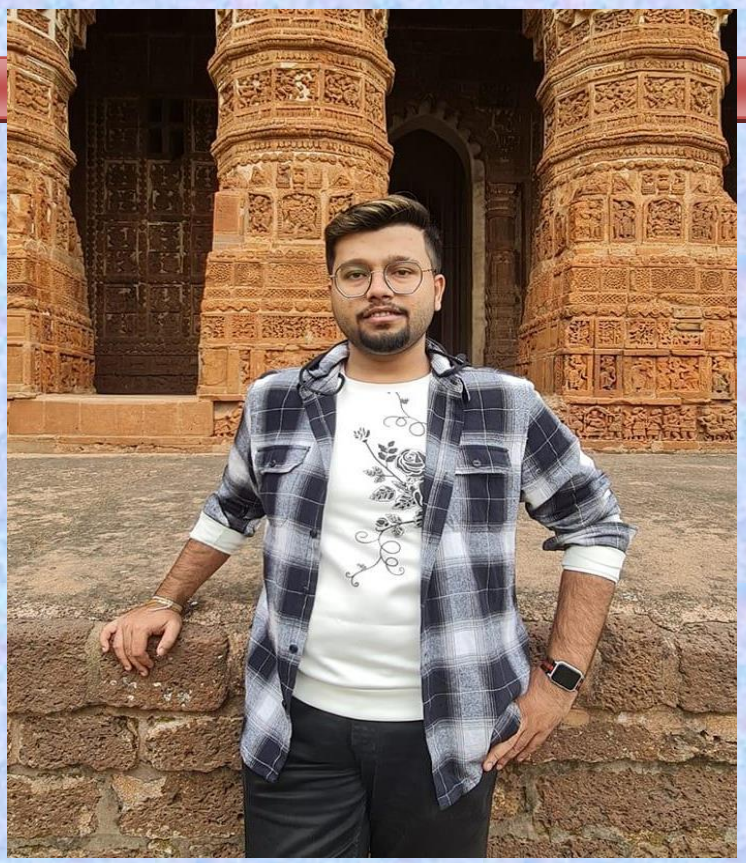
Civil engineers shape the physical environment from the cities and buildings we live in, the way we travel such as the highway networks, bridges, railways, tunnels, the dams and water systems, the power plants and transmission towers, and what not. Civil Engineering is a profession wherein the knowledge of mathematical and physical sciences, gained through the study and experiments, are applied to utilize economically the materials and forces of nature in the design & construction of appealing, functional and safe structures for the progressive wellbeing of humanity.

LABORATORIES

- **Solid Mechanics Lab**
- **Surveying and Geometrics**
- **Fluid Mechanics Lab**
- **Engineering Geology Lab**
- **Soil Mechanics Lab**
- **Concrete Technology Lab**
- **Computer Aided Drawing Lab**
- **Water Resource Engineering Lab**
- **Environmental Engineering Lab**
- **Material Testing Lab**
- **Highway & Transportation Engg. Lab**

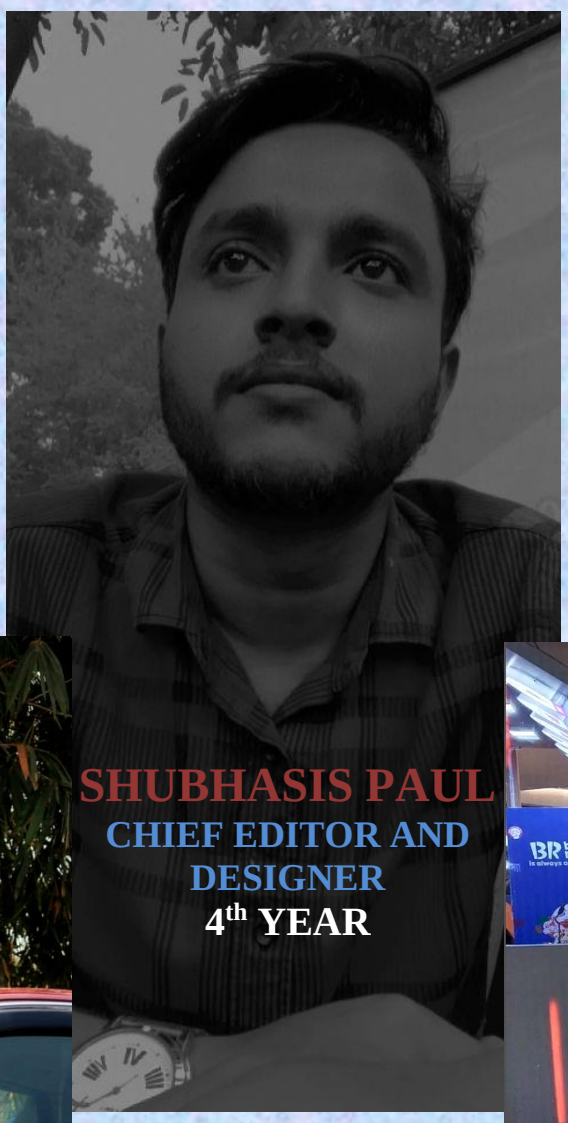
ADVISORY COMMITTEE

Prof. **Anupam Kr. Biswas**
Civil Engineering Department



Prof. **Koyndrik Bhattacharjee**
Civil Engineering Department

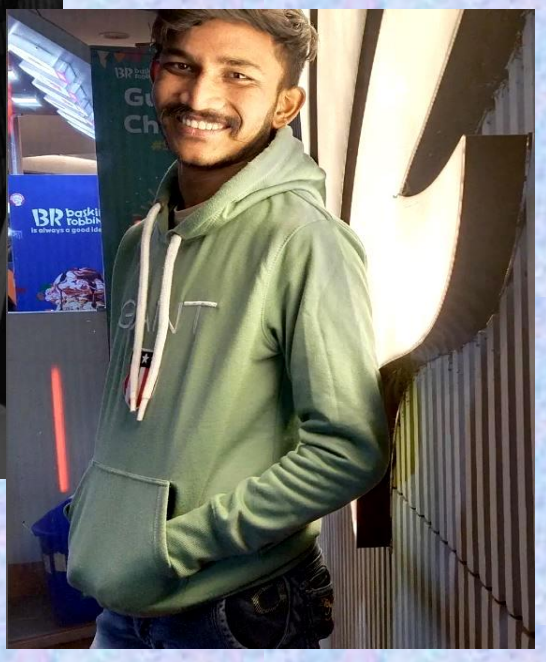
The Editorial Team



SHUBHASIS PAUL

CHIEF EDITOR AND DESIGNER

4th YEAR



Engineer's Day Celebration

This **Poster Competition Program** was organized on 15th September, 2022 from 10.30a.m by Civil Engineering Dept. in BCREC campus. It was based on the **Celebration of Engineer's Day**. On that day we all students of Civil Engineering Dept. were participated on that poster competition program.

Canal Visit Programmed By Civil Engineering Dept.

On 13th August 2022, we had a site visit organized by our *Ast.Prof.* **Pranoy Roy** and *Ast.Prof.* **Anupam Kr. Biswas.** The site located at **11 Mile Bus stand** (Bonkati Rd, Radhamohanpur, Birbhum, West Bengal 713152). It is the construction of a ***Canal design*** under "*Concrete Engineers Co-operative society pvt. Ltd*". Its civil engineer is **Monojit Metya.**

CSIR-CMERI Visit

On 19th Oct 2022 3rd year B.Tech. Students of Civil Engineering Department Dr. B C Roy Engineering College visits water testing facility lab of Environmental Engineering Group, CSIR-CMERI Durgapur Office. Here the students were given brief presentation about Water Testing Facility Lab equipments and process by the chief scientist of CSIR-CMERI Dr. Biswajit Ruj. Students were demonstrated with modern equipments and plant like domestic iron filters, arsenic removal plants, atomic absorption spectroscopy etc.

After this visit students reached at MSW Management Pilot Plant at CSIR-CMERI colony where they were demonstrated with integrated MSW disposal system, segregation system, biogas plant, low cost brick manufacturing units.

5 Days FDP ACE- 2022

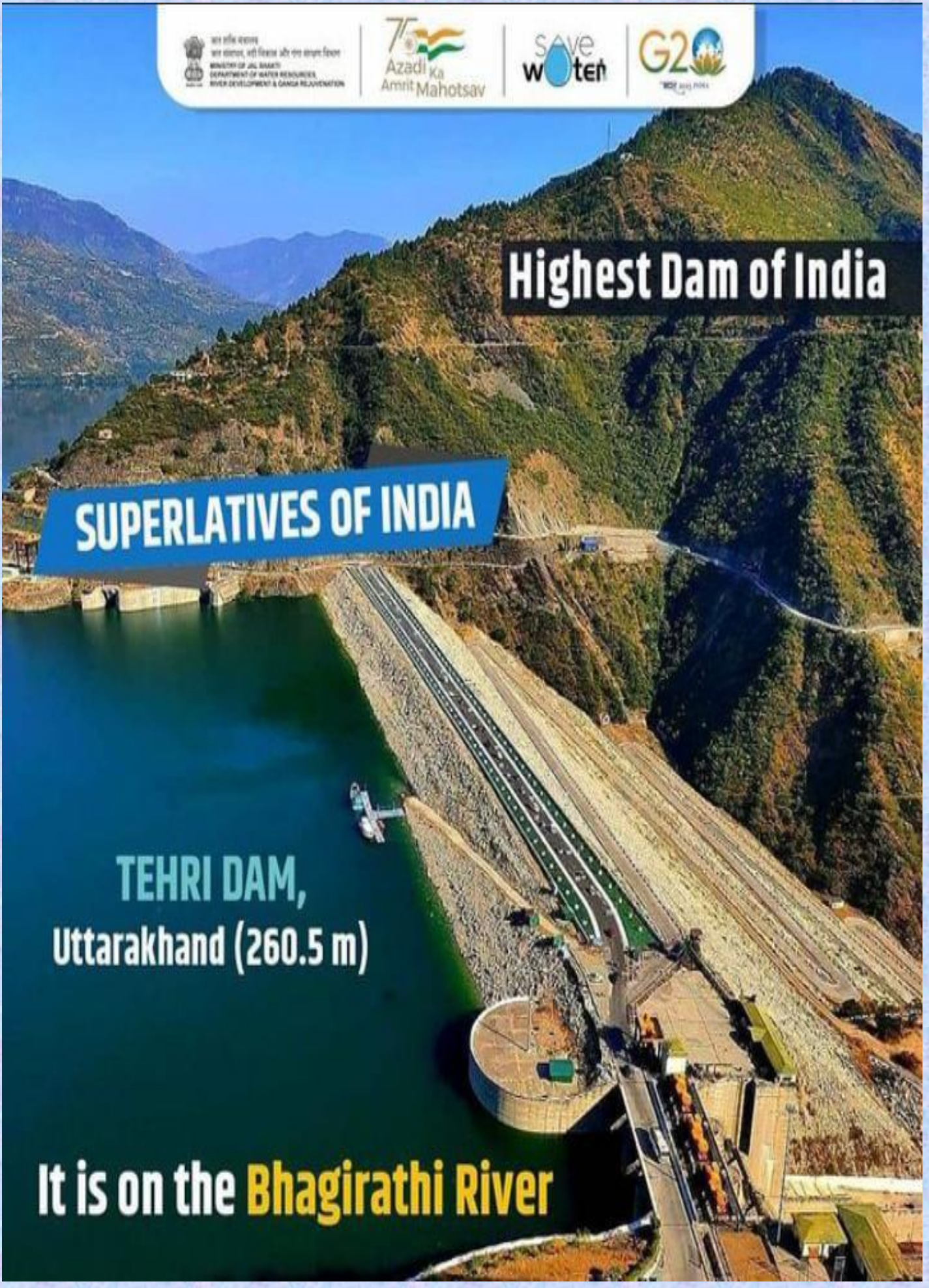
From 14th to 18th November, 2022 a Faculty Development Program was organized at Civil Engineering Department of Dr. B.C. Roy Engineering College, Durgapur. The FDP was on the topic "Advancement in Civil Engineering" jointly hosted by Prof. Md. Hamjala Alam and Prof. (Dr.) Shovan Roy. Prof. (Dr.) Atul Krishna Banik and Prof. (Dr.) Supriya Pal from N.I.T. Durgapur graced the occasion as speakers and shared their valuable experience among the faculty members along with other eminent speakers from various institutions.

NHAI Site Visit

On 18th March 2023, students from 3rd year were given the opportunity to experience the construction techniques prevailing in highway/road as well as their maintenance. The particular site is in Panagarh and the construction is undertaken by National Authority of India.

The department of Civil Engineering of BCREC is committed to produce good civil engineers with a lot of field experience as experiences count a lot in placement. BCREC has MOU with NHAI for paid internships of its civil engineering students. This year twenty students from Civil Engineering 3rd year have attended the NHAI construction work in the Panagarh - Palsit stretch with a remuneration of Rs. 8000.00 each.

Six students from the Department of Civil Engineering, BCREC got the wonderful opportunity for an Internship under Shapoorji Palonji and Company Pvt. Ltd., Engineering Procurement & Construction Division, Pune.


MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES
RIVER DEVELOPMENT & GANGA REJUVENATION
Azadi Ka Amrit Mahotsav
Save Water
G20
Highest Dam of India
SUPERLATIVES OF INDIA
TEHRI DAM,
Uttarakhand (260.5 m)
It is on the Bhagirathi River

On the 30th May 2023, the program "Purashkarayan", the annual award ceremony for the students of BCREC was organized. Goutam Kumar received the prestigious award of "Best Student from the Department of Civil Engineering" of 2023 batch.

INSPIRATIONAL ALUMNI

COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

Abhishek Pandit

M.S. Civil Engineering,
Columbia University

B. Tech. Civil Engineering

BCREC, Batch: 2017-2021

Mr. Abhishek Pandit is currently working as a Resident Engineer for one of the top 10 Engineering companies in the world; Arcadis. His direct client are New York City; Department of Parks and Recreation. He graduated from Columbia University (An Ivy League institution) with a Master's degree In Civil Engineering (Construction Management) and from Dr B.C Roy Engineering college with a Bachelors degree in Civil Engineering.

He served as a student researcher at the Global Leaders in Construction Management (GLCM), a research group in the department of Civil Engineering at Columbia University. His research focused on cost-benefit, market analysis, and 3D construction printing materials. He worked as a Course Assistant for the course | Construction Management Specialization | offered by Columbia University CVN on the Coursera track throughtout his educational journey at Columbia. He has over 2 years of work experience as a Construction Project Engineer working both in India and the top 2 states of the US; Los Angeles & New York!

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EVERY MINUTE
IS A CHANCE
TO CHANGE THE
WORLD

ARTICLES

What is Civil Engineering?

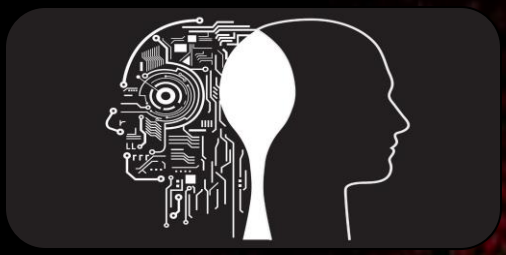
INTRODUCTION:- Civil engineering is a professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including public works such as roads, bridges, canals, dams, airports, sewage systems, pipelines, structural components of buildings, and railways.

Civil engineering is traditionally broken into a number of sub-disciplines. It is considered the **second-oldest engineering discipline after military engineering**, and it is defined to distinguish non-military engineering from military engineering. Civil engineering can take place in the public sector from municipal public works departments through to federal government agencies, and in the private sector from locally based firms to global Fortune 500 companies.

Civil Engineer responsibilities include: Managing, designing, developing, creating and maintaining construction projects. Conducting on-site investigations and analyzing data. Assessing potential risks, materials and costs.

Shubhasis Paul
4th Year
Department of Civil Engineering

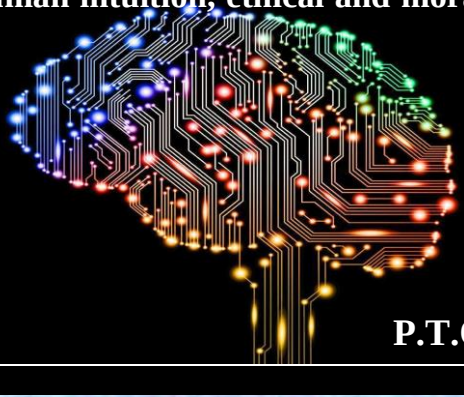
Can AI replace Civil Engineers?



