



# Sthapatya

DEPARTMENT OF CIVIL ENGINEERING

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**RESULT OF DEPARTMENT**



*To cultivate the leaders in Civil Engineering field bearing high technical competence to meet future challenges.*

*To prepare students for the challenges in Civil Engineering industry by infusing Skill based Methodology.*

*To encourage self development of the students through Curricular and Co-curricular activities.*

*To promote high Moral and Ethical values among the students to become responsible citizens.*

## MESSAGE BY HEAD OF DEPARTMENT



**Prof. S.D.Kandale**

*My vision is to develop constructive thinking and analytical capabilities of every student of Civil Engineering Department. Our department is committed to provide students with a strong, broad based fundamental engineering education and prepare the students for a career in the industry, teaching and national laboratories. We also plan to develop entrepreneurial skills in students through internship programmes so that they would drive the spirit of growth of our economy and would be able to generate employment opportunities for other qualified and skilled people.*

*I personally look forward to integrate my experience of over 8 years in teaching and research into the learning systems and the collective efforts of the faculty of the department and build a comprehensive methodology that encompasses whatever that matters for nurturing the minds of our students. I look forward for preparing my students to face the challenges; the technology and engineering sector would offer in the future and succeed in offering technological solutions for the betterment of the society and our nation. I am happy to know that the*

*Department of Civil Engineering, Brahmdevdada Mane Polytechnic Belati Solapur published a newsletter of the Department. I appreciate the department for such an initiative to provide a platform for communicating the innovative ideas of the students and faculty members. Wishing all our students brilliant and bright future.*

## EDITORS DESK



**Mr.D.P. Gawade**

*It brings me immense joy & pleasure to introduce the 2nd edition of the academic .It gives me immense pleasure to present the very first issue of "Sthapatya" magazine of the Department of Civil Engineering. It is the talent and outcome of our students which is reflected through this. This is one of the best platforms for our students to present multifaceted personalities and innovative ideas.*

*I take this opportunity to thank our respected Principal Dr. S.B.Joshi,*

*HOD Mr.Kandale S.D. and all the Civill faculty members for their incessant inspiration and kind support.*

*I believe that this edition will prove to be a success. I express my heartfelt gratitude to the editorial committee for their relentless efforts, the young writers for their valuable articles and all those who have been a part of "Sthapatya*

## FACULTY ARTICLES



**Mr. Kandale S.D (HOD- Civil Engineering Dept)**

### Soil Moisture Content Sensors:

A soil moisture sensor, also known as a soil humidity sensor, is an electronic device specifically designed to measure the moisture content of soil. It provides scientific data on how wet the soil is by accurately sensing changes in soil moisture and converting these changes into quantifiable electrical signals. Such sensors play a vital role in agriculture, horticulture, environmental monitoring, and scientific research.

Using a soil moisture sensor is a relatively straightforward process that primarily involves selecting the right sensor, installing it, connecting it to a data acquisition system or controller, and performing the necessary calibrations and readings. The following are the basic steps in using a soil moisture sensor:

#### **First, preparation**

##### **1. Selection of a suitable sensor**

- Choose the type according to requirements: capacitive, resistive or more specialized TDR/FDR sensors, depending on accuracy

##### **Second, the choice of measurement locations**

1. *Select a suitable measurement location: Avoid hard or irregular objects such as stones, tree roots, etc., and choose a flat, representative soil area for measurement.*

2. *Prepare the measurement environment: throw away the top layer of soil in accordance with the required measurement depth, and keep the original degree of soil looseness and tightness underneath, so that the sensor can accurately measure soil moisture.*

#### **Third, install the soil moisture sensors**

##### **1. Installation method:**

- *Quick measurement: directly inserted vertically into the soil, suitable for rapid measurement.*

- *Buried measurement: digging a pit and then inserted horizontally, suitable for long-term monitoring, if you need to measure continuously for a long time, you can consider fixing the sensor in the soil to avoid frequent insertion and removal of soil damage. Check the status of the sensor make sure that the sensor has no damage to its appearance, the connecting wiring is intact, and the battery or*

- *Depth: Determine the insertion depth*

according to the crop root depth and monitoring needs.

- **Stability:** Ensure the sensor is stable to avoid movement affecting data accuracy.

*Note:* When inserting vertically into the soil, you need to hold the sensor body tightly and insert it vertically into the soil to a predetermined depth. Do not shake it from side to side during insertion to ensure that the sensor is in close contact with the soil.

## 2. Connection and Power Supply

- **Connection circuit:** For RS485 sensors, connect to a controller or data collector that supports RS485 communication.

- **Power supply:** Provide appropriate voltage (e.g. 5V to 24V) according to the sensor specifications.

- **Cabling:** Pay attention to waterproof and signal interference, use appropriate cables.

## Fourth, measurement and recording

### 1. Data reading and analysis

-**Reading data:** According to the output mode of the sensor (e.g. voltage, current, digital signal, etc.), use the appropriate equipment or software to read the soil moisture data.

-**Record data:** Record the read data for subsequent analysis and processing. It is recommended to take the average value of multiple measurements within a small range of the same measurement point to improve the measurement accuracy.

-**Software Integration:** Use the supporting software or self-built system to read the data transmitted by RS485.

- **Data analysis:** Adjust the irrigation plan according to the data to optimize the use of water resources.

- **Threshold setting:** Utilize digital outputs (e.g. DO) to automatically trigger the irrigation system when a specific humidity threshold is reached.

## Five. Maintenance and upkeep

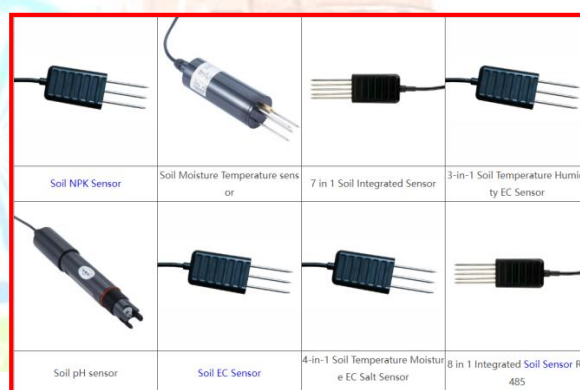
1. **Regular calibration:** In order to maintain the measurement accuracy of the sensor, it needs to be calibrated regularly. The specific calibration method can refer to the sensor manual or consult the supplier.

2. **Avoid damage:** In the process of using the sensor, we should pay attention to avoid strong impact or drop, so as not to damage the internal components of the sensor.

3. **Storage environment:** When not in use for a long time, the sensor should be stored in a dry, ventilated place to avoid moisture or corrosion.

4. **Inspection:** Make sure the connection is stable and check the performance of the sensor regularly.

Through the above steps, you can correctly use the soil moisture sensor to monitor soil moisture, providing strong support for agricultural production, landscaping and other fields.



## Soil moisture sensor application scenarios:

As a precise and practical monitoring tool, soil moisture sensor has a wide range of

applications in many fields. The following are its main application scenarios:

### 1. Farmland management and water-saving irrigation

**Precision agriculture:** Soil moisture sensors can measure soil moisture content in real time, continuously and accurately, providing farmers with an accurate basis for irrigation. By monitoring soil moisture, farmers can implement on-demand irrigation, reduce the occurrence of over flooding and water shortages, improve water utilization efficiency, reduce production costs, and help improve crop yield and quality.

**Water-saving irrigation:** Based on the data from the soil moisture sensor, the irrigation system can be intelligently controlled to realize water-saving irrigation. This helps to reduce the waste of water resources, especially in areas where water is in short supply.

### 2. Ecological environment monitoring and protection

**Nature reserves:** In nature reserves, wetland ecosystems and forest areas, soil moisture sensors can help researchers monitor soil moisture dynamics in real time, reveal the water cycle process between soil-vegetation-atmosphere, and provide scientific basis for ecological restoration, water conservation and biodiversity protection.

**Disaster prevention:** soil moisture monitoring can also predict the occurrence of droughts, floods and other natural disasters, providing important data support for disaster prevention and response.

### 3. Greenhouse and facility agriculture

**Refined management:** In modern greenhouses, soil moisture sensors combined with automated control systems can automatically adjust the irrigation schedule according to actual needs, realizing refined management and intelligent control. This helps to promote

### 4. Gardening and Landscape Construction

**Plant growth monitoring:** soil moisture sensors can monitor the moisture content in garden soil, providing important data support for the growth of garden plants. By reasonably controlling the amount and timing of watering, it can optimize the plant growth environment and improve the effect of gardening.

### 5. Soil improvement and scientific research

**Soil fertility monitoring:** through long-term monitoring of soil moisture and other parameters, you can understand the trend of soil fertility changes, providing a scientific basis for soil improvement.

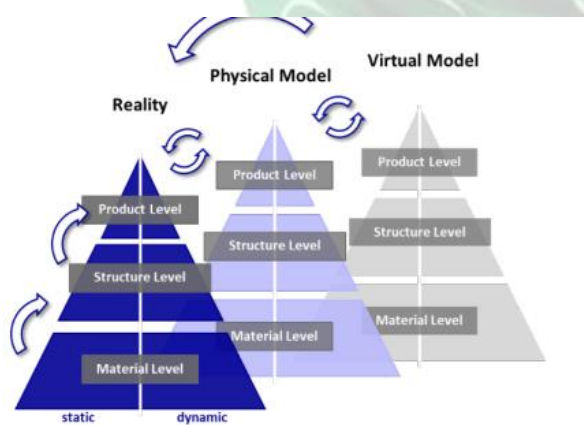
**Scientific research:** soil moisture sensor in plant physiology research, soil science research and other fields also have important applications, to provide researchers with accurate experimental data.