Artificial intelligence (AI) is an aggregative term for describing when a machine mimics human cognitive functions, like problem-solving, pattern recognition, and learning. AI has the potential to assist civil engineers in their work, but it is unlikely to completely replace them in the near future. Civil engineers plan, build, and take care of the infrastructure that is important to modern society. This includes roads, bridges, buildings, water systems, and more. These projects require a deep understanding of engineering principles and knowledge of environmental, economic, and social factors. Civil engineers are also responsible for public safety, and AI systems may not always be able to make ethical decisions or understand the implications of their actions. AI cannot make critical decisions, think creatively, or understand the nuances of a specific project or situation. However, civil engineers must adapt to changing circumstances, work collaboratively with other professionals, and communicate complex information to stakeholders. Civil engineering is a complex and multidisciplinary field that requires the expertise and judgment of human professionals to design and manage infrastructure that meets the needs of society. Civil engineering involves a wide range of complex and nuanced tasks, from developing infrastructure to managing construction projects, identifying potential risks through modeling and simulation, and designing and optimizing structures. AI can be used to analyse large amounts of data and make predictions, which can be useful for tasks such as analyzing soil samples, predicting structural failure, and identifying potential issues in a design. AI can also help with tasks such as surveying and mapping, which can be time-consuming and labour-intensive.

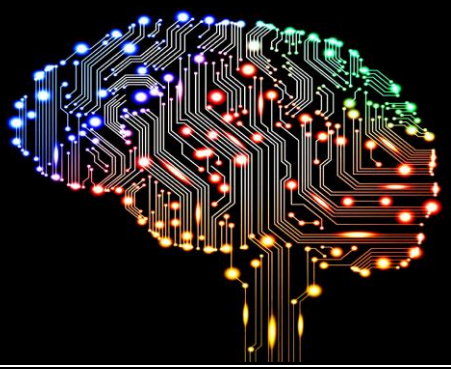
The typical AI-based evolutionary models used in construction include genetic algorithms, artificial immune systems, artificial neural networks, and genetic programming. Artificial neural networks exhibit excellent performance in lots of areas, including construction. AI can boost career opportunities in the construction sector by attracting more and more projects due to its capability for fast delivery models and improved efficiency. On the other hand, it would require proper training to be given to young civil engineers. Also, they need to be taught and trained by including relevant courses in their academic curriculum.

While AI can offer many benefits to the civil engineering sector, there are also potential disadvantages, such as dependence on technology, bias, a lack of human intuition, ethical and moral concerns, and job displacement.



P.T.O

- Site visits: A human civil engineer's ability to assess the site conditions, identify potential problems and opportunities, and communicate with other stakeholders.
- Dependence on technology: Civil engineers may become overly reliant on AI technology, which could decrease critical thinking and problem-solving skills.
- Bias: AI algorithms are only as good as the data they are trained on. If the data used to train the AI system is biased, the output of the system could also be biased.
- Lack of human intuition: While AI can process vast amounts of data, it cannot replicate human intuition and creativity. Civil engineers often rely on their intuition and experience to make important decisions that are not based solely on data.
- Ethics and morality: AI algorithms may not always make ethical or moral decisions. In the case of civil engineering, this could lead to designs that prioritize cost savings over safety or environmental impact.
- Job displacement: As AI technology advances, there is a potential for job displacement as certain tasks are automated. This could decrease the demand for human civil engineers, particularly in repetitive or routine tasks.



Arijit Kumar Banerji
Assistant Professor
Department of Civil Engineering

TRANSPORTATION ENGINEERING

INTRODUCTION :-Transportation engineering or transport engineering is the application of technology and scientific principles to the planning, functional design, operation and management of facilities for any mode of transportation in order to provide for the safe, efficient, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods transport.

HIGHWAY DEVELOPMENT AND PLANNING:-

The road development in the country should be considered as a national interest as this has become beyond the capacity of provincial Govt. & local bodies.

An extra tax should be levied on petrol from the road users to develop a road development fund called "Central Road Fund"

A semi-official technical body should be formed to pool technical know-how from various parts of the country & to act as an advisory body on various aspects of roads.

TRAFFIC ENGINEERING:- **Traffic Engineering is the sub discipline of transportation engineering that addresses the planning, design and operation of streets and highways, their networks, adjacent land uses and interaction with other modes of transportation and their terminals.**

Infrastructure engineering:- **Infrastructure engineering focuses on designing, building, deploying and maintaining IT infrastructure. Infrastructure engineering is a specialized domain in the engineering department which is closely related to Civil engineering. B.Tech Infrastructure engineering, commonly known as Civil Infrastructure engineering, is an essential course in the structural and civil engineering fields. The course focuses on planning and constructing robust and contemporary structures such as buildings and highways to ensure overall civil infrastructure development.**

Aihik Mahinder
3rd Year
Department of Civil Engineering

Water Management System of Netherlands

History:

About 2000 years ago most of the Netherlands was covered by extensive peat swamps. The coast consisted of a row of coastal dunes and natural embankments which kept the swamps from draining and also from washing by sea. The areas that were suitable for habitation were on the high grounds in the south and east and on the dunes and natural embankment. The first permanent inhabitants were attracted by the clayey soil deposited by the sea which was much more fertile than the soil inland. To protect themselves from flood they built their homes on artificial dwelling hills known as terpen.

After about 1000AD the population grew due to which demand of land area increased. There was greater availability of workforce and dike construction was taken more seriously. By 1250AD most dikes had been connected to make a continuous sea defense. The next step was to move the dikes ever more seawards. With every cycle of tides a small layer of sediment, over years these layers had built to such a height that they were rarely flooded. Then it was considered safe to build a new dike around this area, but old dike was often kept as second line of defense. The construction method of dikes has changed over centuries from stacking of sea weed to wood planks to finally stone masonry.

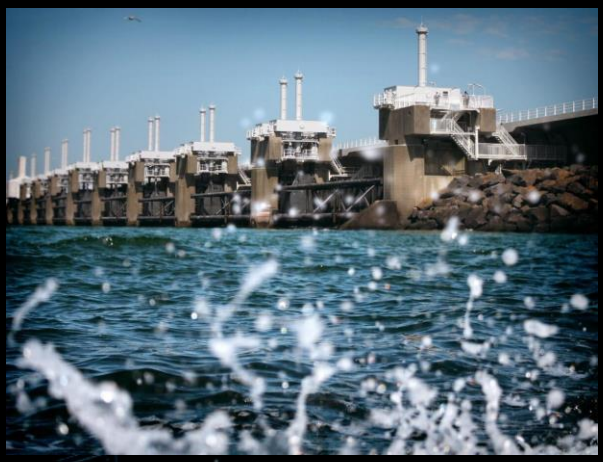
Challenges to set up Netherlands

One of the major problems in establishing Netherlands is that its maximum land area we see today is 1m below the sea level. It means that without humans' interference it would have been impossible to live in Netherlands.

The time when dikes were being constructed to save land area from getting flooded the first swamps were made agricultural land by colonist. Wheat was cultivated by digging a system of parallel drainage ditches water was drained. But peat settled much more than other soil and land subsidence resulted in lands becoming wet, Because of this it become difficult to remove excess water.

Three major European rivers the Rhine, Meuse and Scheldt flow through Netherlands. Large scale deforestation in the upstream for settlement led to river level rise and land being protected by dikes, giving less space to the river stream lead to river floods.

How Netherlands overcome these challenges



Land areas were being saved from washing away by sea by means of construction of dikes. A system of primary and secondary dikes was created to provide more safety. The development in materials constructing dikes has ensured more safety now than before. The mouths of streams and rivers were dammed to prevent high water levels flowing back stream .These systems kept the peat swamps dry for human settlement. Present day Netherlands uses modern sluice gate barriers along with stone masonry dikes for flood control.

Integrated flood management system of Netherlands

The Delta program is the Netherlands approach to flood risk management. An elaborate system of dams sluices gates, storm surge barriers, dikes and other protective measures.

As a part of Delta program 'wide green dike 'was introduced the grass covered clay dike is sufficient to protect dike against erosion.

Futuristic Netherlands

A massive storm surge barrier called Maeslantkering was completed in 1977 to protect Rotterdam Europe's largest port .It's equal in size to two Eiffel towers.

Shouvik Mondal
3rd Year
Department of Civil Engineering

Bamboo as a Reinforcement Member

The design, mix ratios, and construction methods utilised for steel reinforced concrete also apply to bamboo reinforced concrete. Bamboo reinforcement just replaces the steel reinforcement. Bamboo is a natural material that has been utilised for a variety of things. Primarily as a material for strength bearing. They are only available for medium-sized projects. Although bamboo has been around for generations, using it as a reinforcement material is a new development in the world of civil engineering building. This invention was based on research done at Clemson University's Agricultural College. Bamboo is naturally renewable and biodegradable.

SELECTION OF BAMBOO FOR REINFORCED CONCRETE CONSTRUCTION:

These criteria can be used to guide the choice of bamboo for reinforcing.

- Color and Age - Employ bamboo having an evident brown color. This shows the age of bamboo to be at least 3 years.
- Diameter - Use the one with long large culms
- Harvesting - Try to avoid those bamboos that are cut either during spring or summer seasons.
- Species - Among 1500 species of bamboo, the best one must checked, tested

DURABILITY OF BAMBOO MATERIAL:

Being a natural product makes it more vulnerable to environmental contaminants and insects. Curing bamboo is a preventative measure against this. Insect attraction is mostly caused by the starch in the humidity content, which can be treated during the curing process. The correct bamboo must be selected in order for the cure to be effective. It was mentioned in the bamboo choice. The curing of bamboo can be done either by:

- Curing on spot
- Immersion process
- By heating
- Smoke Curing

It is essential to apply the treatment while the bamboo is dry to ensure proper penetration. The durability-enhancing preservation treatment applied to bamboo shouldn't affect its chemical makeup.

The actual treatment ought to be durable and not wash away in high water, if any. Bamboo material durability is a big concern. Bamboo has high levels of physical and chemical characteristics and low humidity content. This low amount would prevent bamboo mould growth.
If bamboo reinforcement has had the appropriate treatments, it is shown to be more durable than steel.

PRESERVATION OF BAMBOO:

Bamboo must be thoroughly treated before use in order to prevent rot and insects from eating it. For this aim, borax and boric acid are frequently combined. Boiling sliced bamboo is another method that is frequently used to get rid of the starches that attract insects.

ADVANTAGES OF BAMBOO AS A REINFORCEMENT MEMBER:

- Because its strands run axially, bamboo has more tensile strength than steel.
- Bamboo has a very strong fire resistance capacity and can endure temperatures of up to 4000 C. This is caused by the presence of water and silicate acid at high concentrations.
- Due to its elastic qualities, bamboo is widely favoured in earthquake-prone areas.
- Due to their light weight, bamboos are readily moved or erected, making transportation and installation much simpler.
- They are affordable and simple to use.
- They are particularly in high demand in locations that are prone to earthquakes.

DISADVANTAGE OF BAMBOO AS A REINFORCEMENT MEMBER:

- Before being used for construction, bamboo should be properly treated against insect or fungus assault.
- Despite the use of numerous jointing procedures, bamboo's structural stability remains in doubt.
- Bamboo shrinks substantially more, especially as it loses water.

CONCLUSION:

Bamboo reinforced concrete can be built using the same techniques as steel reinforced concrete. Simply put, bamboo reinforcement is used in place of steel. Other construction procedures for bamboo-reinforced concrete are identical to those for conventional concrete. The bamboo-reinforced beam was found to be gradually failing; bamboo sticks can act as reinforcement because of their high tensile strength. This is a sensible plan for a cheap building. Compared to the steel reinforcing method, it is three times less expensive.

Rohit Prasad Mondal
Alumni, Batch (2019-23)
Department of Civil engineering

3D Printing Technology

The first 3D printer was invented in 1984 and over the last decades, 3D printing has become one of the fastest growing technologies. At the beginning it was very complicated and what is more, expensive technology. Over the years, 3D printing started to be present in everyday life and printers became commonly used in all kinds of industry fields. A lot of achievements have been made in medicine, automotive or aerospace industry. Thanks to the open source systems, prototyping of new product, and innovative applications of 3D printing in various fields are available for everyone. Improvement of the printing material and 3D technology became to be the goal for many companies all over the world from all industry sectors. In 2014, real revolution in construction industry has started, as the first house was printed starting a new chapter in building technology. Civil/Structural Engineering is one crucial sector that has touched and continues to impact many lives. It cuts across all phases of our daily living, from building construction to bridges, dams, roads, towers, storage centers, and other utilities in the city or community. It also has the task of maintaining and improving such facilities. Many consider it the oldest and most crucial branch of engineering, and one can only imagine the many possibilities of 3D printing and Civil Engineering. An important element is preparation of computer model for the parts to be manufactured. Fortunately, the level of 3D computer graphics both in terms of software and hardware makes it possible to build such digital models without much difficulty. It can be done using many commercial as well as Open Source software packages.

- ***3D Printing work-flow:*** The typical work-flow for 3D printing is illustrated in Figure 1. Firstly, a model is prepared in a 3D modeling application. Then it is exported to a file in a common 3D data exchange format. For 3D printing industry the most popular format is STL (Stereo lithography) discussed below. Next, for the majority of 3D printing technologies the saved data is processed to decompose the model into slices. This results in a set of 2D contour lines that are further processed to generate control commands to position printing head or laser beams.

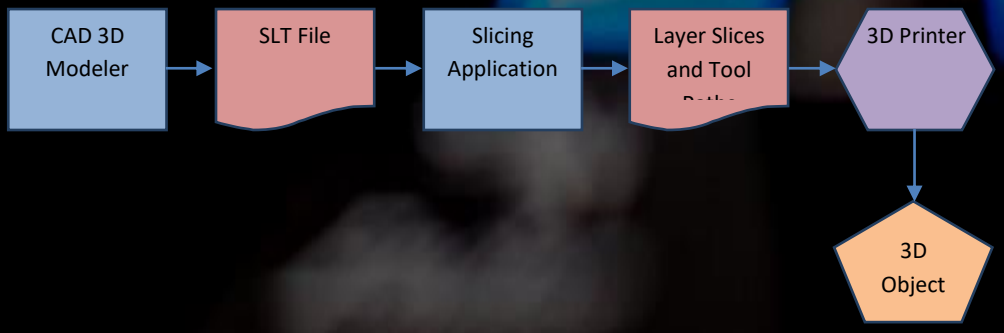


Figure Typical work-flow of 3D printing process.

➢ *STL data format*

Transferring model data via STL format requires constructing a triangulation of all boundary surfaces as illustrated in Figure 2. This is most easily done if the solid model is build using B-Rep (boundary) representation, as forthis representation the solid boundaries are stored explicitly within the model. The key element of exporting such representation to STL format is triangulation of curved surfaces. For CSG (Computed Solid Geometry) models, in order to save them in STL format, additional processing steps are needed to recover model boundaries.

➢ *Preparing 3D models*

In most cases in order to send digital model for printing it is enough to save it in STL format. Many 3D computer graphics programs can export models in STL. However, one should be careful using them, because many of these programs are designed to be used primarily for screen rendering of 3D models. It means that they can tolerate specific features of the models that are non-essential for rendering but that will be crucial for 3Dprinting. The main points to pay attention to are:

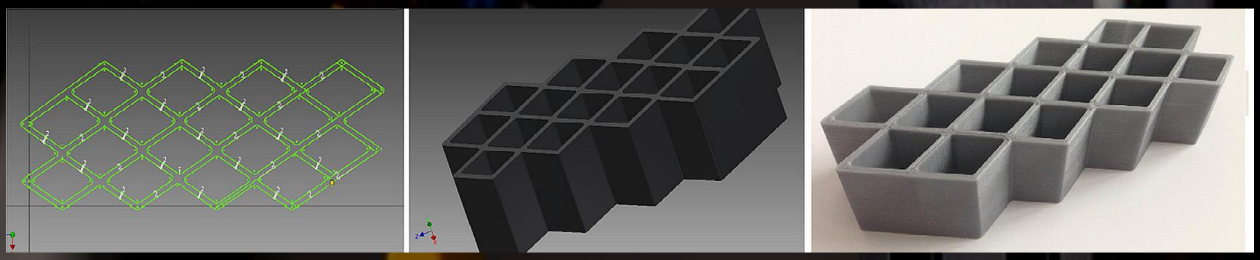
- 3D printing is a physical process contrary to screen rendering. Thus, one has to obey physical constraints. Designing a model for printing one has to ensure that all elements of the model are physically realizable. This means for instance that free 1D edges and 2D faces are not allowed in the model;
- Printing is done in the presence of gravity. One has to consider stability of the model and the weight of its parts to avoid damaging printed parts, for instance by breaking to slender support elements;
- Some printing technologies require to design holes through which excess of non-bounded material can be evacuated;
- The boundary surfaces of the model must be watertight, that means all faces must be connected and have consistent orientation of surface normal. This is in order to distinguish in unique way model interior and exterior space;
- The triangulated surfaces must form a 2D manifold. In particular, all edges must be shared by exactly two faces, and there should be no singular points, where the boundary of the model touches itself. Example of non-manifold model is illustrated in Figure3.

➢ *Software*

Autodesk Inventor is software that allows building complete 3D model of designed construction or device and enabling to create planar drawing documentation for the project. While using Inventor, most of the time that constructor needs to put in a project is sacrificed for creative and conception works. All the changes made in a model are automatically transferred to the drawings. Blender is open source package for 3D modeling, animations and computer games production. Interesting

feature of Blender is the export/import module for IFC models based on Ifc OpenShell library. This module allows import and further processing of models prepared in BIM applications such as Revit or Tekla 3D model of an envelope component developed by WinSun Company and Autodesk Inventor software environment.

Two 3D models of building envelope components have been designed in Autodesk Inventor software. Replicas of the wall from the Canal House and WinSun houses were prepared and printed using ABS material (AcrylonitrileButadiene Styrene) and using standard RepRap 3D printer.



(a) (b) (c)

Figure: (a) 2D sketch; (b) 3D model; (c) printed replica of a Canal House wall.

There are numerous advantages coming from developing 3D technology in construction and most important ones could be resumed as:

- Lower costs – the cost of printing construction elements of houses is much lower than traditional construction methods, also material transportation and storage on sites is limited;
- Environmentally friendly construction processes and the use of raw materials with low embodied energy (i.e. construction and industrial wastes);
- Reduced number of injuries and fatalities onsite as the printers will be able to do most hazardous and dangerous works;
- Wet construction processes are minimized, so that building erection process generate less material wastes and dust compared to traditional methods;
- Time savings – time required to complete the building can be considerably reduced.

Manas Saha
3rd Year
Department of Civil Engineering

Bitumen Emulsion

This Indian standard covers the physical and chemical requirements of cationic bitumen emulsion for application in road works. Bitumen emulsions are usually two-phase systems consisting of two immiscible liquids, bitumen and water.

There are two main types of bitumen emulsions:

1. Cationic
2. Anionic.

Difference between cationic emulsion & anionic emulsion:

The main difference between them is that the former, anionic emulsions are less sensitive to the presence of minerals or other materials in water; and actively interact with them.

Uses of bitumen emulsion:

Bitumen emulsions are by far the most commonly used binder in cold paving technologies, allowing numerous applications such as tack coats, microsurfacings and chip seals. Emulsion mostly refers to paint used for walls and ceilings.

Difference between emulsion and bitumen:

We can clearly see that emulsion easily wets the chip where the bitumen has only a very small amount of bitumen in contact with the aggregate. The bitumen will eventually gain a similar Contact area but emulsion requires warm temperatures and traffic to help with this.

The most important properties of bitumen emulsions are:

Stability, Viscosity, Breaking and Adhesively.

Laboratory test of bitumen emulsion:

1. The particle charge test
2. Reactivity test
3. Viscosity test

4. Adhesion test

Six parameters that can be used to change the breaking properties of emulsions :

1. Bitumen content
2. Aqueous phase composition
3. Particle size distribution
4. Environmental conditions
5. Chippings
6. The use of breaking agents

Pallabi Roy
Alumni, Batch (2019-23)
Department of Civil Engineering

IMBALANCE BETWEEN SOFTWARE AND CIVIL ENGINEERING

The field of civil engineering has seen a significant transformation in recent years, with technology playing an increasingly important role in the design, construction, and maintenance of the built environment. However, there is a growing concern among industry professionals that the rapid pace of technological change is creating an imbalance between software and civil engineering. In this article, we will explore this imbalance in detail and why it is important to bridge the gap between software and civil engineering.

➢ *The Role of Software in Civil Engineering*

Software has revolutionized the field of civil engineering in many ways. One of the most significant ways is in the development of building information modeling (BIM) software. BIM software allows engineers to create 3D models of buildings and infrastructure, enabling them to visualize the entire project and identify potential issues before construction begins. This technology has led to increased efficiency, reduced costs, and improved safety in the construction industry. Another area where software has had a significant impact is in the development of smart cities. Smart cities use data and technology to improve the quality of life for citizens, enhance the delivery of public services, and optimize the use of resources. For example, smart transportation systems use real-time data to optimize traffic flow, reduce congestion, and improve safety on the roads.

➢ *The Imbalance Between Software and Civil Engineering*

While software has brought many benefits to the field of civil engineering, there is a growing concern that the rapid pace of technological change is creating an imbalance between software and civil engineering. The problem is that software is often developed without a deep understanding of civil engineering principles. This can lead to software that does not accurately reflect the complex and often nonlinear behavior of building materials and structures, leading to potentially costly and dangerous errors. For example, BIM software may not accurately simulate the behavior of building materials under different conditions. This can lead to errors in the design of structures that may fail under real-world conditions. Similarly, smart city technologies may not be developed with a deep understanding of the social and cultural context of the cities in which they are being implemented. This can lead to solutions that may be technically impressive but fail to address the real needs of the communities they serve.

➢ *Bridging the Gap Between Software and Civil Engineering*

To bridge the gap between software and civil engineering, there is a growing recognition of the need for interdisciplinary collaboration between software developers and civil engineers. This collaboration can help ensure that software is developed with a deep understanding of the

principles and constraints of civil engineering and those civil engineers can take advantage of the full potential of software to improve their work.

Interdisciplinary collaboration can also lead to the development of new tools and methods that can improve the accuracy and efficiency of civil engineering projects. For example, the development of advanced simulation software that accurately models the behavior of building materials can help engineers design structures that are safer and more durable. Similarly, the integration of real-time data into smart city technologies can improve their effectiveness and ensure they are better aligned with the needs of communities.

➢ *Education and Training*

Another important aspect of bridging the gap between software and civil engineering is education and training. Civil engineers should be encouraged to develop a deeper understanding of the software they use, including its limitations and how it can be used to improve their work. Software developers should also be encouraged to learn more about the principles of civil engineering and the challenges faced by civil engineers in their work. This can be achieved through the development of interdisciplinary courses and training programs that bring together civil engineers and software developers. These programs can help promote greater understanding and collaboration between the two fields and encourage the development of new tools and methods that can improve the built environment.

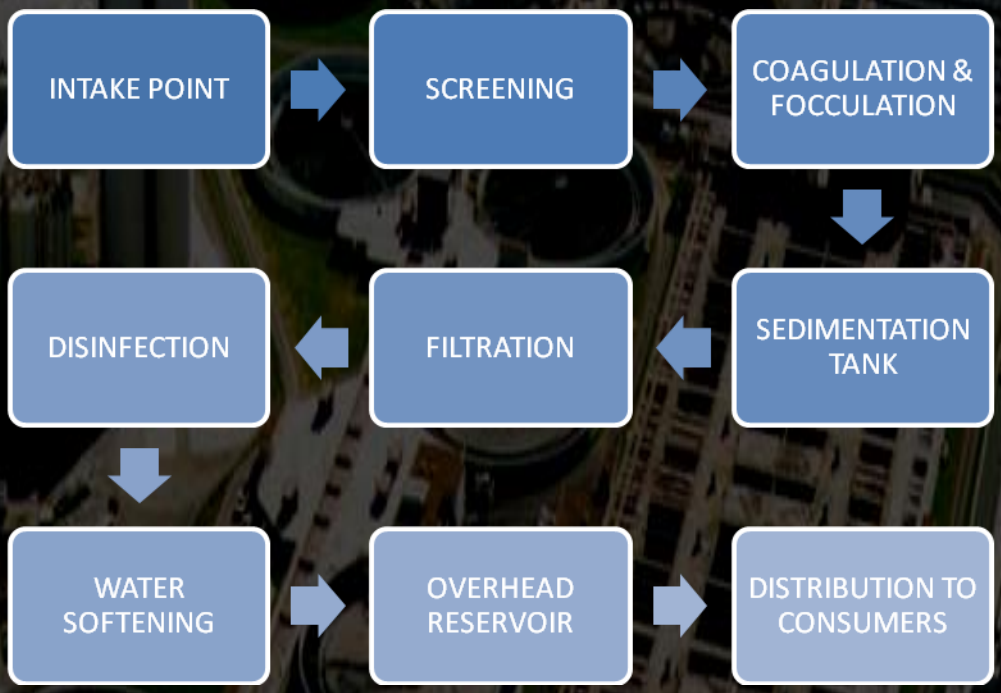
The imbalance between software and civil engineering is a growing concern for the industry. However, by fostering greater interdisciplinary collaboration and investing in education and training, we can bridge this gap and create a more effective and sustainable built environment for future generations.

Manas Saha
3rd Year
Department of Civil Engineering

WATER TREATMENT

Man cannot survive without water. But this water may be the cause of disaster if it is polluted by harmful agencies and used for drinking purpose. When the rainwater flows as run-off, it passes through the ground surface and gets collected in rivers, lakes and pond. On its way, the water get polluted by harmful salts,acids,minarals,pathogenic bacteria, radioactive substances etc.hence, the water may possess undesirable color, odor, taste and even disease causing microorganisms. This type of surface water is consuming by human beings for drinking, bathing, washing etc. as a result man suffers water borne diseases.

FLOW DIAGRAM OF WATER TREATMENT:

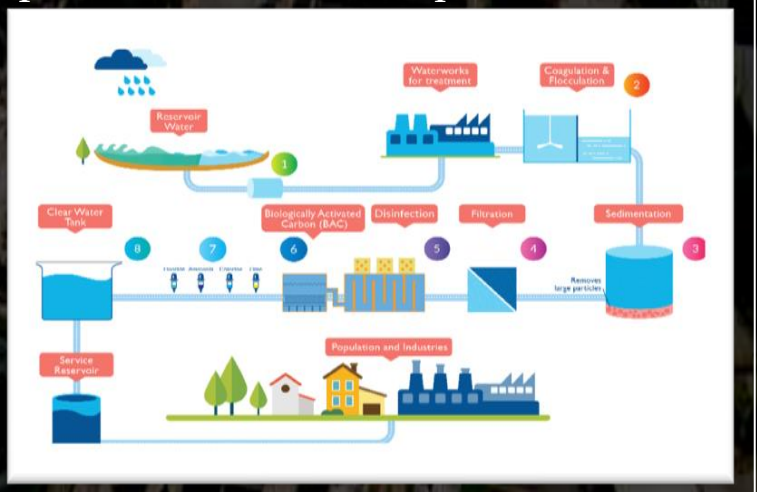


Intake point: **To** collects water in intake well so that the water can be supplied throughout the year.

Screening: **It** is the first process in water treatment. To remove all suspended solid and floating debris like wood pieces, cloth, paper pieces, decayed fruits and vegetables etc.Commonly two type of screen are used – Coarse screen(opening size 6mm to 50mm) and Fine screen (opening size 1.5mm to 5mm).

Coagulation &Flocculation: **To** removes the fine particles suspended in the water. A chemical called coagulant is added to the water, which neutralizes the fine particles negative electrical charge. Two coagulants commonly used in the treatment are aluminiumsulphate and ferric chloride. During flocculation, the water is gently stirred by paddles in a flocculation basin, and the flocks come into contact with each other to form larger forms.

Sedimentation: **To** removes heavier suspended material. The particles fall to the floor of settling tank, called sedimentation. The water is kept in the tank for several hours. The material accumulated at the bottom of the tank is called sludge, this is removed for disposal.



Filtration: **Solids** are separated from a liquid. In the water treatment, the solids that are not separated in the sedimentation tank are removing by passing water through sand and gravel beds. Filters are two types – slow sand filter & rapid sand filter.

Disinfection: **To** removes pathogenic bacteria. There are various methods of disinfection. It is necessary to protect the citizens from health hazard.

Water softening: **To** reduces harness from water, corrosive effect on pipes and improves the taste of food, life of fabrics. Ions exchange is a common industrial method of water softening.

Overhead reservoir: **The** function of this unit is to store the purified water after treatment is complete. The water from the reservoir is supplied to the consumers by gravity system.

Distribution: **The** purified water can be supplied evenly to the consumers and it can reach at every corner of various zones. The methods of distribution such as gravity system, pumping system, dual system.

Neha Bhattacharjee
3rd Year
Department of Civil Engineering

ever seen

lessly about
houlder.

POETRY

hem; he that cometh
Akbar) have a most

Oh, rapturous rose-crowned occasion,
When I such a glory might see!
But a cow of a purple persuasion
I never would be.

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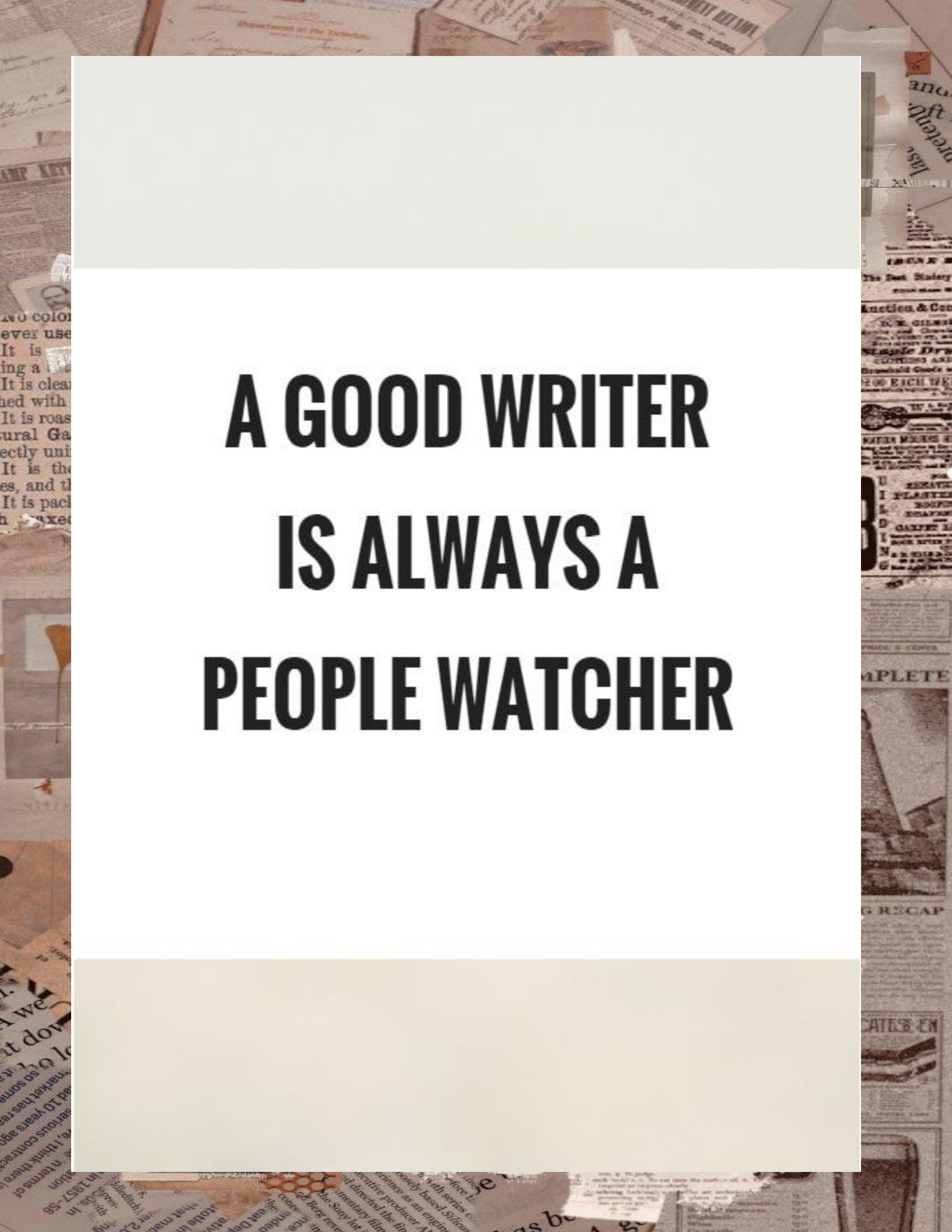

A GOOD WRITER
IS ALWAYS A
PEOPLE WATCHER

সভ্যতা

অনিন্দিতা রায় সেনগুপ্ত

সভ্যতার ধ্বজা উড়িয়ে ছুটছে সভ্যতার রথ,
উন্মত্ত বেপরোয়া সভ্য মানুষগুলো
ছুটে এসেছে অনেকখানি পথ।
আর সেই চাকায় পিষ্ট হচ্ছে প্রতিনিয়ত
আধুনিক সভ্যতা।
হারিয়ে যাচ্ছে প্রকৃত শ্রদ্ধা, সম্মান,ভালবাসা,
বিবেক, সততা।
আজ সভ্য মানুষ তাই আগ্রহী ক্ষুদ্র বসনে;
স্ট্যাটাস যাচাই হয় নাইট ক্লাব আর মদ্যপানে।
কাস্টিং কাউচে লুকিয়ে থাকে সেলিব্রিটির স্বপ্ন;
কালো হাতের ভিড়ে হাড়িয়ে যায় প্রকৃত রত্ন।
মেকী দেশপ্রেমের নামে বহুরূপীদের রাজনীতি,
অনলাইন আর খোলা মাঠের শিক্ষার মাতামাতি।
শৈশবের কুঁড়ি গুলো কেমন যেন নিস্তেজ -রুগ্ন,
স্মার্টফোনের স্মার্ট পড়ায় বড্ড তারা মগ্ন।
"" অনেক এগিয়েছি,,,যদি দুপা পিছিয়ে যাই- তুমি আমি
আর সভ্যতার চাকা- ক্ষতি কি?
যেখানে ছিল না-
মিডিয়ার রঙচঙে খবর বেচাকেনা,
ফেসবুক, হোয়াটস্অ্যাপের হাতছানি।
ছিল না-এত ব্যস্ততা ,রেশারেশি।
ছিল একসাথে বসে গল্প -আড্ডা -আলোচনা।
নিজের জন্য, সবার জন্য একটু সময় রাখা।
যদি এগুলো হয় কম সভ্যতার নিদর্শন---
তবু পিছিয়ে যেতে চাই আরো দু পা
তোমার হাতটি ধরে।
নতুন সুখে বাঁচবো নতুন করে।।

মা

হাজার যুদ্ধ বাইরে হলেও , শান্ত তখনও গর্ভ
সব সুগন্ধি হার মেনে যায় , আঁচল তোমার স্বর্গ
যাদুর খেলায় শ্রেষ্ঠ তুমি , হারছে যাদুকর
আদর শাসন মায়ার স্পর্শে তুমি , মানুষ গড়ার করিগর
তোমার সাথেই হাঁটতে শেখা , প্রথম হামাগুড়ি
তোমার কাছেই প্রথম লেখা , প্রথম হাতেখড়ি
কষ্ট হলেই আগলে নিয়ে , রেখেছো মাথায় হাত
তোমার কোলেই নিশ্চিন্তে কেটেছে , কত মন খারাপের রাত
তুমি আছো বলেই আমি , সঠিক পথে হাঁটি
জীবন বৃত্তের কেন্দ্র তুমি , আমার চাবিকাঠি

FARHAN ASHIQ
12001321009
3rd Year

7 Days

Monday saw me a wonderful hoping,

As I look rest six days joking.