Lecturer in Civil Engineering  
Mr. Gawade D.P.

## Designing Lightweight Structures under Consideration of Material



### INTRODUCTION

Lightweight design is an important aspect in the development of components, e.g. in the aerospace industry, to reduce material use and obtain energy-efficient structures. Frequently, lightweight structures are designed just for one or a few load cases. When optimized for these load cases, designs can be less robust against changes in boundary conditions, scattering material parameters or deviating tolerances. Therefore, these structures must also be designed with safety factors that counteract the targeted lightweight design goal. One way to solve this problem is to take into account the occurring uncertainties, as probabilistic design approaches do. Furthermore, a source of errors in the design are influences of omitted or incorrectly considered boundary conditions. If the boundary conditions are not

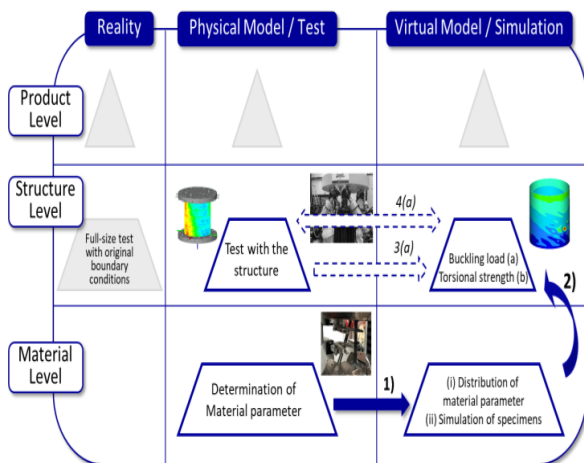
transferred correctly, errors can occur. If, for example, a component is designed with an FE model and this FE model has been validated in a verification test for which other boundary conditions were present and the change of the boundary conditions are not taken into account in the transfer to the application, a safe design is not given.



### DESIGN APPROACHES

The verification test include A common practice in the aerospace industry for the development of components is the Building Block Approach. The Building Block Approach proposes a hierarchical method. It is comparable to a multiscale analysis. On the lower blocks or levels of the test pyramid illustrated in Figure are tests, and simulations on the material level. A comparatively large number of tests are performed at these levels. Then the results are transferred to the next level and new

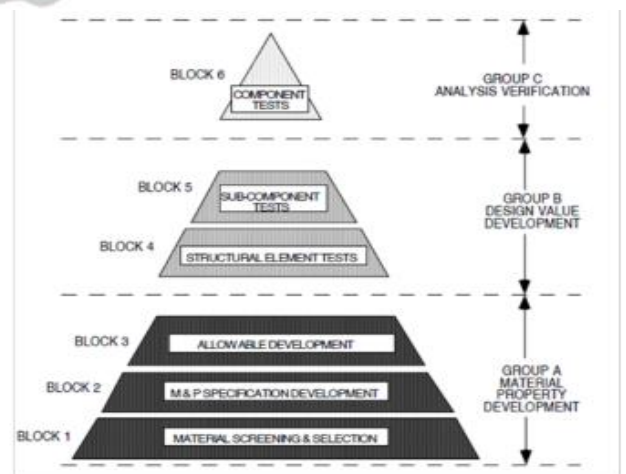
analyses on a more complex structure have to be conducted. With each step up to a higher level, the element under consideration becomes more similar to the component and the number of tests is reduced. At the top of the test pyramid is the the complete component or the product, which is only tested in one verification test. Heyden et. al. extended in the building block approach by a third dimension, so-called layers, to deal with the problems of transferability between simulation, testing and application. For simplification, the test pyramid consists only of three levels: The material level, the structure level and the product level; however, it differentiates between static and dynamic problems. The main point of this approach is that during a transfer, either one level within a pyramid can be moved up or the layer can be changed. For each transfer, the designer must be aware of the constraints and assumptions under which the results of the previous step were achieved and how they may influence further results.



The consideration of uncertainties is of major importance in the design of lightweight structures, as these are optimized for specific load cases. If changes in the boundary conditions or even more than assumed scattering material parameters occur, the component may fail if the design is not robust.

## APPLICATION

The consideration of uncertainties at different levels of the design was shown. It was demonstrated how experimental results including their uncertainties can be integrated into building up simulations and how missing values can be estimated simulatively. In a next step, further influencing factors and their uncertainties must be considered, so that a better match between test and simulation result is achieved. Furthermore, the generalizability of this approach should be demonstrated. A good possibility would be to apply this approach to the fatigue design of fiber reinforced components as indicated



Design Lightweight design is an important aspect in the development of components to reduce material use and obtain energy-efficient structures. Frequently, lightweight structures are designed for one or a few load cases. Therefore, optimized designs can be less robust against changes in boundary conditions, scattering material parameters or deviating tolerances. Thus, these structures must be designed with safety factors that counteract the targeted lightweight design goal.



Lecturer in Civil Engineering  
Mr. Tupe R.R.

### Different types of flows

India is the second ranked largest country in the world depending on the basis of population – has about 17.3% of world's population, approximately 4% of the world's water resources, and 2.44% of the total geographical land area of the world. Hence, in spite of having an average annual average precipitation to the tune of more than 1105 mm/year, the population density (lack of land resources) and per capita water resources availability Put together India a water-stressed country, as a whole. However, at a regional or basin level, more areas in the country are water-scarce or severely water-scarce due to the spatial and temporal variability of water resources. It is estimated that average annual precipitation over India is about 3880 BCM. Hydraulics is the branch of science that deals with the behavior of fluids in motion and at rest, particularly when subjected to pressure. Understanding the types of flow in hydraulics is crucial for designing efficient systems in engineering applications such as pipelines, water distribution networks, and hydraulic machinery. Here's an overview of the primary types of flow in hydraulics:

#### 1. Laminar Flow

##### **Definition:**

Laminar flow occurs when a fluid flows in parallel layers, with minimal disruption

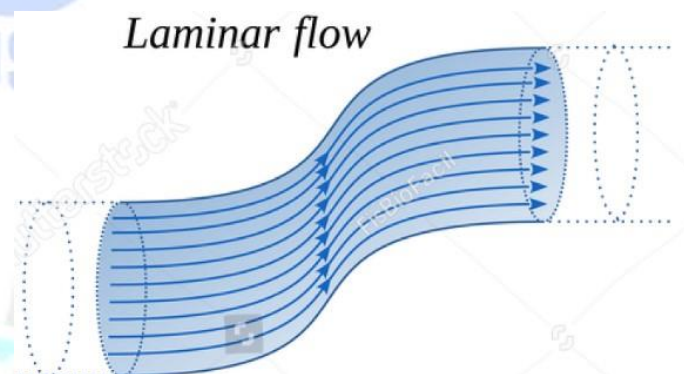
between the layers. This type of flow is smooth and orderly, often described as streamlined.

##### **Characteristics:**

- **Velocity Profile:** The velocity of the fluid is highest at the center of the pipe and gradually decreases towards the walls due to friction.
- **Reynolds Number:** Laminar flow typically occurs when the Reynolds number ( $Re$ ) is less than 2,000.
- **Applications:** This flow type is common in small pipes or at low flow velocities, where the fluid movement is more predictable and controllable.

##### **Example:**

**Blood flow in capillaries or oil flow in thin pipelines**



#### 2. Turbulent Flow

##### **Definition:**

Turbulent flow is characterized by chaotic and irregular fluid motion. In this type of flow, eddies and vortices cause mixing of the fluid, leading to a more complex flow pattern.

##### **Characteristics:**

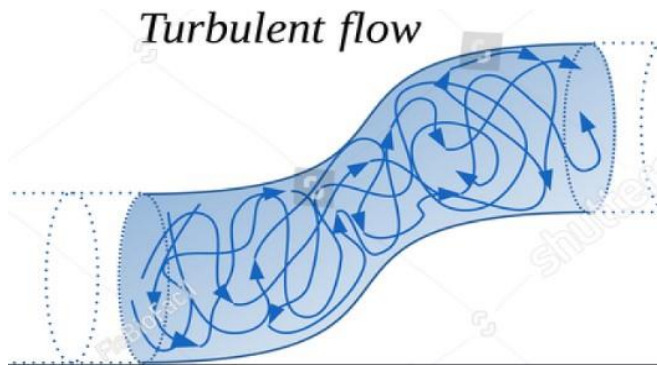
- **Velocity Profile:** The velocity distribution is flatter compared to laminar flow, with higher momentum near the walls.



- **Reynolds Number:** Turbulent flow occurs when the Reynolds number exceeds 4,000.
- **Applications:** Common in large pipes, rivers, and channels where high velocities or large diameters are present.

**Example:**

Water flowing rapidly in a river or through a large pipeline.



### 3. Transitional Flow

**Definition:**

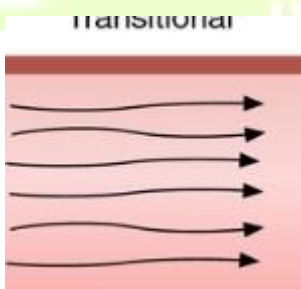
Transitional flow is an intermediate phase between laminar and turbulent flow. It is a mix of smooth and chaotic flow, where the fluid might oscillate between the two states.

**Characteristics:**

- **Reynolds Number:** This flow type generally occurs when the Reynolds number is between 2,000 and 4,000.
- **Applications:** Transitional flow is less common in practice, as systems usually operate predominantly in laminar or turbulent regimes.

**Example:**

Flow in a pipe that gradually increases in velocity, moving from laminar to turbulent.



### 4. Steady Flow

**Definition:**

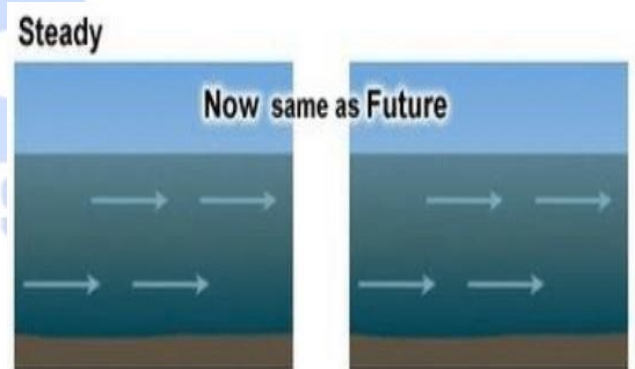
Steady flow refers to a fluid flow where the velocity at any given point does not change with time. This is an idealized flow type used in many engineering calculations.

**Characteristics:**

- **Time Independence:** Conditions such as velocity, pressure, and cross-sectional area remain constant over time.
- **Applications:** Used in situations where consistent flow is necessary, like in long pipelines.

**Example:**

Water supply in a well-designed and maintained pipeline network.



### 5. Unsteady Flow

**Definition:**

Unsteady flow, also known as transient flow, occurs when the flow parameters (velocity, pressure, etc.) change with time.

**Characteristics:**

- **Time Dependence:** Flow variables change over time, often due to changes in boundary conditions or external forces.
- **Applications:** Unsteady flow is important in systems subjected to variable demand, such as water supply networks during peak usage times.



Lecturer in Civil Engineering  
Ms. Yamgar P.Y.

### Water Dam Leakage Inspection

### ERT geophysical inspection to find potential seepage areas in an earthen dam

#### Background

When visible pools of water were seen on the surface near the dam, it was obvious that a leak had occurred. The leak produced water at roughly 10L/s. It was unknown if this seepage was coming from the dam's levee structure or in the subsurface below. Our client, Global Image, concluded that an Electrical Resistivity Imaging (ERI) profile was needed to map areas as potential sources of this leakage. They used AGI's equipment to complete this task.

#### Process

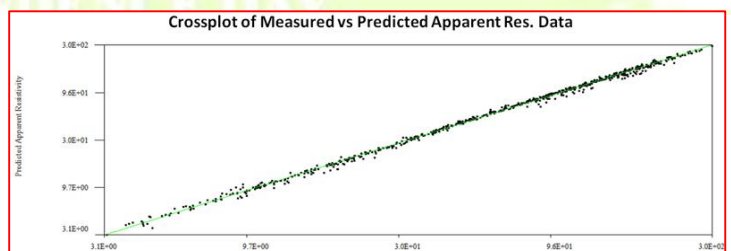
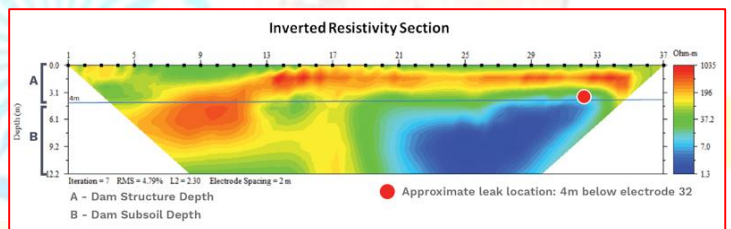
Global Image decided to focus on the crest of the dam that was closest to where the leak was seen on the surface. They installed a 2D resistivity line over the entire length of that section of the crest. The 2D data was collected using a SuperSting™ R8/IP and a 56-electrode SwitchBox implementing a Dipole-Dipole array. Though they used a SwitchBox 56, only 37 active electrodes were used with 2m electrode spacing. The obtained 2D data was then processed and inverted with EarthImager 2D.

### Results

The crossplot above shows that the data was obtained cleanly with very little noise. When observing crossplots, you want to see the majority of your data points along the diagonal line. This gives us confidence in the inversion model and results.

Preliminarily, it was believed that the leak originated somewhere in the dam structure (A) since the leak was visible on the surface. After an analysis of the 2D resistivity model, integrated with topographic data, the dam's primary conductive anomaly was found in the subsoil beneath the dam structure (B). The conductive anomaly is depicted via the blue areas between electrodes 20 through 33 in the inversion model above.

A 5-pipe sluice structure was located on the same crest near the leak. These 900mm pipes had a depth of 7m and were associated with the conductive anomaly in the subsurface—which was near the eastern sector of the structure. All data indicated to Global Image that the water accumulated in the subsoil and made its way to the surface. As the primary and starting point of the leak is close to electrode 32, the sector east of the pipeline structure could be committed.





**Lecturer in Civil Engineering  
Ms.Potdar S.H.**

### Recent Advances in Water and Water Resources Engineering

Water has recently become a focal point in the management of natural resources on Earth. This resource, while potentially renewable, is often not available in the quantities and quality needed due to the global climatic and environmental changes. Water resource engineering (WRE) is the study, design, and management of approaches, equipment, facilities, and techniques used to manage and protect water on Earth. WRE is related to both hydrological and water quality processes. Many of the tools used in WRE rely on theoretical knowledge and practical water engineering methods, which apply fluid mechanics principles to water flowing in both closed conduits and open channels.

Fresh water is arguably the most important resource in the world. Climate change and population growth are rapidly changing the availability and distribution of fresh water resources. Water resources engineers manage, plan, and design water resources systems and structures, thus playing a pivotal role in dealing with the increasing complexities of fresh water systems. At the University of Nebraska, we strive to educate engineers who are capable of adapting to these rapid changes in water resources; engineers capable of developing better management strategies, better hydraulic

designs and more efficient water resources systems

Water resources engineering professors at the University of Nebraska conduct a wide variety of research in hydrology, hydraulics, groundwater, water resources systems and education. Their research helps to improve the designs of hydraulic structures so that they do not fail prematurely, improves conservation of limited quantities of surface and groundwater, protects people from polluted water, and helps to advance knowledge about water resources at an international level. In addition, their work has helped to advance new methods for measuring different properties and flow characteristics of water using both local and remote sensing technologies



## Training and Placement officer



**Lecturer in Civil Engineering  
Mr.Dange S.B.**

*As your Training and Placement Officer, I am excited to share the recent initiatives we have undertaken and our plans for the future to enhance your career prospects. Our goal is to ensure you are well-prepared and positioned for success in the civil engineering industry.*

### **Recent Initiatives:**

- **Placement Drives:** We have successfully organized multiple placement drives, bringing leading companies and industry experts directly to you. These drives have provided you with invaluable opportunities to engage with potential employers and explore career options.
- **Industry Partnerships:** We've forged new partnerships with top civil engineering firms and organizations. These collaborations have led to exciting internship placements and real-world project opportunities, giving you hands-on experience in your field.
- **Skill Development Workshops:** We have conducted a series of workshops focusing on essential skills such as resume building, interview techniques, and professional communication. These sessions are designed to enhance your employability and prepare you for the competitive job market. Provide feedback on communication, technical knowledge, and professionalism.
- **Career Counseling Sessions:** Personalized career counseling sessions have been

*provided to help you identify your strengths, interests, and career goals. This tailored guidance aims to align your academic achievements with your professional aspirations.*

- **Enhanced Internship Programs:** We are working on expanding our network of internship providers to include a wider range of companies and projects. This will offer you more diverse and enriching internship experiences.
- **Guest Lectures and Industry Panels:** We plan to host a series of guest lectures and industry panels featuring renowned professionals and experts. These events will provide you with insights into current industry trends, challenges, and innovations.
- **Job Placement Support:** We are developing a comprehensive job placement support system that will include mock interviews, job search strategies, and one-on-one mentoring. This system aims to give you a competitive edge in the job market.



**TRAINING  
AND  
PLACEMENT**

### **Future Plans:**

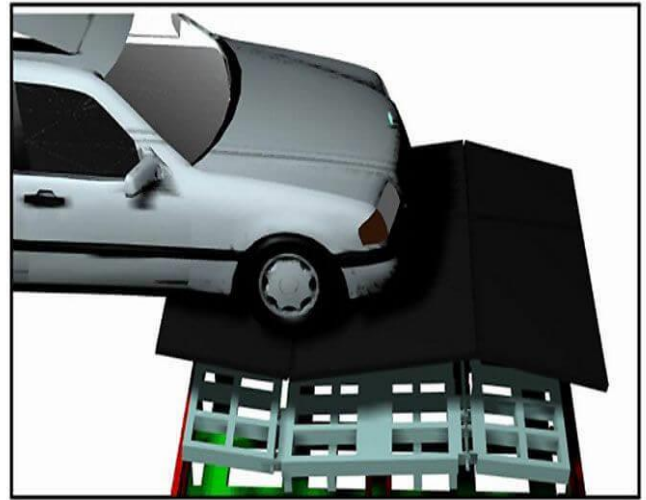
- **Alumni Networking Events:** We will organize networking events with our alumni, who are now successful professionals in the industry. These interactions will offer you valuable advice, mentorship, and potential job leads.
- **Skill Enhancement Programs:** In response to industry feedback, we are introducing new training modules focused on emerging technologies and skills that are in high demand, such as sustainability

## STUDENT ARTICLES

## KINETIC ROADS



**Mr. Taffi J Bagwan**  
(Class – 3<sup>rd</sup> year Civil. Engg.)

INTRODUCTION

Nowadays, all the energy resources are depleting due to our constant dependency on natural resources. At this stage, an urgency has emerged to harness the energy that can operate almost anything in the world. Likewise, in the civil engineering world, new inventions are emerging to make a greener world. Sustainable Construction

In the transportation sector, kinetic roads can help tackle pollution and our extensive dependency on natural resources. Solar radiation and kinetic energy from passing automobiles are two forms of energy sources frequently applied to road surfaces. As a result, they offer a lot of potential as long-term energy sources. Roadway pavement occupies a large portion of urban and rural areas, covering millions of square kilometers and constantly being exposed to various energy sources such as sun radiation, vibration, and traffic-induced pressures.