Tuesday saw me smiling,

While sitting, eagerly waiting for weekend coming.

Wednesday saw me getting paid,

Money spent, bills underpaid.

Thursday convince me to doing great,

Time passed, nothing decorate.

Friday saw me a good vibes,

While napping, five days I just described.

Saturday make me more patience.

For pursue a passion, do something maintenance.

Sunday make me very rushing.

Because again Monday is coming.

- Susmita Bauri

4th Year

Department of Civil Engineering

An Engineer's valentine

-Kashinath Bhadra
4th year

Most probably,
When I was in class 12th
I was alone and
All was dark.
Beneath me and above
My life was full of confusion and wicked
But not the spark of love.
But now that are here with me
My heart is overjoyed
You have turned the straight line of my heart into sinusoidal
You load things from my memory
Onto my two-way lane
My life was once assembly code it's now like c++
My circuits, you can fix the voltage
Cross diode is much more
Than just point six or eight
With your op – amps and resistor
You have built my integrator.
You load the structural concept
That was shear force to bending moment
Then it was normal
Come to real picture,
You add structure with solved redundant reaction, the program was hanged
……..
Just recovery,
Earth pressure theory was come into the header file; you are my function generator,
I can't survive without you.
You have changed my world, increased my gain and
Made my math discrete,
So now,
I will end my poem here
With getch ().
Then press altx with double enter …