With these in mind, to collect energy from the pavement, two main technological groups are now being used (a) those based on heat or sun radiation, and (b) those

Both of these sources have demonstrated their ability to provide energy to transportation infrastructure. Piezoelectric-based modules, photovoltaic pavements (solar panels embedded in the pavement), thermoelectric systems, electromagnetic systems, and asphalt solar collectors are among the technologies included in these two areas. Some of these technologies have been evaluated, and various prototypes based on piezoelectric and thermoelectric technologies are developed by investigators involved in this study. Earlier studies have shown that piezoelectric energy harvesting systems are reliable energy resources for low-power roads, including sensor and LED lighting research. Several prototypes have been developed in order to increase the power output, reduce floor deflections and ensure prototype durability by modifying the prototype geometry and piezoelectric configuration.

One design created by the Israeli company Innowattech consists of a thin box encircling the piezoelectric material placed beneath a layer of asphalt. As a result, as vehicles drive over plates embedded in the

asphalt, a hydraulic fluid tank beneath the road is compressed, generating a series of pumping movements that turn a generator to generate electricity. The vertical force compresses the piezoelectric material when a vehicle drives across the box and produces electricity.

Engineers are now poised to harvest some of the excess kinetic energy of the world's moving vehicles using this technology, with various designs being proposed. Engineers have developed a new style of road that can convert vehicle vibration into power. While the concept isn't new, the implementation is unique.

### ADVANTAGES

Some of the advantages of these kinetic roads are –

- These roads are pollution-free and can generate an endless amount of energy and power.
- These roads are of low cost and have low maintenance. Initially, the construction of these roads may cost a considerable amount of money, but it will prove economical in the long run.
- No manual work is required during the process as the roads are pre-cast with these kinetic materials. The construction of these roads is similar to Interlocking concrete block pavements.
- No fuel is consumed in transportation as constant monitoring is avoided. Also, unlike flexible pavements, these roads don't require stoning, dusting, macadam works, etc., and hence are laborless works.
- These roads, if wear out after some time, can easily be replaced within a few minutes. Hence, these do not block the traffic for a long time. Therefore, time is saved.

- These roads are energy-efficient throughout the year. The generation of energy by these roads is massive and beneficial for other types of work too

### MECHANISM

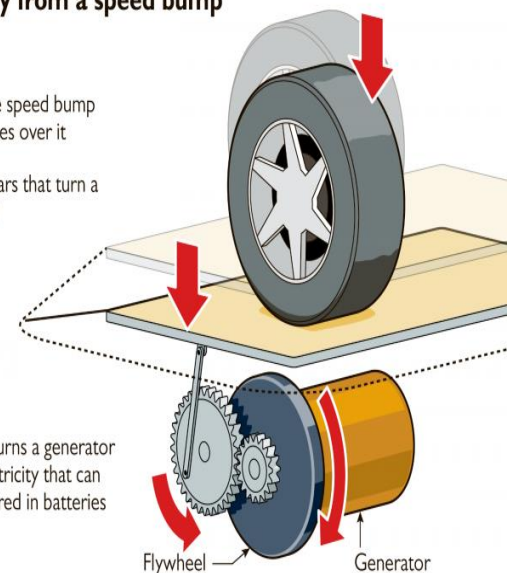
The asphalt solar collector technology mechanism involves heat exchange between the pavement and the fluid in an embedded pipe inside the paving, followed by the storage and use of energy in asphalt solar collectors for heating and cooling purposes. Thermal gradients are used to generate electricity using a thermoelectric generator between layers of pavement (TEG). Solar panels on road surfaces to generate electricity are installed in photovoltaic paving.

#### Kinetic energy from a speed bump

1 Car pushes the speed bump down as it drives over it

2 Plate drives gears that turn a heavy flywheel

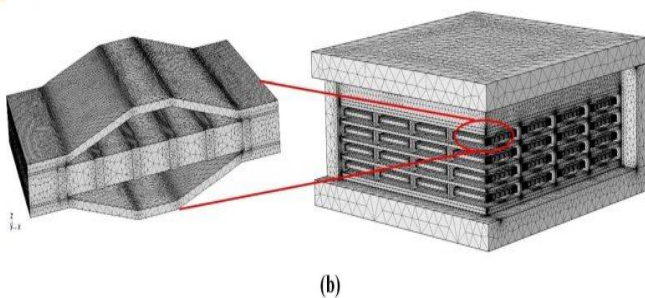
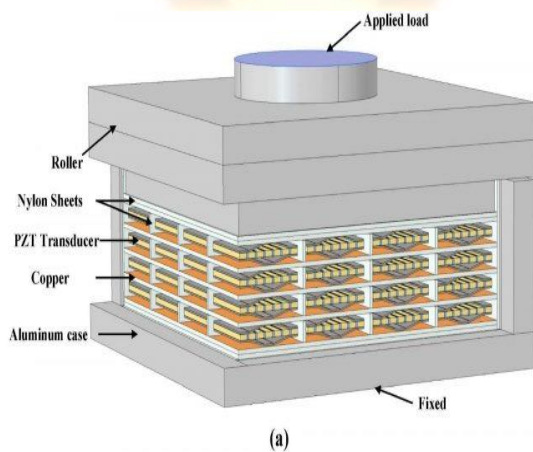
3 The flywheel turns a generator producing electricity that can be used or stored in batteries



generate electricity using a thermoelectric generator between layers of pavement (TEG). Solar panels on road surfaces to generate electricity are installed in photovoltaic paving. Dr. Hao Wang (Rutgers, Civil, and Environmental Engineering) explains this mechanism using piezoelectric transducers in the pavement as a sustainable source of energy. Traffic-driven mechanical energy, in particular heavy cars, can in many ways generate electricity. A piezoelectric material or an electromagnetic generator can be used to produce relative movement to capture

mechanical stress related to traffic. Photovoltaic cells, heat flux, or thermoelectric material can also be used to harvest some of the solar energy absorbed by pavement. Even geothermal energy can be gathered with a heat pump and subsurface thermal energy storage by following this mechanism. Hence, it's effective in unimaginable ways.

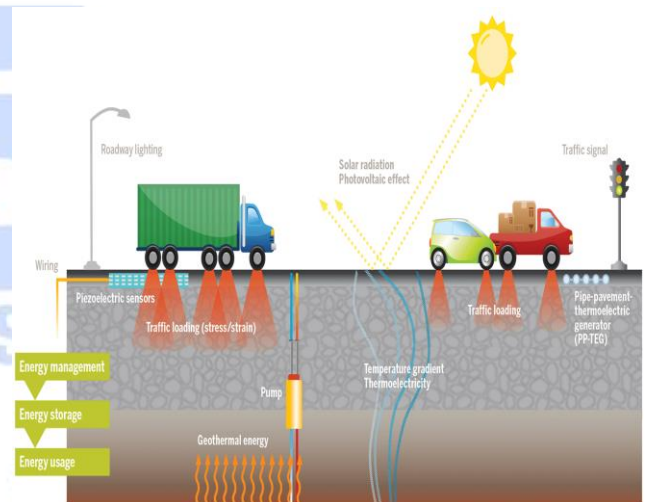
For the energy-efficient devices to be installed on the roads, the fundamental principle is the movement of internal mechanical components due to the cinematic energy generated by the vehicle's weight. These include pinion rack systems, camarm systems, chain and rocket systems, hydraulic power systems, reel and chain systems, and relative mobility of two parts of permanent magnet generators, as well as stator and translators. The compressing air (through a vehicle's passage) and the pressure-induced to generate electric power are other unconventional approaches that also can be adopted in the future.



Another approach is Piezoelectricity. Piezoelectricity refers to the ability of some

materials, most notably crystals and some ceramics, including bone, to generate an electric potential in response to applied pressure. It has applications in sound production and detection, high tension generation, electronic frequency generation, and day-to-day applications such as cigarette lights and push-start propane grills. Piezoelectricity generates electricity under fast-moving traffic pressure by burying metal crystal pads hundreds of meters beneath the road paving.