DRAWING

BE THE
TYPE OF
PERSON
YOU WANT TO
MEET

Ankita Kundu

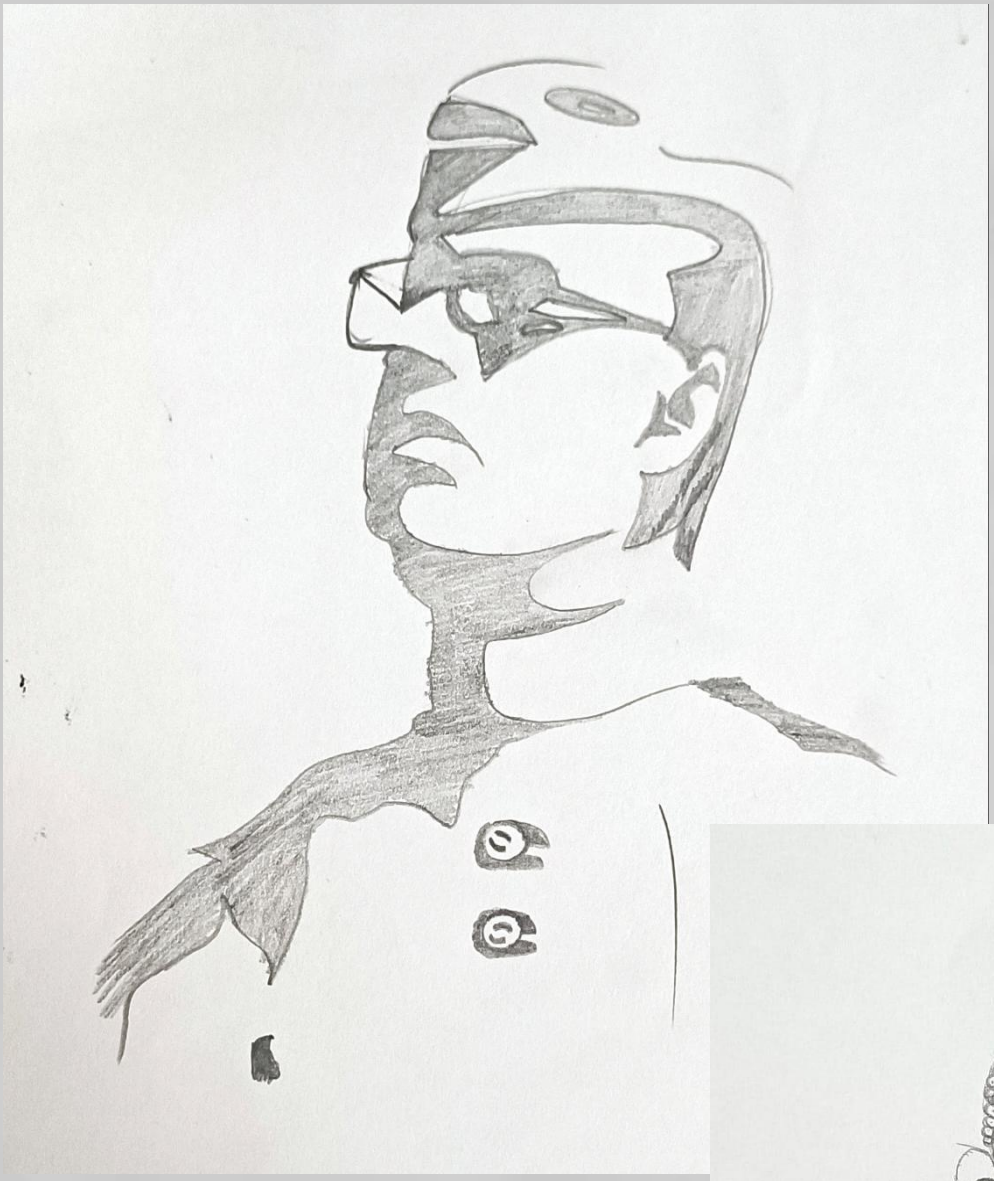
3rd Year

Department of Civil Engineering

Anindya Chatterjee
3rd Year
Department of Civil Engineering

Sayan Pathak
3rd Year
Department of Civil Engineering

Manisha Dey
4th Year
Department of Civil Engineering

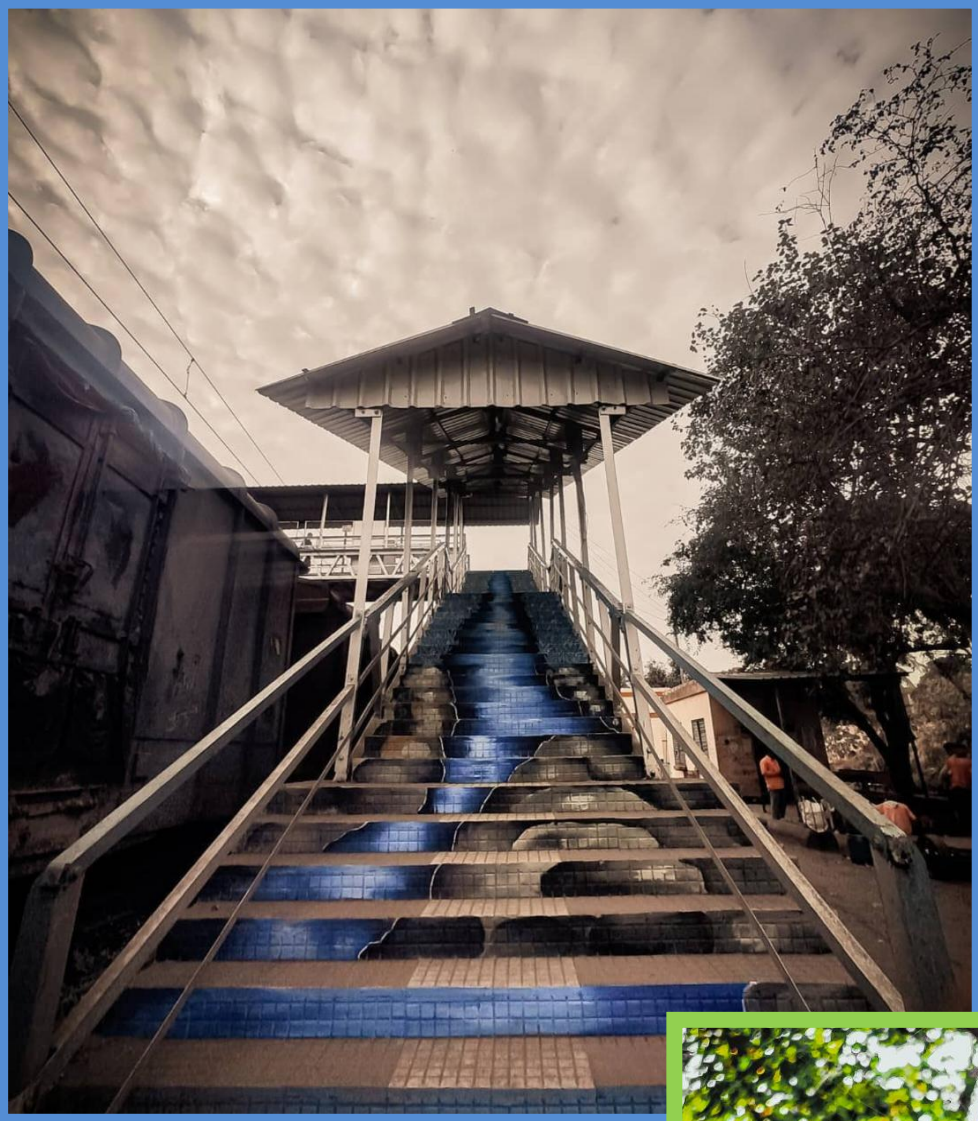


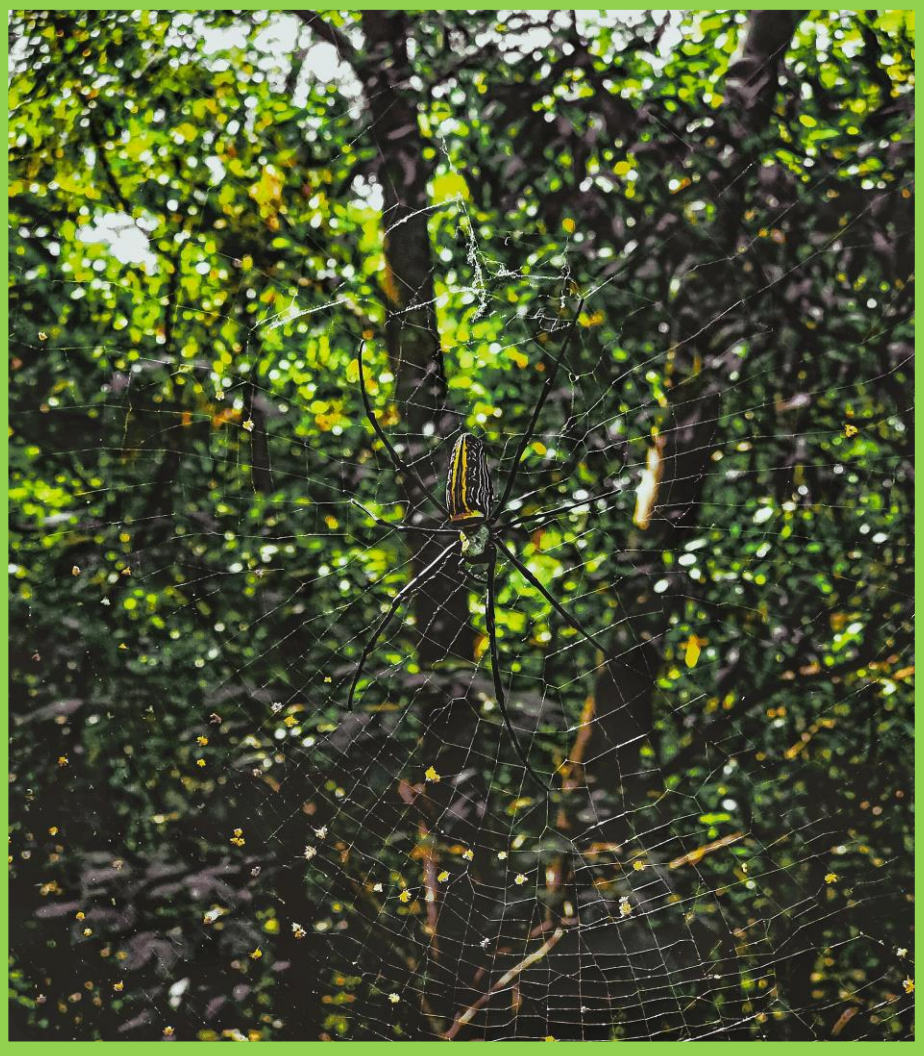
Jhilik Bandyopadhyay

4th Year

Department of Civil Engineering

photography

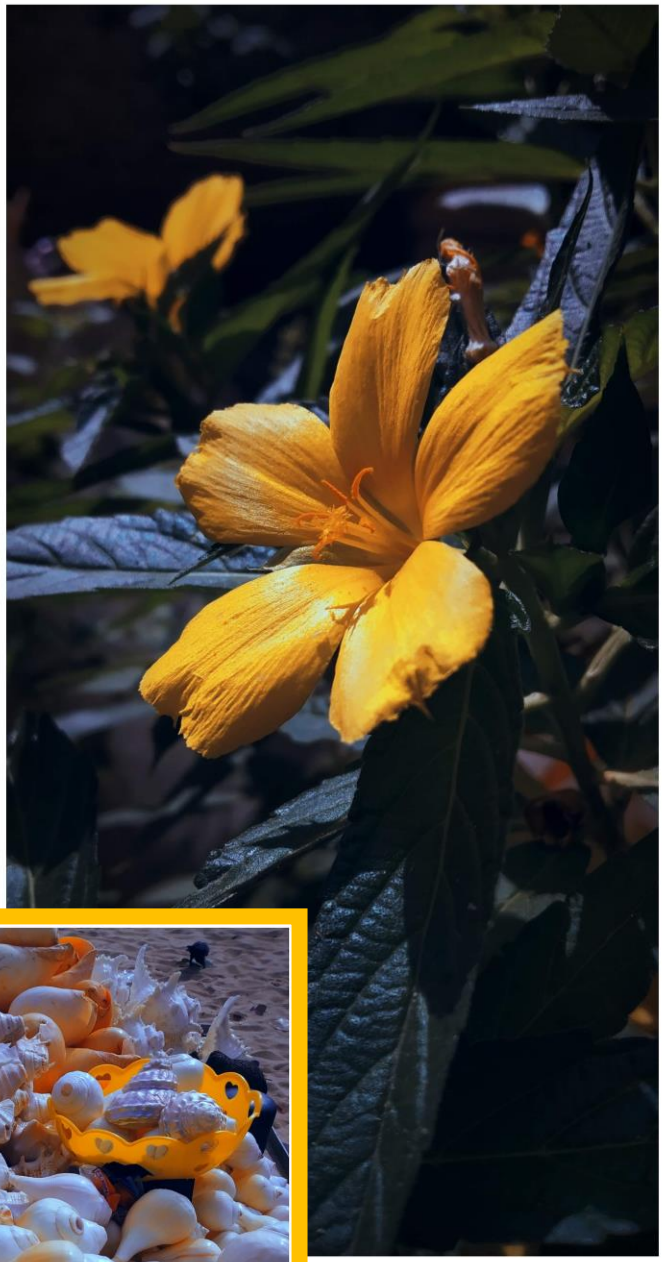




Rethik Das

4th Year

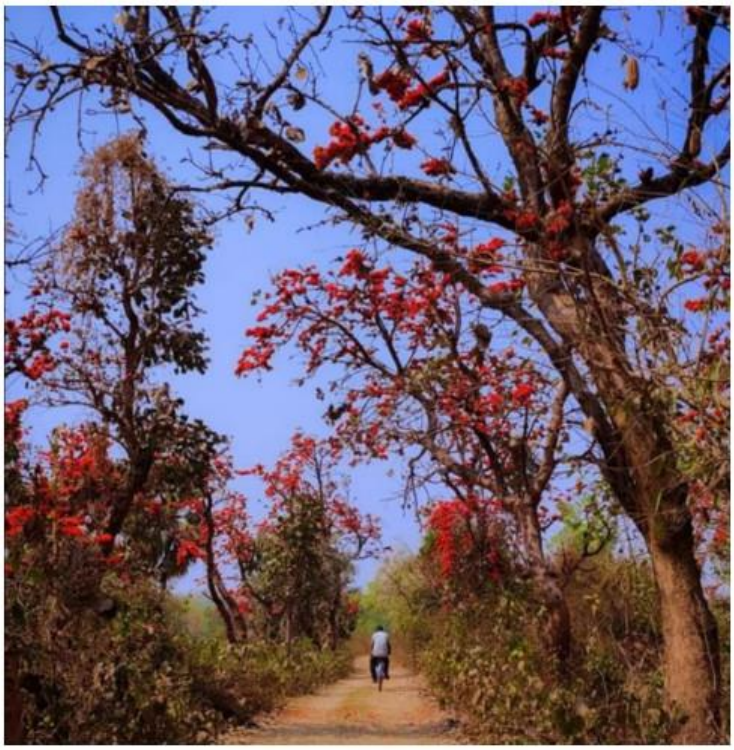
Department of Civil Engineering



Dipika Sen

3rd Year

Department of Civil Engineering



Shuvam Majee

3rd Year

Department of Civil Engineering

Ankita Kundu

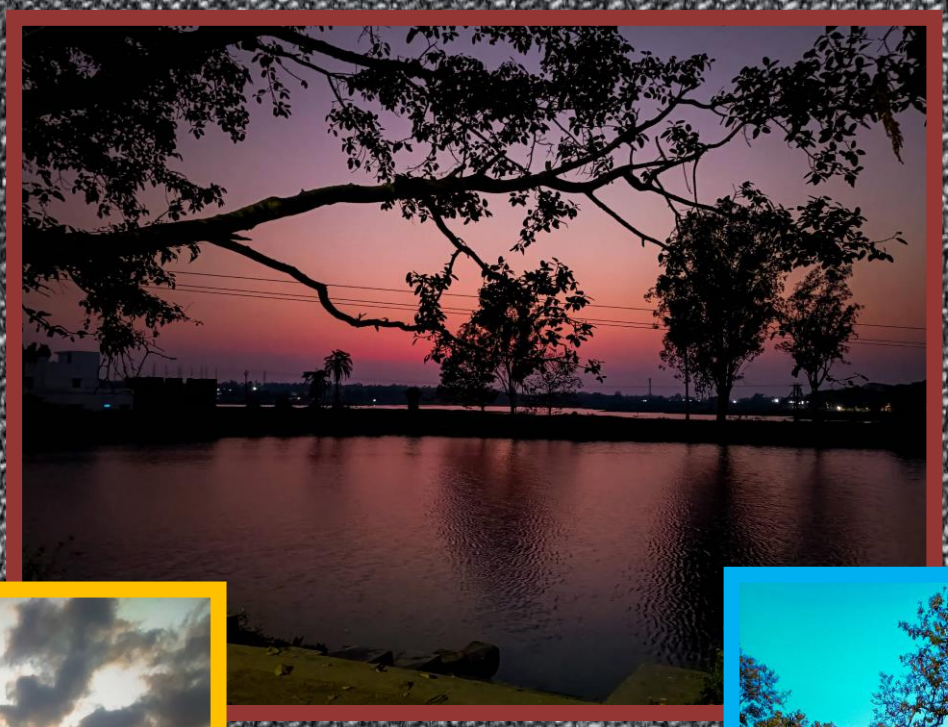
3rd Year

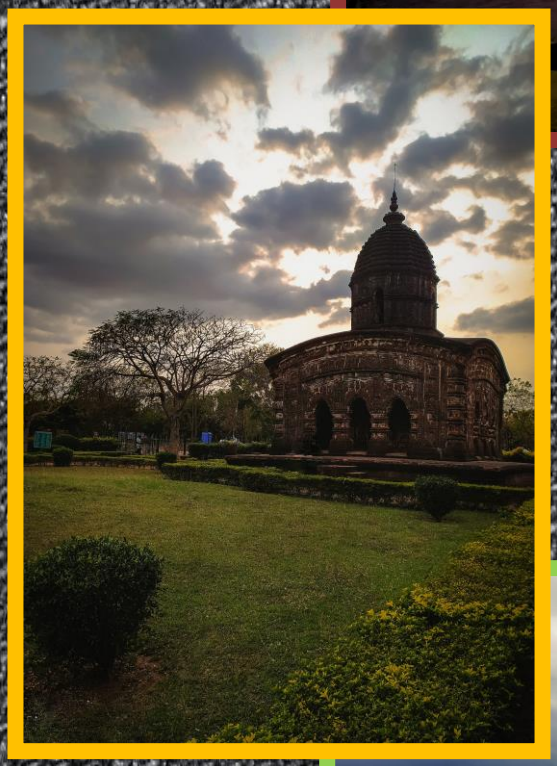
Department of Civil Engineering

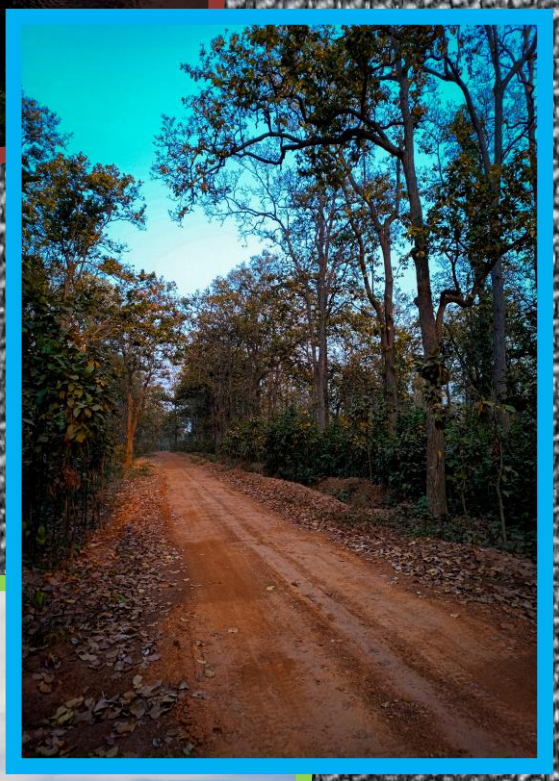
Neha Bhattacharjee

3rd Year

Department of Civil Engineering



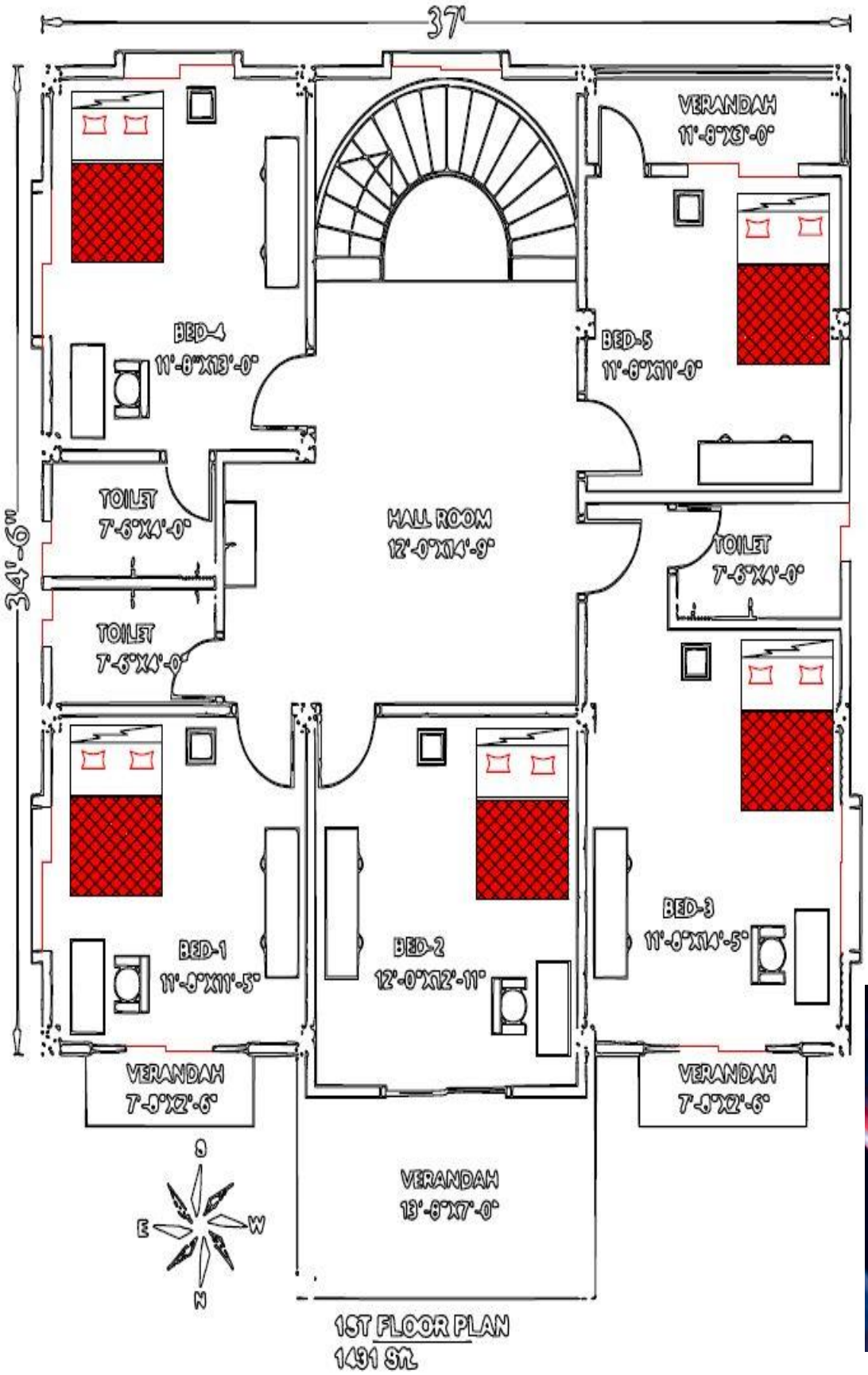




Sneha Karmakar

3rd Year

Department of Civil Engineering



SUBIR GHOSH

4th Year, Civil Dept.

12001321069

E - Magazine

CIVILOHOLIC Vol-3

Technical Articles, Literatures, Poetry, Drawings and Photography are invited for upcoming publication.

Guidelines for submission to the magazine:

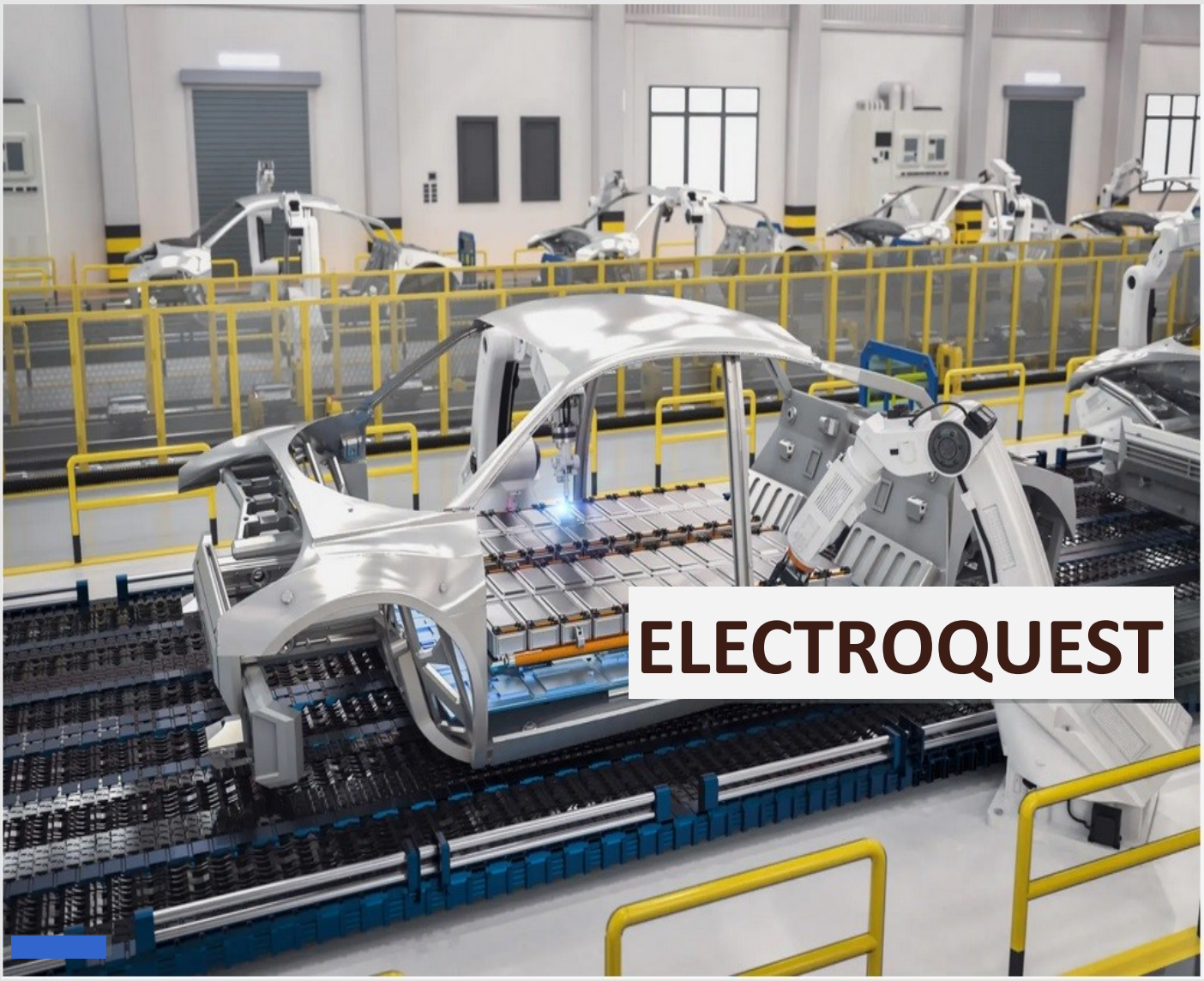
1. *Topic of Article*: Technical or Literature
2. *Language*: English, Hindi and Bengali
3. *Word limit*: 2000
4. Articles are to be sent as *Microsoft Word document*.
5. *For Photography and Drawings* send photos only in jpg/jpeg/png format.
6. Provide particulars: NAME, Roll no/Registration No., Year, Branch/ Department, and Contact Number.
7. Students of DR. B. C. Roy Engineering College can send their creations.
8. You can send suggestions if any at:

anupam.biswas@bcrec.ac.in

!!!THANK YOU!!!

Dr. B. C. Roy Engineering College, Durgapur

Department of Electrical Engineering



ELECTROQUEST

VOLUME: 4

DECEMBER, 2023

Sangbedya Das, Student

Vision

To create a strong teaching, learning, innovation and research environment with inclusive improvement of students and global participation so that the institute is regarded as global center of learning through meaningful, devoted and determined efforts of all stakeholders.

Mission

Excelling in professional career and/or higher education and research in developing innovative technologies by acquiring sound knowledge in basic sciences, professional cores and interdisciplinary subjects of electrical engineering.

Imparting meaningful learning centric education in both professional core and inter disciplinary subjects with latest advancement to bridge the gap between industry and academia.

Inculcating a deep sense of organizational behavior, financial management, values, ethics, societal responsibilities and environmental awareness.

Developing communication skills in the students to help them adopt and contribute more under diverse and dynamic working climates.

Program Outputs (POs) of the course

PO	Graduate Attribute	Description of PO
PO1	Engineering knowledge	An ability to apply knowledge of mathematics, science, engineering and humanities for solving Engineering problems.
PO2	Problem analysis	An ability to define problems and provide solutions by designing and conducting experiments, interpreting and analyzing data and reporting the results
PO3	Design / development of solutions	An ability to design manufacturing systems that would encompass system design requirements as demanded by the Industry/customer
PO4	Conduct investigations of complex problems	An ability to identify, comprehend, analyze, design and synthesis of the information to solve complex engineering problems with proper validation.
PO5	Modern tool usage	An ability to develop skills and techniques to handle state art engineering tools necessary for engineering applications.
PO6	The engineer and society	An understanding of professional, health, safety, legal, cultural and social responsibilities.
PO7	Environment and sustainability	An ability to practice impact engineering solutions for economic, environmental and global development.
PO8	Ethics	An ability to apply ethical principles, responsibility and norms of the engineering practice
PO9	Individual and team work	An ability to function and lead a group of members for multi-disciplinary projects.
PO10	Communication	An ability to communicate, represent problem related to engineering society.
PO11	Project management and finance	An ability to use the modern engineering tools, techniques, financial skills and management principles to function as a member and leader in a

		team, to manage projects in multi-disciplinary environments.
PO12	**Life-long learning**	An ability to engage for resolving engineering problems and contemporary issues to acquire lifelong learning.