## CONCLUSION



In this way, many other techniques can be applied to utilize and harness the energy around us. Engineers need to think of innovative ideas to save the earth as well as to generate ideas that are robust, sturdy, and economical. Global energy demand has risen significantly due to the world's growing population and the growing need to meet human needs through sustainable means. Efforts are being made to modify the system, even though the problems are insurmountable. Private companies compete in this sector, but governments in developed countries have recently noticed the developments in converting traffic rush into electricity and are funding many projects. Hence, we need more innovative ideas to save our planet

## SELF-HEALING CONCRETE



**Ms. Nandani A. Firangi**

(Class – 2<sup>nd</sup> year Civil. Engg. Student)

### What is Self-healing Concrete?

*Self-healing concrete is a specific type of concrete that can repair itself after the damage has occurred. Concrete's ability to mend itself when cracks appear is known as its self-healing or self-repairing property. The durability of concrete is the defining feature of these uses. Concrete's ability to withstand physical and chemical assaults is enhanced by its material characteristic of durability. There is a correlation between a decrease in durability and an increase in the likelihood of cracking. Cracks in concrete can be classified as settlement fractures, expansion cracks, plastic shrinkage cracks, shear and flexural cracks, or any combination of these. Splits caused by reinforcing corrosion, Weathering-related cracks, heat strains, and poor construction all contribute to the problem.*

*There are a variety of causes for cracks to appear. For the sake of brevity, nevertheless, here are a few examples:*

- *Improper blending, agitation, and curing, resulting in a substandard product.*
- *Use of excessive force*
- *using low-quality components (Like reinforcements – easy corrosion)*

- *Consequences of unfavourable temperature*
- *Mixing flaws*
- *Too much moisture in the concrete and the ratio of water to cement was not kept at an adequate level.*



### Methods of Self-healing in Concrete

*Natural Concrete with the Ability to Heal Itself There are self-healing characteristics inherent to concrete. In this technique, the Un-hydrated cement particles are used as a reparative substance. Minerals in the clinkers activate the healing process when they get hydrated.*

*By utilising the natural qualities of concrete and the dissolution of calcium, this reaction with water of cement aids in repairing fine cracks in the material.*

### Autonomous Self-healing Concrete

*While the inherent autogenous self-healing approach is promising, it is limited to repairing very minor damage. This is where the self-healing, autonomous approaches shine. Here, additional exterior self-healing measures are provided for concrete restoration, boosting performance. Method of vascular Self-healing*

*Vascular self-healing is an example of a multi-healing approach in which a web of*



*hollow ducts containing a healing element is placed within the concrete. It is important to remember that the ducts are chemically inert when making your selection. These lengthy parallel tubes should also bind well with the surrounding concrete.*

*With clay ducts, inorganic phosphate cement (IPC) is the best option. Hydrostatic pressures, together with capillary or gravity forces, force the healing agent through a gap in the concrete, sealing the crack.*

### Capsule-based Self-healing Method

*Microcapsules of either spherical or cylindrical shapes can be employed in this method. Ceramics, silica, glass, urea-formaldehyde and polystyrene are all viable options for the outer shell.*

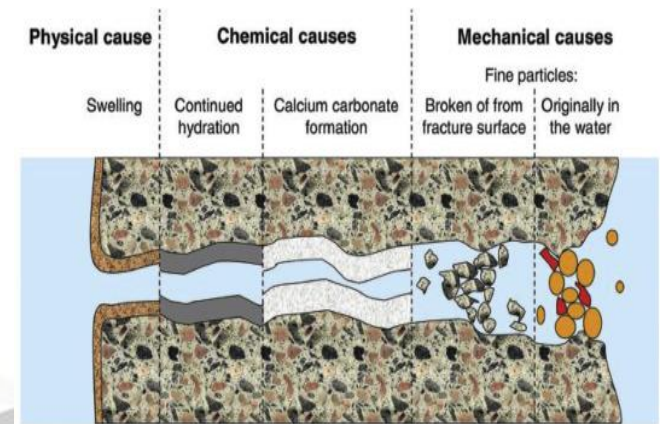
*The cementitious matrix and capsule qualities determine the method's healing effectiveness. The multi-capsule system can be trusted as well. Healing components are released and the crack is repaired when these capsules break apart upon touch. Epoxy resins, polyurethane, or Methyl methacrylate monomers are all viable options for the healing agents (MMA).*

### Embedding shape memory alloys (SMAs) method

*Context-Recalling Shapes Concrete can make use of alloys, a type of smart material with the unusual virtue of remembering its original shape after being distorted. Ultimately, they help in the process of introspection.*

*Putting Shape Memory Alloy wires through an electrical current to heat them up and then giving that heat to concrete beams has been studied by scientists. For this retrofitting project, we employed Shape Memory Alloys and pre-tensioned them before putting them through their paces.*

*Midspan loading was provided during the test cycles so that cracking and deformation could be studied. The cracks were successfully repaired by the heated wires.*



### Bacterial or Microbial Self-healing Concrete

*Microcracking in concrete can be patched using the bacterial/ microbial self-healing technique, which is aided by the precipitation of calcium carbonate ( $\text{CaCO}_3$ ). The healing ingredients, which consist of microbial spores and calcium nutrients, are first created in batches and then mixed into concrete.*

### CONCLUSION

*The compressive strength of concrete treated with bacteria is significantly enhanced during the curing process when ordinary water is used. The strength of concrete improves by around 40% after 7 days and by around 45% after 28 days.*

*Salt crystallisation during the first week of curing, as observed in experiments, appears to help boost strength by around 50%. This is presumably due to a high concentration of calcium chloride. On the other hand, after 28 days, the strength of cured lime in saline water gradually drops*



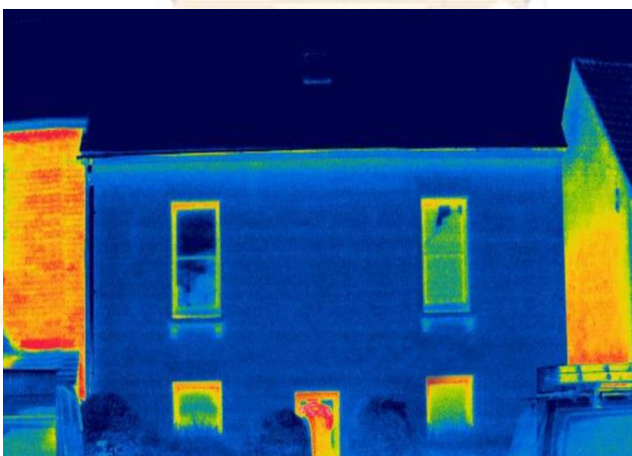
**Mr. Yash P Tate**  
(Class – 2<sup>nd</sup> year Civil. Engg.)

## THERMAL BRIDGING

### What is Thermal Bridging?

*Thermal bridges, also known as cold bridges, are weak points (or areas) in the building envelope which allow heat to pass through more easily. They occur where materials which are better conductors of heat are allowed to form a 'bridge' between the inner and outer face of a construction. This commonly happens where there is a gap in the insulation layer or where an element such as a joist penetrates through the construction:*

### Why does thermal bridging matter?



*Heat will always try to find the path of least resistance through a space. As we insulate buildings to a higher level, thermal bridges can become a significant source of heat loss, accounting for as much as 30% of total losses. This can undermine the work*

*completed to insulate a property and contribute to the performance gap between the expected and actual energy demand of the building.*

*Additionally, as the inner surface of a construction where a bridge occurs will be cooler than the surrounding area, it can allow condensation to form, potentially damaging the surface or leading to mould growth which can present health risks.*

### Where do thermal bridges occur?

**Repeating thermal bridges** – occur when there are regular interruptions in the building fabric such as studs or wall ties;

**Linear (non-repeating) thermal bridges** – occur where there are gaps in the insulation layer around openings such as windows or doors or where a more conductive material penetrates or bridges through the insulation layer;

**Geometrical thermal bridges** – occur where two or three different planes meet such as junctions between the different building elements. These typically occur where the heat loss area is greater than the internal surface such as corners

### How can you prevent thermal bridges?

*There are several ways to address thermal bridges, particularly at the design stage. These include:*

- *moving or removing the material causing the bridge from the design;*
- *changing the materials causing the thermal bridge for ones which are less conductive;*
- *varying the thickness or placement of insulation.*



**Mr. Surwase Deepchandra**  
(Class – 3rd year Civil. Engg. Student)

## MODULAR CONSTRUCTION

### *What is a Modular Building?*

*Modular buildings are structures that are constructed in a factory setting before being transported for assembly on site.*

*Despite having been used as a method of construction for decades, this type of modular structure is increasingly being used for a wider range of construction projects, ranging from offices and hospitality builds to residential properties, and more*

### *How are They Made?*

*Modular buildings are manufactured in sections away from construction sites before being delivered to the desired location where they are installed into a final building design. 60-90% of the work is completed in a factory-controlled environment, either as a complete structure or as modular subassemblies for a larger project. This offsite construction allows the use of lean manufacturing techniques to create the prefabricated modules. These modular units can be placed end-to-end or stacked up to create different configurations. The modular construction process is completed onsite using inter-*

*module connections (or inter-connections) to tie the units together.*

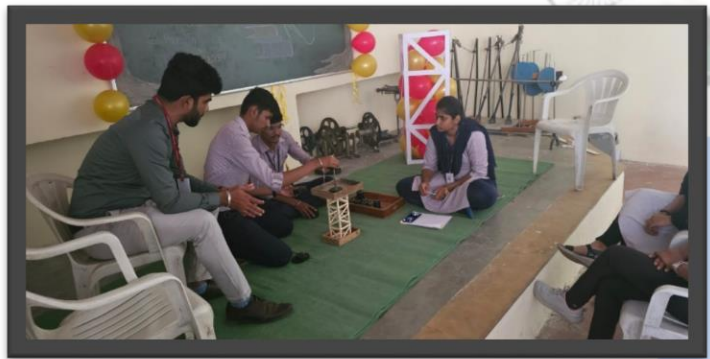
*Permanent modular buildings, such as prefabricated homes, are built to standards that are equal or higher than traditional site built properties, ensuring high levels of quality control.*

*Permanent modular construction (PMC) can be carried out with a variety of building materials, such as concrete, steel or wood, and can also include provision for adding windows, power supplies, water and sewage pipes, telecommunications, air conditioning and more. Many of these additional features can be installed before being taken to site, saving construction time later in the process. These PMC structures are designed to remain in one location once built and can include as many storeys as allowed by building regulations.*



*The first recorded instance of modular construction came in the 1830s, when a London carpenter called John Manning made a prefabricated home for his son. This home was made in parts before being shipped from England to Australia and assembled. Modular units are the **sections that are joined together to make a prefabricated building or house**. The number of units required differs depending on the size and style of the finished project.*

## BRAHMSTRA 2024



## TARANG 2024



## TRADITIONAL DAY



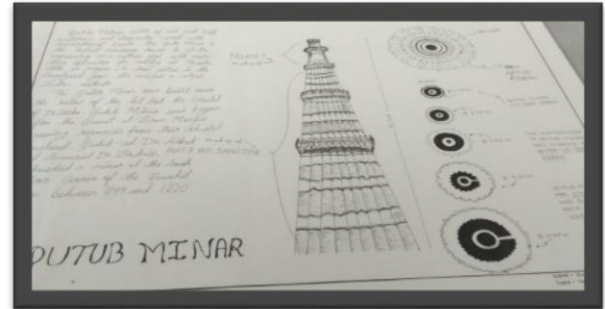
## POSTER PRESENTATION



# POSTER MAKING WINNERS



Zaibunissa M Shaikh  
Desai Nageshwari  
3<sup>rd</sup> Year Civil



*Monumental Structure (Kutub Minar)*



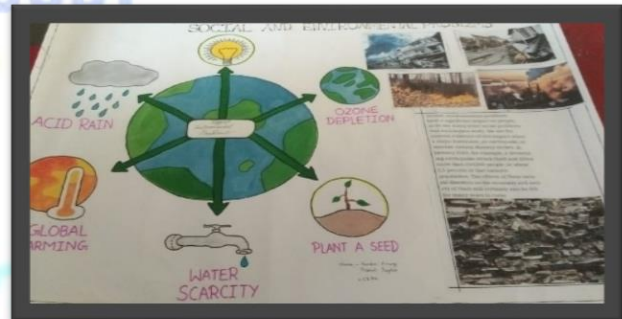
Vaibhavi Nikam  
Namrata Doke  
3<sup>rd</sup> Year Civil



*Bad Effects of plastic on Environment*



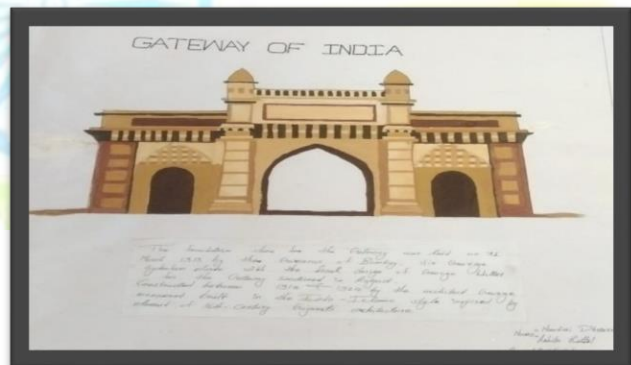
Pranoti Jagtap  
Firangi Nandini  
2<sup>nd</sup> Year Civil



*Social & Environmental Problems*



Ankita Battul  
Nandini Dhotre  
2<sup>nd</sup> Year Civil



*Ancient Monuments & Its History*

GUEST LECTURE



We have signed the MOU with following industries:

- ✚ Siddhanath sugar factory
- ✚ Mauli landmark
- ✚ Furde Construction
- ✚ Amar Construction



INDUSTRIAL VISITS

STP Plant Degaon Solapur

Mrs Mangal Sutar on "Civil Engineering services provided by PWD"

Civil Engineering Department Placed Students



Ujani Dam Solapur



Onkar N Babar  
(R.K. Construction  
Mumbai)



Mosin Y Patel  
(B.G.SHIRKE Pune)



Shahid M Patel  
(B.G.SHIRKE Pune)



# *Congratulations!*



*Vipul G Chavan*  
*3<sup>rd</sup> Year 1<sup>st</sup> rank*  
*84.67%*



*Onkar N Babar*  
*3<sup>rd</sup> Year 2<sup>nd</sup> rank*  
*81.33%*



*Mahadeo S Pawar*  
*3<sup>rd</sup> Year 3<sup>rd</sup> rank*  
*77.21%*



*Zaibunissa M*  
*Shaikh*  
*2<sup>nd</sup> Year 1<sup>st</sup> rank*  
*77.88%*



*Vishwatej A Patil*  
*2<sup>nd</sup> Year 2<sup>nd</sup> rank*  
*75.75%*



*Namrata D Doke*  
*2<sup>nd</sup> Year 3<sup>rd</sup> rank*  
*75.50%*





**15**  
**AUGUST**



INDEPENDENCE DAY





# STHAPATYA

DEVELOPING ROADS OF SUCCESS

Department of Civil Engineering,

BRAHMDEV DADA MANE POLYTECHNIC BELATI SOLAPUR

26<sup>th</sup> January 2023



## DEPARTMENT OF CIVIL ENGINEERING

Department of Civil Engineering was started in the academic year 2009-2010 with an aim of promoting high quality education in the field of civil engineering. The academic activities of the department emphasis deep understanding of fundamental principles, development of creative ability to handle the challenges of civil engineering and the analytical ability to solve the problems which are inter disciplinary in nature.

The department currently offers Diploma in Civil Engineering program in following the Maharashtra State Board of Technical Education Mumbai curriculum. The curriculum broadly covers the engineering subjects of related fields such as Surveying, Building Construction Materials, Geotechnical Engineering, Structural Analysis and Design, Hydraulics and Water Resources Engineering, Environmental Engineering, Highway Engineering.

The teaching is assisted with digitalized presentation for better understanding of the students. Industrial visits are arranged for students to gain practical experience. The department toppers have been encouraged by best performer awards.

## INSIDE THIS ISSUE

IMPORTANCE OF CIVIL ENGINEERING

DEPARTMENTAL VISION AND MISSION

MESSAGE FROM HOD

DEPARTMENTAL ACTIVITIES

TECHNICAL EVENT

## IMPORTANCE OF CIVIL ENGINEERING

All humans benefit from civil engineering. You can thank civil engineers every time you use an electrical device, turn on a tap, take public transportation, or drive on a road. Civil engineers are responsible for the buildings, structures, and major public works projects that make modern life possible. Civil Engineers are an integral part of society, without them, we would have no roads, airports, buildings, dams, harbors etc. It is safe to say that a Civil Engineering degree gives you the best of both worlds due to its diversity. been encouraged by best performer awards.

VISION

MISSION

*To cultivate the leaders in civil engineering with high technical competence to meet future challenges*

*To promote quality education & competency for industry & social needs.*

*To develop students to meet global challenges in civil engineering profession by imbining skill based technique.*

*To inculcate moral & ethical values amongst student*

**MESSAGE FROM HOD:**

*Happy Republic Day to all. With the pandemic slowly becoming an endemic, we're slowly getting back on track with offline classes. While students are relieved to be back and are happy that they can interact with their friends, classmates and teachers in person rather than talking to them across a screen, the transition has been challenging. The pandemic brought in a drastic change in the learning spectrum and education systems too have changed from pre-pandemic times.*

*I am happy to know that the Department of Civil Engineering, Brahmdevdada Mane Polytechnic Belati Solapur is bring a newsletter of the Department. I appreciate the department for such an initiative to provide a platform for communicating the innovative ideas of the students and faculty members. Newsletter is an*

*excellent platform for the students to publish their success stories, innovative ideas and findings. They can also write about the improvements, required in the curriculum and syllabus of the course and subjects they study. The students and faculty members can take some interviews with their alumni about their experiences and job opportunities and publish in the news letter for the benefit of the students. Apart from the professional interest, every student and faculty will have literary interest and capabilities like poem writing, comics writing and moral story writing. This will add value and interest for the readers of the news letter. I congratulate the Department and the concerned staff members and students for the efforts taken by them to bring out this news letter. I wish that the news letter brings fruits to the student community and wish a grand success for their efforts.*

**Mr. Kandale S.D**  
**HOD CE**

**TEACHERS DAY CELEBRATION**

*Every year, World Teachers' Day is celebrated globally in the month of October to honour and pay tribute to all the teachers. The day is recognised to highlight the great role played by teachers and mentors in the lives of students. In India, Teachers' Day is celebrated on 5 September*



*in the memory of birth anniversary of Dr Sarvepalli Radhakrishnan, while the World Teachers' Day is marked on 5 October.*

*This day was celebrated in the department and program was engaged by the CE department Students. The program started by the Photo puja of Late Dr. Sarvepalli Radhakrishnan, Program was conducted under the guidance of Head of the department Mr. Kandale S.D and other teaching staff Mr. Gavali D.M, Mr. More P.S, Mr. Tupe R.R, Ms. Potdar S.H and Ms. Yamgar P.Y. Various speeches were given by the students of Second and Third year students of Civil Engineering Department. Students of Third year conducted the lectures on the classes of First year and Second Year and program was concluded by giving valuable advices by the staff to the students for their carrier.*

**ENGINEERS DAY:**

**The way to build a nation is to build a good citizen.-(Dr. Ml. Visvesvaraya)**



September 15: Visvesvaraya is regarded in India as one of the foremost civil engineers whose birthday, 15 September, is celebrated every year as Engineer's Day in India, Sri Lanka, and Tanzania

The programme was started by welcoming the Guest of the programme Prof.: Kulkarni S.V Principal of the Institution. Head of the Department Mr Kandale S.D and all the Staff of Civil Engineering department welcomed the guest and proceeded to the programme by Enlightening the diya and Photo pujan of Dr M. Visvesvaraya.



Chief guest of the programme shared valuable words and Experience with the Students of Civil Engineering Department.

The programme included speeches of all the staff and students also participated in the speeches. The idea behind this event was to honour and recognise the hard work of all engineers who have made significant contributions towards the growth and development of the country and motivate the students by giving the iconic examples of Sir M. Visvesvaraya.