Program Specific Outputs (PSOs) of the course

PSO	Description of PSO
PSO1	Indentify, formulate and solve various real time problems of Electrical Machines, Power System, Control System, Power Electronics and Electrical Drives, Microprocessor, Digital Signal Processing and other interdisciplinary subjects with the knowledge of basic science and engineering science as prerequisites, design various types of machine and power system components with cost minimisation, explain Indian Electricity Rules, Energy Acts for safety of society, tariff and energy savings.
PSO2	Perform laboratory experiment in a group using various electrical technologies, both modern hardware and software tools like MATLAB, Mi-Power used in industry and prepare reports tabulating & analyzing the results/ data, drawing the circuit diagram & graphs to enable the documentation capability and solve engineering problems using programming languages like C, C++, JAVA which will help them in being recruited by software industries.
PSO3	Carry out project on new age technologies like renewable energy sources, power quality, energy management/savings, smart grid, wireless system, automatic control system, embedded systems based on modern technologies like IoT and defend their project work in front of experts which help in developing the capability of doing team work, satisfying the requirement of the present day working environment.
PSO4	Communicate; write term paper integrating various information in standard format to that of a research paper for effective & life-long learning, present seminar on recent developments in engineering & technology, fulfilling social, behavioural, managerial, ethical & cultural requirements.

From the desk of the Head of the Department

Dr. Susanta Dutta, Associate Professor

Greetings to all the stakeholders from Electrical Engineering department of BCREC, Durgapur. It is a great pleasure to share 4th volume of e-magazine 'ElectroQuest '. The magazine provides an opportunity for the faculty, staff, students, alumni and guest members of EE department to showcase their inner talents and innovative ideas in form of technical write-ups, photography, literary items, science fiction and thought provoking articles.

I wish to congratulate the editorial team for their excellent effort in bringing out the current issue of ElectroQuest.

ElectroQuest has become a platform for expressing the ethos of the members of the department. It is undoubtedly helping us in attaining our philosophy of learning through academic rigour along with recreation and fun. Our motto is to strive for excellence in all fields. We are committed to all round development of the department and its members. This commitment is amply acknowledged by National Board of Accreditation. Our department is now NBA accredited, (717/1000): June 2022-2025]

Other noteworthy achievements made by the department are listed below:

Publication and Research Status: Session 2022-23 **** (July 2022 to 15th June, 2023)	
	No of Publication & Project
Journal (SCI)	10
Journal (Scopus)	2
Journal (Others)	0
Conf (Scopus)	43
Conf (Others)	3
Book Ch (Scopus)	5
Total Publication	**63**
IP Filed	3
Patent published &Grant	6
Sponsored Project grant	2

Adding feathers to its cap, AICTE IDEA Lab. of our college has now made its presence felt nationally. It is a matter of honour for us, that out of the 106 AICTE IDEA Labs in our country, IDEA Lab BCREC has attained Position-I among all labs for its remarkable performance throughout the last year.

It is a pleasure to inform you that our college has attained necessary requisites for autonomy. Therefore, our journey towards excellence is continuing unabated.

On the placement front, we are making records. Total 783 nos. BTech. Final year students got offer letters from reputed companies. The spirit of the BCREC family is touching new heights. Therefore, our quest for class and distinction is having its footprint felt on all fronts.

We hope that our all out efforts of nurturing the talents of members of department will deliver best results. With best wishes for the success of the e-magazine.

EDITORIAL

Dear Readers,

EE department is pleased to put forward 4th issue of e-magazine 'ElectroQuest'. The e-magazine has now become a medium which addresses our aspirations, expressions and dreams. Its essence is to portray the inner talents of the members of the department. The launch of the current issue is possible, with the cooperation of ever-enthusiastic members with an eye for excellence.

Since the publication of previous issue, our department and the institute have been making great strides in various fields. . It is a matter of pride and jubilation to inform you that EE department has scored a massive in performance evaluation by National Board of Accreditation. We are now NBA accredited. (June 2022- 2025) Our performance is undoubtedly commendable. Thus EE department has set up the benchmark.

As usual, technical, literary, science fiction, inspirational, and hand-drawn pieces can be found in the current edition of ElectroQuest. We sincerely appreciate the college administration's unwavering support and collaboration on all fronts. For their outstanding contributions toward the publication of this issue, we are grateful to Dr. Sunita Dey (BSH), Prof. Arka Banerjee (ME), Dr. Saibal Majumder (CSE, DS), Subhasis Datta (FMS). A special thanks to Dr. Shanti Gopal Pain (COE, CUSB) for providing his insightful write up. The editorial team would also like to express its gratitude to Souvik Singha, Sangbedya Das, and Akash Prasad for their exquisite drawings that further accentuate this issue's glory.

We would like to thank all those who contributed for successful publication of this issue of e-magazine.

Dr. Dola Sinha

Prof. Anupam Sinha

Prof. Kingsuk Majumdar

ATHLETIC MONITORING SYSTEM

Mriganko Sarkar, EE Student

Athletic Monitoring Systems have become increasingly popular in the sports and fitness industry, providing valuable data to athletes, coaches, and sports scientists. These systems leverage various technologies to track and analyse an athlete's performance, health, and training progress.

The key components and features typically found in a comprehensive athletic monitoring system:

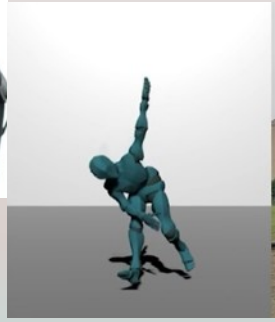
Wearable Sensors: Athletes wear wearable devices, such as smartwatches, fitness trackers, or specialized sports sensors, that are equipped with various sensors to collect data. These sensors may include accelerometers, gyroscopes, heart rate monitors, GPS, and sometimes more advanced sensors like electromyography (EMG) sensors.

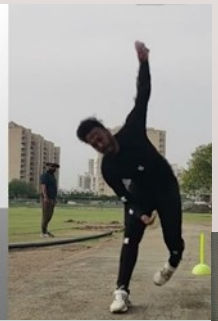
Biomechanical Analysis: Athletic monitoring systems often include biomechanical analysis tools that track an athlete's movements and form during training or competition. This analysis can help identify areas for improvement, optimize techniques, and prevent injuries.

Physiological Monitoring: The system may measure various physiological parameters like heart rate, heart rate variability (HRV), blood pressure, respiratory rate, oxygen saturation, and core body temperature. Monitoring these metrics can provide insights into an athlete's physical condition, fatigue levels, and recovery status.

GPS Tracking: GPS technology is used to monitor an athlete's position, speed, and distance covered during training or competition. This is especially valuable in sports like running, cycling, soccer, and other outdoor activities.

Performance Metrics: Athletic monitoring systems can track performance metrics such as speed, power output, cadence, jump height, reaction times, and other relevant metrics specific to the sport being monitored.





Data Analytics and Visualization: The collected data is processed and analysed using sophisticated algorithms and machine learning techniques. Advanced analytics provide athletes and coaches with valuable insights into performance trends and areas for improvement. Data is often presented in easy-to-understand visualizations and reports.
Injury Prevention and Recovery: By continuously monitoring an athlete's physical condition, training load, and recovery, the system can help prevent injuries and optimize the athlete's training regimen.
Cloud Connectivity: Many modern athletic monitoring systems have cloud connectivity, allowing athletes and coaches to access data remotely on various devices, share information, and collaborate with others.
Mobile Apps and User Interface: User-friendly mobile applications or web interfaces provide athletes and coaches with real-time feedback, training plans, and personalized insights based on the collected data.
Integration with Training Platforms: Some systems integrate with existing training platforms and sports performance software, making it easier for coaches and athletes to incorporate monitoring data into their training programs.

Criticism

Athletic monitoring systems includes concerns regarding privacy and data security, potential overemphasis on data-driven decisions, cost barriers limiting access for some athletes and teams, and the challenge of translating data into actionable training strategies effectively. Additionally, wearable devices usability and potential distractions during training or competition are also points of criticism.

Conclusion

Athletic monitoring systems play a vital role in modern sports and fitness, offering valuable data to optimize performance, prevent injuries, and enhance training strategies. While they have numerous advantages, including data-driven insights and real-time feedback, there are challenges to address, such as cost, privacy concerns, and ensuring the balance between data-driven decisions and traditional coaching methods. When used responsibly and ethically, athletic monitoring systems can be powerful tools in empowering athletes and coaches to achieve their full potential.

What do students want from Teachers?

Suneeta De. Associate Professor, Dept of English (BSH)

2020 changed our world in so many different ways.

Learning Management systems took forward the path to continued education. The novelty of Google Forms, Google Classrooms, Google Form quizzes with instant results, Live worksheets with instant feedback and attendance of the 'face'/'display picture' took precedence over a student's active participation in a brick and mortar classroom

At least the 'shutdown' did not *stop* the continuity, or its semblance, of the process of education for those who had the privilege of data and device. The students adapted like fish to water, as did many on the correct side of the digital divide. Teachers of a certain level of digital (dis) comfort remained on the margins of this technical tsunami. Predictably though, one had to adopt and adapt to keep the home fires burning, sooner rather than later.

Cut to a post-Covid classroom today.

The learners as well as the teachers have grown used to technology, devices, 'sharing' digital content and using multimedia inputs. 'Chalk and talk' is a pedagogy that is considered unstimulating. The knowledge sharing that occurs now does not need the teacher, always. The world, being at one's finger tips has left the teacher vulnerable to being compared to higher standards of competence, in an instant.

Knowledge dissemination is not what is the only *ask* of a student from the teacher, in class. Knowledge is available online, in byte sized nuggets, with a background score and a well groomed presenter to boot! It is available in a language of one's choice, in one's own bedroom/ study, at a time when it suits the learner. The learner decides what, when and where s/he wants to learn. The timetable and the strictures of obeisance to the 'teacher' – have become irrelevant.

What, then , does the post-Covid learner want from their post-Covid Teaching Environment?

To my best understanding over the last 2 years of classroom teaching in person, the learner is not looking for information anymore.

The learner would like to be mentored in the subject in question. That may be achieved by taking the subject to the floor in terms of applicationality. Additionally, the learner does not want to remain 'passive' anymore. So, engaging the learner physically, with 'tasks', is a requirement. Total Physical Response (TPR) may need to be revived as a pedagogic tool, irrespective of subject. Projects, Experiential Learning (good old 'excursions' of the yore) and Service Learning are what might become mandatory in every domain, going forward.

For a subject that focuses on Interpersonal Skills and Communication, for instance, a video of the learners taken in the first weeks of class and compared to their term-end performance would be tangible proof of what milestones have been achieved. The curriculum inputs would include all forms of Blended Learning tools. The new age learner believes in a life of options, a drop menu, links (to content), shorts (YouTube), impatience for anything more than 200 characters, continuing for more than 3mins, not having the option to scroll, un-follow or unsubscribe. The classroom and the curriculum fail them here.

Learners require customization, individual attention, a certain level of 'pampering' (given the rising phenomena of 'mental health issues) and the continuation of being treated (in class) like the only child of the family, which many truly are.

Teachers are required to cater. This and emotional wisdom, patience, subject knowledge up-skilling, publications and conferences, organizing interactive events for learners, and evaluating the processes that form the bedrock of education, are all on the menu for the teachers that the learner has on her/his wish list of an ideal teacher. If one appears friendly, pleasing and smartly groomed while at it, things becomes all the better.

Let us not forget maintaining scrupulous *records.*

I hope our learners appreciate the efforts that one puts into the task of preparing for teaching – one 50 minute class at a time!

Sustainable Development – Role of Educated Engineers:

Prof. Anupam Sinha

'Sustainable development is development that meets the needs of present, without compromising the ability of future generations to meet their own needs.' - *Sustainable Development Commission*

Therefore, the main aspect of sustainable development is that we must keep in mind the future impact our present actions will have on planet earth. This calls for concerted and collective action by all countries, societies and individuals. Thus sustainable development means all inclusive development by utilising our resources in such a way that enables us to renew our resources or to ensure availability of the accessible resources for benefit of all of humanity. The advantage of the resources should be available to the present as well as future generations. The development should benefit all with equitable and just distribution among different societies and keeping the environment of the planet earth safe and habitable. Therefore, economic viability, environmental protection and social equity form the three fundamental aspects of sustainable development.

Role of Educated Engineers:

Education is the essential tool which equips individuals with necessary skills and acumen to successfully face the challenges posed by their work environment, professional career, and interpersonal relations. Education imbibes the habit of rational and logical thinking. It essentially encourages and fosters creativity and innovation among the learners.

By viable education young engineers shall be capable of having a deep understanding of environmental issues, a clear idea of eco systems and human habitats. It will help him to inculcate the qualities of ethical thinking, social welfare and become responsible citizens. The engineers shall have the role of key player in creation of society, with development of technology and material prosperity. Based on engineering knowledge they should ensure the best interest of the society. They should be able to find practical solution to engineering problems, which are addressing environmental concerns, society and are economically viable.

Contending with the challenges of Global climate changes, reducing the carbon footprint should form the prime concern of engineers. Emphasis should be on development and use of cleaner and renewable energy resources for our energy needs. The creative engineers with their novel ideas shall be able to find feasible solution to complex engineering problems, with multiple constraints. While formulating engineering problems and finding solutions, they should desist from exploiting Nature; rather work in tandem with Nature. Improved models of development with ever increasing perfection may be ushered into existence by creative and innovative engineers. This will help in planned technological development of society.

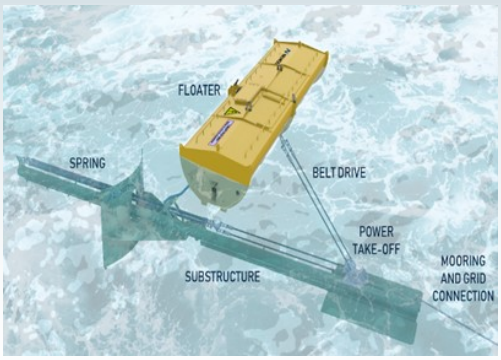
Therefore, educated, creative and innovative engineers should have a big role in sustainable development of society. They can ensure a clean and habitable world for us and the posterity.

Innovative Wave Power Plant

Rajdeep Choudhury, Student

In our growing world we need huge amount of power to develop our lifestyle. But due to growing climate concerns and energy price hikes, all's are showing interest in renewables energy to meet out energy needs.

In Innovative Wave Power Plant, the power of the waves used to generate electricity. The engineers have developed an innovative technology which offers a new affordable & clean electricity for us.



Innovative Wave Power Plant tested in the North Sea
The NEMOS wave power plant produces electricity in the middle of the sea. It is the first plant that is expected to perform successfully both technically and economically.

Key Facts:

Wave energy has historically been uncommercialized due to the complexity but new technology can easily extract the energy from the ocean waves.

Commercializing wave energy has enormous potential - the World Energy Council predicts that wave energy can produce twice the amount of electricity which the world currently produces.

More than half the world's population lives within 100 km of a coastline, and in many locations, the power of the waves is available around the clock.

A new technology in wave power is Floating Oscillating Surge Wave Energy Converter,

This converter could generate about 100 kilowatts energy, enough to power about 35 homes. Ac team of Stevens Institute of Technology uses an advanced control system to allow device operators to maximize power production based on wave conditions.

WAVE POWER PLANT in WORLDWIDE: -

The world's largest-ever wave power plant is set to be built by Israel's Eco Wave Power (EWP) on Turkey's Black Sea coast following inking of deal with Oren Ordu Enerji.

The phased, 77MW plant, based on a fixed, modular array of steel floats hinged to piston-equipped arms that pump a working fluid via a subsea umbilical pieline to an onshore generator in time with the rise and fall of incoming waves, would be built starting with a 4MW pilot in the port of Ordu. **Ocean Energy Europe**, has said 100GW of installed capacity could be installed off EU by 2050.

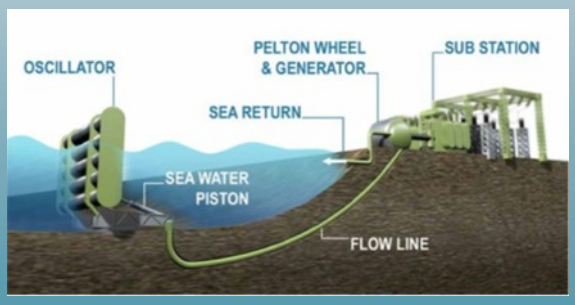
- World total wave power plant capacity is about more than 100 GW.
- China has developed several small Tidal Power projects at Jiangxia and at mouth of Yalu.
- World's first commercial Tidal stream power station was installed in Strangford Lough (Northern Ireland). Fast tidal stream (approx. 4m/s) was able to generate 1.2 MW.
- Many more tidal generation projects are at planning stage in South Korea, Portugal, Australia, US, UK, Russia, Philippines and India.
- In history tidal basins were used in Europe to drive mills to grind grain before AD 1100.