### Entrepreneurship Development Programme

3 days (3,4 and 5 November 2022)

Entrepreneurship Development Programme was conducted.

EDP is a programme which helps in developing entrepreneurial abilities for students. The skills that are required to run a business successfully is developed among the students through this programme. Sometimes, students may have skills but

it requires polishing and incubation. Guidance over the topic was delivered by Mr Madhusudhan Bhutada (Sales and Marketing), Mrs. Smita Kulkarni (Government Schemes and Business Loans), Mr. Amit Kamatkar and Mr. Parimal Khade (New Business Ideas), Mr. Sushilkumar Shinde (Development and Successful running of Business).



### IEDSSA (Inter Engineering Diploma Students Sports Association) 2022-23

Bramhadev Dada Mane Polytechnic, Belati is a prominent member institute of IEDSSA, and has been vigorously participating and hosting various indoor and outdoor games. Our college has taken part in various sports activities in IEDSSA 2022-23 held in S.M.S.M., Akluj. But major success was gained in weightlifting category of under 70 platform. Our student Laxuman Mhamane from third year diploma civil engineering obtained a 1<sup>st</sup> prize and word of guidance from host authority.



BRAHMASTRA 2K22:

*A State level Technical Event was organized on 11<sup>th</sup> November 2022. Under this event students of various institutes from Maharashtra came together to participate in Paper Presentation and Poster Presentation competition. Students are able to put forward their ideas by participating in this event. About 40 groups of two students each had participated from various colleges. Mr. Kandale A.K (HOD CE, Shri siddheshwar Womens Polytechnic) and Mr. Nitin Pawar ( A.G. Patil Institute Solapur ) were honoured to judge the students who had participated in this events. .*

EDITORIAL

*On the occasion of 74<sup>th</sup> Republic day, it gives us a great pleasure to present the tenth volume of our departmental newsletter STHAPATYA to you which gives us the opportunity to put forth the achievements of our department. In this issue, we have covered different activity carried out at the Department of Civil Engineering. We are thankful to all the faculties & students who have contributed to this newsletter.*

**Mr Kandale S.D & Mr.Gawade D.**





# STHAPATY

DEPARTMENT OF CIVIL ENGINEERING

26TH JANUARY 2024

**INSIDE THIS ISSUE**

**FACULTY ARTICLES**

**TRAINING & PLACEMENT**

**STUDENT ARTICLES**

**MESSAGE FROM HOD**

**EDITORIAL DESK**

**MEMORANDUM OF UNDERSTANDING**

**INDUSTRIAL VISIT**

**QUEST LECTURE**

**RESULT OF DEPARTMENT**



*To cultivate the leaders in Civil Engineering field bearing high technical competence to meet future challenges.*

**VISION**

*To prepare students for the challenges in Civil Engineering industry by infusing Skill based Methodology.*

**MISSION**

*To encourage self development of the students through Curricular and Co-curricular activities.*

*To promote high Moral and Ethical values among the students to become responsible citizens.*

## FACULTY ARTICLES



**Mr. Kandale S.D (HOD- Civil Engineering Dept)**



### **BIM: Building Information Modelling**

*There was a time before technology when the construction industry used pencils, papers, and big tables, to create complex drawings. It was a long and tiring process that required much manual labor and was highly inefficient. However, the world has changed since, and leading the way to make construction drawings better is 'Building Information Modelling,' or BIM.*

*In this blog, we will discuss what BIM is, how it differs from a simple 3D model, its benefits, and some popular BIM tools.*

#### ***What is BIM?***

*BIM, or Building Information Modelling, has been part of the industry for a while now. According to the industry giant Autodesk, BIM is "the holistic process of creating and managing information for a built asset." To be fair, that pretty much sums it up.*

*BIM is an intelligent, model-based process that allows multiple stakeholders, such as architects, engineers, developers, consultants, and even manufacturers, to collaborate and build better buildings faster.*

*With BIM, designers create a digital representation of a built asset that contains*

*data associated with its physical and functional characteristics. BIM improves collaboration and efficiency and gives stakeholders deeper insight into the project.*

#### ***What is a BIM Model?***

*Many in the industry are unaware of how BIM differs from other 3D models. In 3D models created using Sketchup or Rhinoceros, objects are merely a 3D mesh or surface. The software cannot classify or differentiate between objects—for example, a door vs. a window. Even though they are popular among Architects & Designers, these products are not built for the construction Industry.*

*BIM objects are more than just geometry. They are data containers that share relationships with other elements in a model. By default, objects are classified and come baked with data. For example, it can understand how a bearing wall would differ from a non-bearing wall or calculate how much material is required to construct one. A brick wall is not just visually; it also contains many relevant data - cost, materials, structural properties, physical parameters, or even thermal performance. BIM tools are built for building design and construction, which is why this is possible.*

*The differences do not end here, as BIM helps solve other construction problems. In traditional processes, Architects and consultants have to coordinate and edit every individual drawing (plan, sections, elevations, and 3D), increasing the scope for errors. A small change to a single room could be much manual work.*

*BIM allows stakeholders to visualize projects better because all functions come together in one model. Using a BIM tool, edits made on any view or drawing will automatically be reflected in every other view, increasing efficiency. Some BIM tools even allow users to prepare cost estimations or analyze spending, helping them track project costs.*

*In short, BIM allows stakeholders to achieve what they have always wanted - construction completed on time & within budget. It lays the foundation for a win-win situation for everyone involved.*

### *Future of BIM*

*Technology is evolving, with machines becoming more portable, affordable, and powerful. Buildings are becoming more complex, with architects pushing the boundaries of creativity and engineering. BIM will continue to play an essential role in the future of construction because the benefits are pretty apparent.*

*At Snaptrude, we are always thinking about the future of BIM. Before we started building the platform, we noticed how existing BIM tools are expensive and hardware intensive. They are complex to install and maintain, difficult to master & not very user-friendly. So, we began building Snaptrude on the cloud. It is easier to learn, requires basic hardware to run, and supports real-time collaboration. In some ways, young companies like Snaptrude have already*

*started rethinking BIM for the next generation.*

*Another key area is sustainability. Current BIM tools are rudimentary when it comes to sustainability. However, software like Cove Tool is already creating a buzz in the Industry with advanced energy analysis capabilities. With the widespread adoption of these tools, buildings will be sustainable and built efficiently.*

*Furthermore, we have interoperability. Today, software companies are taking interoperability seriously because BIM software is not the most effective unless it is interoperable with other tools in an ecosystem. Organizations such as buildingSMART are laying the groundwork for interoperability with universal file formats like IFC. At Snaptrude, we are paving the way for interoperability by seamlessly integrating models with popular tools like Revit, which is otherwise impossible.*

*The industry has understood that buildings cannot be built with teams working in isolation. The most effective way is to work together, and BIM enables this. Construction greatly contributes to environmental problems, but BIM can help mitigate this while improving efficiency. In short, the nature and scope of BIM will only grow, but the concept is here to stay.*





**Lecturer in Civil Engineering  
Mr.Gawade D.P.**

### *Pre Engineered Building (PEB)*

*Pre Engineered Building (PEB) is a concept of structure having high structural strength, economical design while it supersedes the conventional fabrication, it lowers down the stress of foundation, hence there is less cost on civil construction as well. Tailor made buildings based on client's requirement and actual design calculations using tapered sections can be done efficiently designed Pre Engineered Building (PEB)*



*pre-engineered building is a system utilizing three distinct product categories: Built-up "I" to shape primary structural framing members (columns and rafters) Cold-formed "Z" and "C" to shape secondary structural members (roof purlins, wall girts, and eave struts) Roll-formed sheeting profiles (roof and wall cladding).*

*Optional structural sub-systems and accessories are widely incorporated into pre-engineered buildings to ensure functionality as well as aesthetics:*

*Functional sub-systems include mezzanine floors (including joists and decking), crane runway beams (to support crane systems), roof platforms, catwalks, etc. esthetic features and accessories*



*include fascias, parapets, canopies, roof extensions, flashing and trims, eave gutter, downspout, galvanized bracing cables, ridge ventilation. Pre-engineered steel buildings are recently becoming popular since they perform better than conventional buildings in terms of cost-saving benefits and constructing speed. The primary framing of a PEB structure consists of the main structural members that support the*



roof and walls. These members are typically made up of steel beams, columns, and rafters, and are designed to resist a range of loads.

**Design flexibility:** PEBs can be easily customized to meet a variety of design requirements. The components are designed to be easily assembled and disassembled, which allows for greater flexibility in terms of building size, shape, and layout. This can be especially beneficial for businesses that need to adapt to changing needs over time. **Durability and safety** PEB components are designed to be highly durable and resistant to a range of environmental conditions, including wind, rain, and seismic events. This makes them a popular choice for industries that require buildings that can withstand extreme conditions. In summary, PEB structures are a type of construction that involves the use of factory-built components that are designed to be easily assembled on-site. Compared to traditional construction methods, PEBs offer a range of benefits, including reduced construction time, cost-effectiveness, design flexibility, and durability and safety. The primary framing of a PEB structure consists of the main structural members that support the roof



They can be quickly assembled on-site, reducing the overall construction time. This can be especially beneficial in

situations where time is a critical factor, such as emergency response buildings, temporary shelters, or facilities that need to be up and running quickly. **Cost-effective:** PEB structures are typically more cost-effective than traditional

construction methods because they require fewer materials and labor to assemble. Additionally, the prefabricated components are designed to be easily assembled reducing the need for skilled labor and specialized equipment



**i** bility: PEBs can be easily customized to meet a variety of design requirements. The components are designed to be easily assembled and disassembled, which allows for greater flexibility in terms of building size, shape, and layout. This can be especially beneficial for businesses that need to adapt to changing needs over time. **Durability and safety** PEB components are designed to be highly durable and resistant to a range of environmental conditions, including wind, rain, and seismic events. This makes them a popular choice for industries that require buildings that can withstand extreme conditions. In summary, PEB structures are a type of construction that involves the use of factory-built components that are designed to be easily assembled on-site. Compared to traditional construction

methods, PEBs offer a range of benefits, including reduced construction time, cost-effectiveness, design flexibility, and durability and safety. The primary framing of a PEB structure consists of the main structural members that support the roof.