Rank	Power station	Country	Capacity (MW)
1	Sihwa Lake Tidal Power station	South Korea	254
2	La Rance Tidal Power station	France	240
3	Annapolis Royal Generating Station	Canada	20
4	Jiangxia Tidal Power Station	China	3.2

WAVE POWER IN INDIA:

India has a long coastline of 7517km marked along by numerous estuaries and gulfs which makes it attractive for the development of wave energy projects. India's wave power potential is around 5-15 MW/m, so the theoretical estimated potential to be around 40-60 GW.

IIT Madras and CRISIL have identified some locations for wave power development along the west coast of India in Maharashtra, Goa, Karnataka, Kerala & Kanyakumari. The CUF for wave energy in India is in the range of 15-20%.



Vizhinjam Wave Energy Plant:

Wave energy research in India was initiated in 1983 when the Department of Ocean Development of Government of India provided funds to IIT, Madras for carrying out the research. This led to the establishment of a 150 kW Pilot wave energy plant in 1991 at Vizhinjam in Thiruvananthapuram, Kerala.

Vizhinjam Wave Energy Plant was the world's first wave power plant working on Oscillating Water Column (OWC) technology. This technology utilizes the increase of water level in the caisson, after that the air inside is compressed, which is then used to drive an air turbine.

After a long duration of use, it was planned to be utilized for powering a Reverse Osmosis Desalination plant in 2004. This project also was not successful and the wave energy plant was finally decommissioned in 2011.

Benefits:

Wave energy is a clean and renewable source of energy.
Since waves are always present, so it's consistent in electricity generation is more than wind and solar.
They can be a good source of energy generation for off grid coastal areas and islands.
Wave energy often used to power the desalination plants.
Wave energy turbines when combined with offshore breakwaters, can help the protection of seashores.

Challenges:

Technological challenges include low turbine efficiencies, high turbine costs, unavailability of grid connections at potential sites, lack of experience and unpredictable environmental conditions.
Due to inadequate data, it is challenging to estimate the wave power plant on marine ecosystem.
Moreover, investment in wave power is risky because of high capital cost and lack of operational experience.

Note: According to Karnataka Electricity Regularity Commission (KERC) – a) The cost of project is ₹60cr, b) Price of power ₹4.70/unit, c) Space needed to build - 5km, d) Wind speed at beach – 28km/hr.

Transformation of rural to urban: A curse or boon to mankind

Dr. Sourav Paul and Dr. Sneha Sultana, EE

The continuous conversion of rural areas into thriving urban centers is a prominent and widespread phenomena that is influencing the development of human civilization. This transformation, driven by economic growth, industrialization, and technical breakthroughs, is sometimes seen as a double-edged sword that offers humankind both chances and problems. Many transformations occur as rural areas become urban areas, impacting environmental, economic, and social dynamics. This article explores the complex relationship between the transition from rural to urban areas and how it affects both people and the wider world. Strong infrastructure development is a sign of urbanization. Urban landscapes transform rural regions via major upgrades to roads, bridges, schools, hospitals, and other infrastructure. In addition to being a representation of advancement, this change is essential for meeting the demands of an expanding metropolitan population. Modern infrastructure not only promotes economic expansion but also raises urban dwellers' standards of living. The transition from rural to urban settings is inextricably tied to possibilities and goals related to the economy. Urban areas, which are frequently defined by commercial and industrial activity, draw people looking for greater job opportunities and higher wages. Cities turn into furnaces of economic vitality that promote entrepreneurship, innovation, and a wide range of employment options. Many people stand to benefit from this economic attraction, which may lower poverty, enhance access to education, and raise living standards generally. Cities frequently act as centers for healthcare and education, providing citizens with access to top-notch services. People who move from rural to urban regions might seek chances for higher education, which opens doors to career advancement and economic mobility. Better access to medical services is also ensured by the concentration of healthcare institutions in metropolitan areas, which enhances general wellbeing. The shift from rural to urban areas represents a significant social and cultural shift in addition to a physical one. Urban centers, which are known for being cosmopolitan, operate as melting pots for many cultures, encouraging exchanges and interactions between them. This diversity creates a dynamic tapestry of human experiences by enhancing social ideals, fostering artistic expression, and sculpting distinctive cultural landscapes.

Notwithstanding the possible advantages, the quick transition from rural to urban settings presents a number of difficulties that should be carefully considered. Urbanization is typically accompanied by problems including resource depletion, overcrowding, inadequate infrastructure, and environmental deterioration. Migration from rural to urban areas can cause close-knit rural communities to break apart, which can exacerbate societal problems including alienation, urban poverty, and overburdening social services.

The ecology usually suffers as a result of urbanization. The growth of cities is associated with a rise in air and water pollution, deforestation, and biodiversity loss.

Urban areas can have a significant ecological imprint that endangers ecosystems and exacerbates climate change. For the sake of the planet's health and the welfare of its people, urban growth and environmental sustainability must coexist in harmony. People are moving into cities at a rate that is frequently faster than the infrastructure that is needed. Urban systems can become overburdened by inadequate water supply, sanitation, and transportation, which can result in traffic jams, inefficiencies, and a general decline in quality of life. To lessen these difficulties, sustainable infrastructure development and effective urban planning are essential.

Summary in a nutshell

Economically, socially, and ecologically, the process of turning rural regions into urban ones is intricate and varied. Unquestionably, technology offers chances for advancement, economic expansion, and cross-cultural interaction, but it also presents obstacles that must be addressed with careful thinking and sustainable methods. Navigating this revolutionary path requires striking a balance between environmental care and urban growth, fostering inclusivity, and protecting cultural heritage. Transitioning from rural to urban areas is a complex process that calls for careful navigation rather than being either a clear blessing or a severe curse. The sustainability and prosperity of future generations will depend on humanity's capacity to maximize the positive effects of urbanization while reducing its negative effects. We need to have a comprehensive vision that puts social justice, environmental sustainability, and cultural heritage preservation above all else when we design our urban environments. The transformation of rural areas into urban ones can only benefit humankind if it is done so in a way that promotes harmony between urban dynamism and the principles that unite us as a species.

A Journey from a Researcher to an Entrepreneur

Dr. Dola Sinha

On the day of May 2021, at evening 5:30, my phone started ringing. "Dola, wouldn't you like to participate in the PowerPoint presentation?" the other party says as I take up the phone.

"You have applied for the RKVY Raftaar scheme. We have shortlisted you and sent you mail with details of today's presentation," he said, and I then gradually understood what he meant.

"But I didn't receive any correspondence from you—I suppose it's in my spam folder. If you could just give me five minutes, sir—I'll be right there." I told him.

I joined the meeting completely unprepared and was given only five minutes to pitch my idea. It was the day when everything was shut down because of the COVID-19 epidemic. It came as a complete surprise, even though I had done everything and discussed all the small things in detail. After one month, on June 12, I received an email from MANAGE (National Institute of Extension Management) Hyderabad, informing me that I had been selected for a two-month training program. They also informed me that an elimination procedure would be initiated with the training and that only twenty participants out of forty would be awarded the financial grant. From day 1, I accepted this challenge and promised myself that whatever it may be I won't be eliminated till the end. The program was demanding full attention, quick response, and lots of activities; courses began promptly at 10:00 a.m. and ended at 6:00 p.m. Two hours of break in the middle. I adjusted my classes of BCREC from 9 am to 10 am and in the middle 1 hour.

They specifically asked that we must maintain an attendance rate of 90% (minimum) during training or face immediate termination. During the first half of the training, there was a question-and-answer session, group work, and other different types of competition; we had to be on high alert the whole time. In the second half, there was a one-on-one session with an expert member, but only the first ten people could get the scope. They were asked to fill out a form for that session at the first one, and the eleventh person couldn't participate and their attendance went down. As a part of this training, we are required to do extensive coursework, fieldwork, and interaction with the farmers throughout this program and provide them with the videos as proof. I have always had a lot of support from my teammates, Chaity, Kinshuk, and Suchismita. We gained a lot for our business, promotion, revenue-earning methods, digital platform handling, website design, newest digital technology for promotion, Omni channel management, cash management, opportunity flow, grant-in-aid proposal writing, and attractive PPT making.

My sincere thanks go out to Mr. Alokhnath C. R., our favorite coordinator for making the most of our two months working with MANAGE. Our beloved leader "Alok Sir" was incredibly careful with us because he was both knowledgeable and compassionate. Adjectives become insufficient when used to characterize such an individual. During this time, we made many acquaintances across India, including Suyog Kulkarni and Varsha from Mumbai, Alito from Nagaland, Aruneswar from South India, and countless more. Near the conclusion of the two months of training, my attendance rate was 98.5% and after elimination, we were then only 25.

Professor Murthy served as a judge for our practice presentation. He was an exceptional critic and an exceptional human being. Because of his criticism, everyone was on edge. Me and Suyog performed better and our confidence levels rose, I'll never forget how much happier we felt after satisfying him. With this, our winning journey starts.

In the first CIC, we have just five minutes to pitch our proposal to the entire MANAGE team and an impartial third party. Since it was an elimination process as well, we were extra cautious. However, now that we're used to the system, we can finish our presentation well and explain everything in a flash. There was no provided list, so I have no idea how many of us made it through Phase 1, as MANAGE had provided a letter of acceptance to the selected person only. Following that, we patiently awaited the ministry's second and last CIC round. We need to finish the legal procedure of opening the company at the first and second CIC meetings. Yes, ANKURAAN (The magical journey from seed to seedling) is the name and tagline of our joint venture. In the second CIC, we were given just three minutes to present our ideas, with the remaining seventeen minutes being reserved for questions and answers. The assessment team included members from the Indian Ministry of Agriculture as well as specialists from throughout the country. We were able to finish our presentation in only three minutes thanks to the training we received from MANAGE. My presentation was well-received by the ministry, and I attribute my success to my engineering experience, which allowed me to clearly describe the product's value proposition as well as its recent technological developments. MANAGE provided me with training on both the engineering and the business side and helped to carry out the statistical analysis of TAM SAM and SOM.

Along the way, in 2020, I had the pleasure of meeting Professor Vijay Nadiminty of PJTSA University in Hyderabad. After getting his advice and training session, I was able to crack the first level of RKVY Raftaar without any preparation. We were able to approach the proposal writing with fresh eyes. Thanks to his one hour session. The reason is, that it goes against our grain of thought. So, I was able to ace the first round when I received the first call from MANAGE;

Additional difficulties arise as the mechanical fabrication phase begins. Finding equipment with a proper rating and desirable structure is just searching needle in a haystack. The limitations of cost-quality-weight were a constant source of contention for us. We finally found a supplier in Ahmedabad who could supply us with DC motors at the required rating with the help of a digital marketing platform after a tremendous amount of searching. However, we must still make compromises in terms of weight. A fully-equipped workshop is required for this kind of construction. Dr. Chandan Bandyopadhyay stepped up to the plate and became an integral part of Ankuraan's efforts to resolve this issue. Our production manager, Mr. Tarun Dutta, poured his heart and everything into making the bot. In his pursuit of putting his dream into action, he does not spare any effort. The supportive atmosphere fostered by Sovan Bhattacharya , Saibal Majumder and Debkanta sir of BCREC has been invaluable to the growth of my startup team. Thanks to their assistance, we were able to finish the first milestone and go on to the next one. We are thankful to Abhishek sir of Aparajita Solar and Krishna sir of AICT Pvt. Ltd, Chitra Madam of SBI, Durgapur, Mr. Yuvraju sir and Dr, Sarvanan sir Director, MANAGE, Mou (EE), Moutusi (ECE), Sushanta da (CSE) and other faculty members of BCREC. Mr. Ravi Sharma, Senior Finance manager, BCREC stretched his hand for official document verification, and Mr. Sougata Ganguly CA for audit during the submission of 1st review report.

Please keep me and my ANKURAAN in your prayers as we are working hard to get our product to market as quickly as possible and successfully run.

We can still remember the advice of Dr. APJ Abdul Kalam that, "we must have a dream before our dreams come true".

Will come soon with the story of "**The next-phase-struggle**".....

(To be continued.....)

Student Psychology Overview

Angika Anjan, Student

Student psychology refers to the study of the psychological factors that influence and affect students' behavior, emotions, cognition, and overall well-being in an educational setting. It is a branch of psychology that focuses on understanding the unique challenges, developmental stages, and learning processes that students go through during their academic journey. Student psychology encompasses various aspects, including:

Learning and cognition: Understanding how students acquire knowledge, process information, and develop problem-solving skills. This area explores memory, attention, motivation, and the impact of different teaching methods on learning outcomes.

Developmental psychology: Examining the physical, cognitive, emotional, and social changes that occur as students progress through different stages of development, from early childhood through adolescence and young adulthood.

Motivation and engagement: Investigating the factors that drive students to participate actively in their education, set and achieve goals, and remain engaged in the learning process.

Emotional well-being: Studying the emotional challenges students face, such as stress, anxiety, depression, and how these emotions can influence their academic performance and overall quality of life. Social interactions and relationships: Analyzing the impact of peer relationships, teacher-student interactions, and the school environment on students' social development and academic success.

Educational interventions and support: Developing and implementing strategies and support systems to help students overcome academic difficulties, enhance their strengths, and promote overall well-being.

Educational decision-making: Understanding how students make choices related to their academic and career paths and exploring factors that influence these decisions.

Student psychology plays a crucial role in improving the educational system, as it helps educators, parents, and policymakers gain insights into the needs and challenges of students. By understanding student psychology, stakeholders can develop effective teaching methods, design appropriate interventions, and create supportive environments that foster optimal learning and personal growth.

Ingenious Horizons

Dr. Saibal Majumder (CSE, Data Science)

At one point in time, there lived a bright young engineer named Alex Mitchell in the midst of all the activity at Horizon University. Alex, who was well-known for his originality and creative thinking, was constantly testing the limits of what appeared feasible. Rumors about his possible project circulated throughout the halls as his last year drew near, generating interest and excitement.

Alex was self-motivated to make a mark in the renewable energy industry, which he loved. The enormous difficulty of the task spurred innovative thinking on his part. He finally came up with an innovative idea—a solar-powered, self-sustaining mobile charging station—after months of devoting himself to the subject. His goal was to meet the increasing demand for mobile devices while also bringing sustainable energy to underserved communities.

Incorporating state-of-the-art photovoltaic cells and energy storage devices, the solar charging station guarantees a constant supply of electricity, even when lighting is scarce. The unique feature of Alex's concept was its modular architecture, which made it easy to adapt to the demands of the community and scale or down as needed. Rather than being a simple fix, it was a groundbreaking breakthrough with numerous potential uses.

Prominent members of the academic and business communities took notice of Alex's research as word of it spread. We were all impressed by his commitment and inventive strength. Given the support and guidance he received from the institution, he was able to realize his dream. A solar charging station prototype was brought to life, demonstrating not just technical skill but also a practical use that has the potential to impact people's lives for the better.

In the midst of placement season, leading firms fought for Alex's interest. Technical prowess and the capacity to think creatively beyond the box were both on display in his endeavor. Interviewers were impressed by his self-assurance as he described the creation's complexities, which spoke volumes about his ability to think creatively and efficiently. Because of the great potential of Alex's solar charging station, one business, SolTech Innovations, gave him a generous compensation plan. They saw that Alex's inventiveness was a strength that would propel their business ahead, and they were excited to introduce his idea to the competition.

Alex Mitchell felt accomplished when he started his career after graduating with honors. Going from an aspirational engineering student to a highly sought-after inventor, he exemplified the potential of creative thought and its influence in scholarly and professional settings. In addition to molding his own future, the "Ingenious Horizons" that Alex had dreamed of helped make the world a better and more sustainable place

রেখা

অর্ক ব্যানার্জী , সহকারী অধ্যাপক, মেকানিক্যাল ইঞ্জিনিয়ারিং

একটা পথ আঁকতে গিয়ে

পেনসিল এঁকে-বেঁকে ছুঁয়ে গেল

প্রাইমারি স্কুলের খেলার মাঠ,

গ্রামের এক প্রান্তের আরেকটা পুকুরঘাট,

যেখানে সাবান-তেলের বাটি নামিয়ে রেখে

একটা রেলস্টেশানের স্পর্শক বরাবর

পেনসিল ছুটে পৌঁছল একটা শহরের কলতলায়,

সেখানে পথের বক্রতাকেন্দ্র

একটা ঘুবচি গলির মধ্যে পড়ে রইলো কয়েকটা বছর।

কলেজের ক্যান্টিন, কমনরুম ঘেঁষে বাঁক নিতে

মিছিলের সামনে উদ্যত রাইফেলের চোখে চোখ রাখল।

তারপর একদিন নতি কমে যায়

সমস্ত গতিশীল বস্তুর সরণরেখার ;

একটা অফিসের বাস সোজাসুজি আসা-যাওয়া করতে থাকে রোজ দুইবেলা।

তারপর, ত্রিকোণমিতি শেখায়

কিভাবে ছায়া দীর্ঘ হয় শরীরের থেকে...

এই বেলা যথেষ্ট অবসর, বোঝার বয়স হয়

প্রতিটি বক্ররেখাই আসলে

যথেষ্ট কাছ থেকে দেখলে, সরলরেখা।

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Artificial Intelligence: An Indispensable Tool from the past for Future Engineers

Prof. Soham Dey, EE

Artificial Intelligence - explores a realm that has captivated human imagination for decades and is now weaving its way into the very fabric of our existence. AI has become a driving force in shaping the landscape of modern technology, revolutionizing the way we live, work, and interact with the world around us. Artificial Intelligence, or AI, is not merely a technological innovation; it is a paradigm shift, a leap forward into a world where machines not only perform tasks but learn and adapt, mimicking, and sometimes surpassing human intelligence. It's a journey that started with theoretical musings on the possibility of machines thinking, evolving into a complex tapestry of algorithms, data, and computation that now surrounds us.

Historical evolution of AI:

This journey takes us back to the roots of AI, where visionaries like Alan Turing laid the groundwork for machines that could simulate any human intellect. Over the years, AI has evolved from rule-based systems to the dynamic and self-improving algorithms we witness today. It is a journey of exploration, innovation, and continuous refinement, fuelled by the insatiable human quest for knowledge and progress.

1. **Dartmouth Conference (1956):** The term "Artificial Intelligence" was coined during the Dartmouth Conference in 1956. John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon gathered to explore the possibility of creating machines that could simulate human intelligence.

2. **Early Symbolic AI (1950s-1960s):** The initial years focused on symbolic AI, where researchers attempted to create intelligent systems through symbolic reasoning and rule-based logic. Programs were developed to mimic human problem-solving and logical reasoning.

3. **Machine Learning Emerges (1950s-1960s):** The concept of machine learning, a crucial aspect of modern AI, began to take shape. Researchers like Arthur Samuel worked on creating systems that could learn from experience, paving the way for the development of algorithms capable of improving performance over time.

4**. AI Winter (1970s-1980s):** Due to over-optimistic expectations and unmet promises, the field experienced a period known as the "AI winter," marked by decreased funding and waning interest in AI research. Many believed that achieving true artificial intelligence was more elusive than initially thought.

5. Expert Systems (1980s): Despite the challenges, the 1980s saw a resurgence in interest, particularly in the development of expert systems. These systems utilized knowledge bases and rules to mimic the decision-making processes of human experts in specific domains.

6. **Rise of Neural Networks (1980s-1990s):** The 1980s witnessed a renewed focus on neural networks, inspired by the human brain's structure and functioning. Although progress was made, the computational power required for training deep neural networks was often prohibitive.

7. **Machine Learning Renaissance (2000s-Present):** Advances in computing power, the availability of vast datasets, and improved algorithms contributed to a resurgence in machine learning. Techniques like support vector machines, decision trees, and ensemble methods gained prominence.

8. **Deep Learning Revolution (2010s-Present):** The current era is characterized by the dominance of deep learning, a subfield of machine learning that leverages neural networks with multiple layers (deep neural networks). Breakthroughs in deep learning have fueled remarkable achievements in image recognition, natural language processing, and game-playing AI.

9. **AI in Everyday Life (2010s-Present):** AI has become an integral part of our daily lives. Virtual assistants like Siri and Alexa, recommendation algorithms on social media and streaming platforms, and autonomous vehicles are just a few examples of AI applications that have become commonplace.

10. **Ongoing Developments (2020s):** AI continues to evolve rapidly, with ongoing developments in areas such as reinforcement learning, explainable AI, and the integration of AI with other emerging technologies like quantum computing and 5G.

In the subsequent sections of our exploration today, we will unravel the intricacies of AI, examining its fundamental components such as machine learning and natural language processing. We will venture into its practical applications, from the conveniences of virtual assistants to the profound impact it has on healthcare, industry, and beyond.

The Building Blocks:

Understanding the fundamentals of AI is crucial. The core components of AI includes machine learning, natural language processing, and robotics. AI explore how these building blocks come together to create intelligent systems capable of learning and adapting.

Machine Learning:

A deep dive into the engine that powers much of AI—machine learning. Discussing supervised and unsupervised learning, reinforcement learning, and neural networks, AI executes how machines can be trained learn from data and improve their performance over time.

AI in Everyday Life:

AI is no longer confined to research labs. We can absolutely feel the ubiquitous presence of AI in our daily lives, from virtual assistants like Siri and Alexa to recommendation algorithms shaping our online experiences.

AI in Healthcare:

One of the most promising applications of AI is in healthcare. AI is now revolutionizing diagnostics, drug discovery, and personalized medicine.

AI in Industry and Automation:

The impact of AI on industries is profound. This section delves into the role of AI in automation, predictive maintenance, and quality control. AI is now reshaping manufacturing processes, supply chain management, and the concept of smart factories.

The Human-AI Partnership:

Emphasizing the importance of collaboration, this section explores the concept of human-AI partnership. There are scenarios where AI augments human capabilities, leading to more efficient problem-solving, research, and decision-making.

Challenges and Ethical Considerations:

While AI presents tremendous opportunities, it also raises ethical concerns. There are various issues such as bias in algorithms, job displacement, transparency and explain ability, Data Privacy and Security Risks: that come with the widespread adoption of AI.

Yet, even amidst these challenges, there is an undeniable sense of optimism. The future of AI holds promises of advancements that could redefine the very essence of creativity, collaboration, and the human-machine partnership. This article investigates how AI is not just a technological tool but a collaborator, augmenting human capabilities and ushering in new possibilities.

Artificial Intelligence stands at the forefront of technological innovation, reshaping the world as we know it. So we have seen an extensive journey of AI, from its historical roots to its present applications and future potential. As we navigate the ever-evolving landscape of intelligent machines, understanding and responsibly harnessing the power of AI will be key to unlocking its full benefits for humanity. So, let us open our minds to the potential, acknowledge the challenges, and together, contemplate the responsible and ethical integration of AI into our lives. The age of intelligent machines is upon us, and together, we shall navigate its complexities, shaping a future where the collaboration between human ingenuity and artificial intelligence knows no bounds.

Integrating sensors and actuators for a robust BIOT-enabled smart farming

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Improved farming efficiency is a result of the Internet of Things (IoT) and its two performers: sensors and actuators. Sensors sense the physical environment and relay that information to devices, which trigger actuators, the doers of the IoT-enabled ecosystem, to take specific actions based on real-time data. Sensors gather information about soil temperature, humidity, and other physical parameters for environmental monitoring. Sensors are used to monitor the qualities of the soil, including temperature and humidity. Actuators then use this information to automate processes such as fertilization, sowing rates, and pesticide application which results in the most economical use of resources. Thus, the Internet of Things (IoT), together with actuators and sensors, improves productivity. The IoT-enabled ecosystem is based on real-time data by sensors that perceive the environment and communicate that information to devices.

The Vigilant Eyes: Sensors

The heart of every IoT network is sensors, acting as the watchful eyes of the physical parameters governing farming resources. These devices come in various forms, from temperature sensors and motion detectors to sophisticated environmental monitors. Their primary task is to perceive changes in their surroundings and convert this information into valuable data just like a smart home adjusting its real-time temperature readings or a smart city optimizing traffic flow through intelligent sensors monitoring vehicle movements.

The Hands That Respond: Actuators

The IoT-enabled system reacting hands, or actuators, are on the other side. The conversion of digital intelligence into tangible actions is handled by these devices. Actuators give sensors' data life, whether they're used to remotely operate robotic arms in a smart factory or tilt solar panels to optimize energy absorption. In an IoT system, the actuator can act on data collected by sensors to create an outcome. Actuators receive data from sensors, which enables them to precisely schedule and carry out operations like push, pull, injection, trigger, etc to the agricultural equipment. The IoT ecosystem is driven by this smooth cooperation, which makes automation efficient. These are the instruments that translate digital intelligence into physical actions. They perform decisions that maximize ease of use and efficacy, acting as a bridge between the digital and physical worlds.

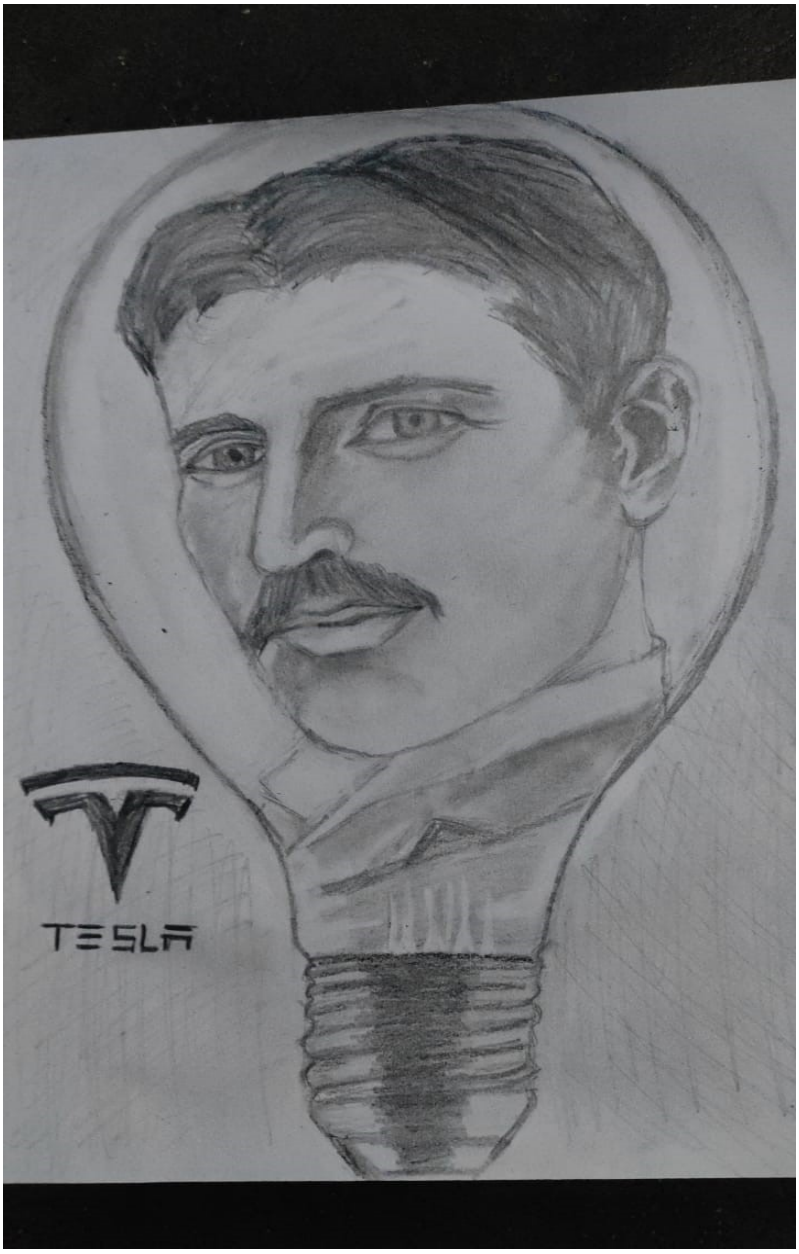
Challenges and Future Horizons

As a way to minimize resource use and fulfil the growing worldwide need for food, smart agricultural farming has gained popularity. Crop production is sustainably demanded by population pressure.

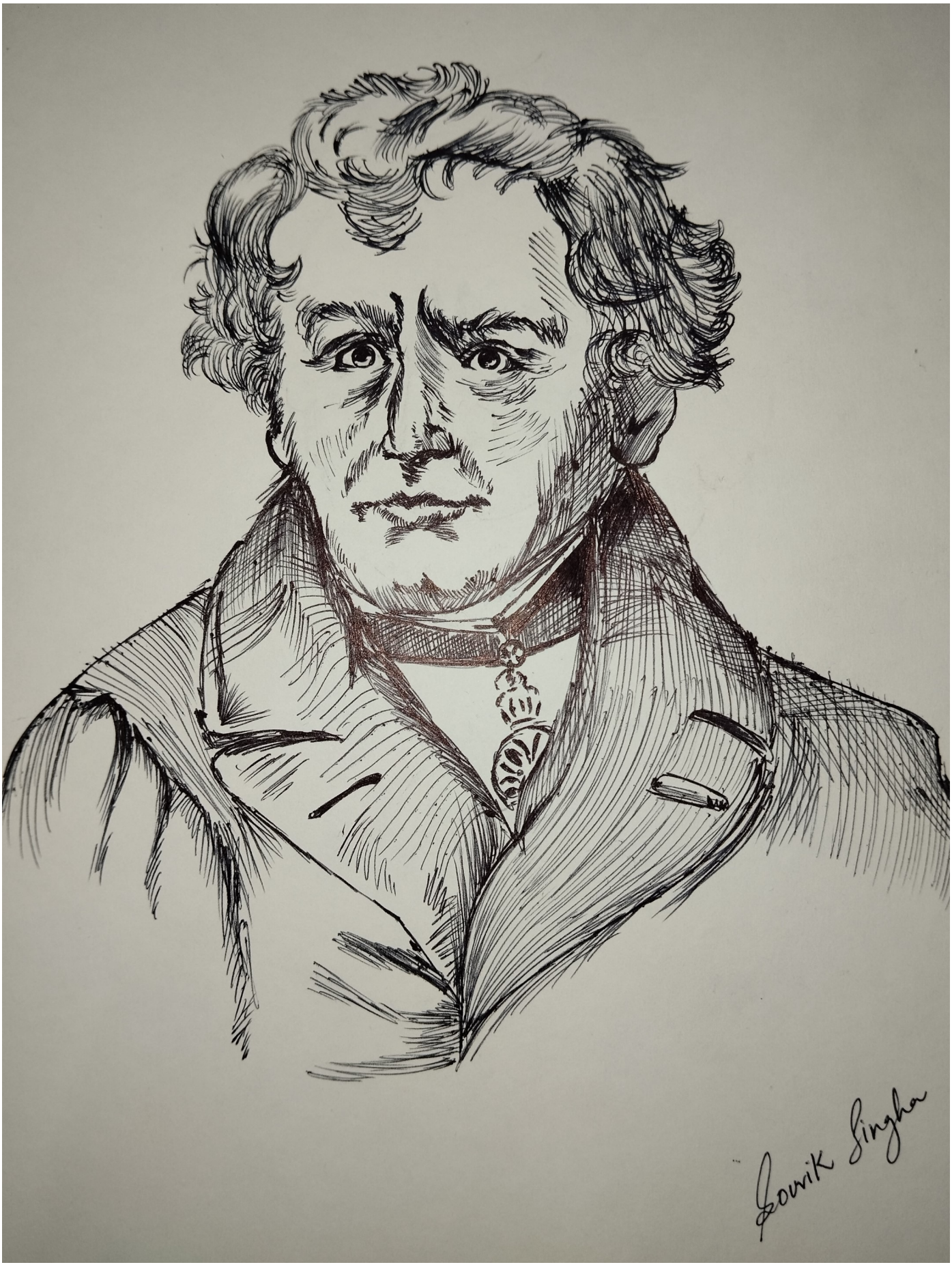
The constraints of organic crop management include the need to get past issues with data gathering, storage, security, and sharing about crop growth; monitoring irrigation and soil conditions as well as fertilizer use during harvest; rising commodity prices; and traditional food supply chain systems that lack a direct link between the producer and the consumer. Stakeholders create and manage data at different stages according to their capabilities and requirements. Data must be unchangeable and clear. Blockchain technology is used in smart agriculture to handle data via the Internet of Things (IoT).

Since we are dependent on the capabilities of sensors and actuators, issues like data security, privacy concerns, and standardization must be carefully considered; however, as technology develops, so do the solutions to these issues. As we approach the brink of a future with greater connectivity, it is evident that the interaction between sensors and actuators is what propels the Internet of Things' transformative potential. The complex dance that these devices perform between data and action opens doors to innovation, improving the efficiency, sustainability, and interconnectedness of our lives. Therefore, the IoT paving the way for a day when the digital and physical worlds seamlessly merge.

Blockchain-based IoT, which emphasizes man-machine cooperation, is therefore a must for Industry 5.0, or sustainable agriculture production. A distributed application-based approach for smart agriculture using Industry 5.0 technology is the need of modern farming. Because the current IoT-based agricultural systems are isolated, there are worries about data manipulation, security, and single points of failure. The study's goal is to create a reliable, safe automated system with BIoT technology that will enable the Internet of Things and do away with data tampering in organic agricultural growing using blockchain technology. Farmers may be able to make data-driven decisions because of the blockchain's ability to securely store data gathered by IoT devices.



Akash Prasad, Student



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