Lecturer in Civil Engineering  
Mr. Tupe R.R.

### DGPS Based Bathymetric Survey

India is the second ranked largest country in the world depending on the basis of population – has about 17.3% of world's population, approximately 4% of the world's water resources, and 2.44% of the total geographical land area of the world. Hence, in spite of having an average annual average precipitation to the tune of more than 1105 mm/year, the population density (lack of land resources) and per capita water resources availability Put together India a water-stressed country, as a whole. However, at a regional or basin level, more areas in the country are water-scarce or severely water-scarce due to the spatial and temporal variability of water resources. It is estimated that average annual precipitation over India is about 3880 BCM. Out of this precipitation, the average annual water resources available in the country is about 1999. 2 BCM, as estimated by the Central Water Commission (CWC) in 2019. The water resources availability situation is getting

murkier due to topographical and other constraints. this, the total utilizable water resources in the country are about 1122 BCM (690 BCM of surface water and 432

BCM of groundwater). On one hand, the per-capita water resource availability is reducing due to increasing population.

### DGPS BASED BATHYMETRIC SURVEY

The High Tech DGPS based Bathymetric Survey is accurate and reliable. It is also faster than conventional hydrographic survey and does not require much manpower. The cost of conducting DGPS Bathymetric survey depends on the size of the reservoir. For reservoirs with a large water spread area the survey becomes expensive. Another limitation of this method is that it requires about minimum 1.5-2 meters clearance between bed level and the bottom of the boat floating on the water. Thus this method also does not cover the entire reservoir portion from FRL to reservoir bed level. For reservoir portions of less than 2 meters depth, this survey is to be supplemented with ground survey by total station or by remote sensing. The survey is generally not undertaken during the monsoon period because of heavy inflow and Reservoirs coming into reservoirs. The Hydrographic survey is usually undertaken when the reservoir is full so that the maximum reservoir zone is covered under the survey; such surveys normally start in the late October / November when the monsoon is almost over by that time. Considering all the practical difficulties while conducting an actual survey, a 2 months period is normally required for completing the field work.

### Project chart and range lines

The bathymetric survey software (Lavasoftware) used consists of various modules to support the survey activities.

## 1. Planning and presentation

## 2. Survey

## 3. Calculate

## 4. Data edit

## 5. Data exchange

The final output to the display unit provide a 3d mapping and Iconographic survey.design. It has following options:

Chart set up

Header set up

Object set up

Segment set up

Symbol set up

Grid set up

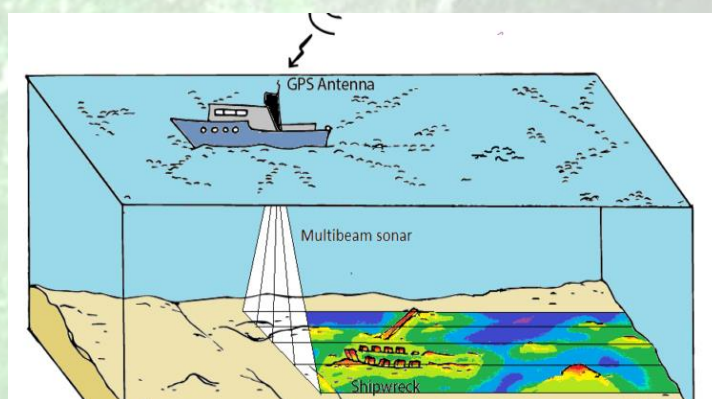
At the start of work, two points near the left banks were selected. Coordinates of these two points were rad from the mobile GPS IN UTM system. A chart with suitable dimensions is selected in the chart set up. To plan the survey,the coordinates of these two points were used to draw a Survey line across the points

### Conclusion:

For conducting reservoir sedimentation surveys the Hybrid

technique of DGPS bathymetric survey in combination with remote sensing survey is found to be very useful. It is very economical,faster, less laborious and reliable also. This survey covers the entire reservoir portion from bed level to FRL. The study revealed that present gross storage capacity of Ujjani reservoir is 3131.37 Mm<sup>3</sup> against original gross storage capacity of 3319.47 Mm<sup>3</sup>.The difference between original & The present gross capacity is only 188.107 Mm<sup>3</sup> which is moderate. However the reservoir is 37

years old; it is seen that 18.011 Mm<sup>3</sup> storage capacity loss in the dead storage zone while capacity loss in live storage zone by 170.096 Mm<sup>3</sup>.It may be possible due to sedimentation of the dam. The upstream flow is very strong in catchment area of ujani thus causing these sedimentation loss in capacity of dam.Thus We can Conclude That The current live storage capacity of Ujjani reservoir is worked out to be 1347.074 Mm<sup>3</sup> The Current Dead storage capacity of Ujjani reservoir is 1784.288 Mm<sup>3</sup>Capacity loss of 11.213 % in live storage is observed in a period of 37 years since first impounding . Annual Gross capacity loss works out to be 0.152% for the last 37 years.



## Training and Placement officer



**Lecturer in Civil Engineering  
Mr.Dange S.B.**

### 1. Understanding Industry Trends:

- a. Keep the placement officer updated on the latest trends, technologies, and advancements in the civil engineering industry.
- b. Provide resources for staying informed about industry demands and changes.

### 2. Building Industry Networks:

- a. Encourage the placement officer to establish and maintain strong relationships with industry professionals, alumni, and potential employers.
- b. Attend industry conferences, seminars, and networking events to expand connections.

### 3. Resume and Cover Letter Workshops:

- a. Conduct workshops on resume writing and cover letter preparation specific to civil engineering roles.
- b. Provide guidance on highlighting relevant skills, projects, and experiences.

### 4. Mock Interviews:

- a. Organize mock interview sessions to help students practice and improve their interview skills.
- Provide feedback on communication, technical knowledge, and professionalism.

### 6. Internship Opportunities:

- a. Collaborate with companies to create internship opportunities for civil engineering students.
- b. Help students secure internships to gain practical experience.

### 7. Industry Insights Sessions:

- a. Arrange guest lectures and sessions with industry professionals to share insights about the field.
- b. Keep students and faculty informed about the expectations and requirements of the industry.

### 8. Soft Skills Development:

- a. Emphasize the importance of soft skills such as communication, teamwork, and problem-solving.

Provide training on effective communication, networking, and interpersonal skills.

### 9. Online Presence and Branding:



- a. Train the placement officer on utilizing online platforms for job postings and networking.
- b. Guide students on building a professional online presence, including LinkedIn profiles.

### 10. Industry Certifications:

a. Promote relevant industry certifications and help students understand their importance.

b. Provide information on certifications that are valued by employers in the civil engineering sector.

#### 11. Feedback Mechanism:

a. Establish a system for collecting feedback from employers about the performance of students placed through the placement office.

b. Use feedback to continuously improve the preparation and placement process.

#### 12. Career Counseling:

a. Offer personalized career counseling sessions to help students identify their strengths, interests, and career goals.

#### 13. Collaborate with Academic Departments:

Work closely with academic departments to align the curriculum with industry requirements. Ensure that students are well-prepared with the necessary technical skills.

#### 14. Professional Development:

a. Encourage the placement officer to pursue continuous professional development in the field of career services.

b. Attend workshops, conferences, and training programs related to career counseling and placement.

#### 15. Diversity and Inclusion Training:

a. Promote diversity and inclusion in the placement process.

Ensure that the placement officer is aware of and addresses issues related to diversity in the workplace.

#### 16. Monitoring Placement Success:

a. Regularly track and analyze the success of placements from the Civil Engineering department.

b. Use data to identify areas for improvement and to celebrate successes.

Remember to customize these ideas based on the specific needs and dynamics of your institution and the civil engineering industry in your region. Ongoing support and collaboration with faculty, students, and industry partners are key elements for the success.



## STUDENT ARTICLES

### Sustainable Practices In Civil Engineering For A Greener Future



**Mr. Chavan Vipul**  
(Class – 3<sup>rd</sup> year Civil. Engg.)

#### INTRODUCTION

As urbanization and infrastructure development continue to expand, adopting sustainable practices is essential to minimize the environmental impact and ensure a healthier planet for generations to come. In this blog, we will explore some of the key sustainable practices in civil engineering that can pave the way towards a greener and more sustainable future.

#### Sustainable Construction

Engineers play a crucial role in improving living standards; especially civil engineers, through development of the infrastructure of the society. Engineers apply science and empirical experience to a great range of projects such as water supply, food production, housing and shelter, sanitation and waste management, energy development, transportation, communication, industrial processing, and development of natural resources

#### Objective:

- net zero operational carbon
- net zero embodied carbon
- sustainable water cycle
- sustainable connectivity and transport
- sustainable land use and biodiversity
- good health and wellbeing
- sustainable communities and social value
- sustainable life cycle cost.

#### 1) Solar Power

Solar energy is being additionally wide used as a property building technique. It's going to be utilized in two strategies in Sustainable building, one for active solar energy and passive solar energy. Active solar energy makes use of solar panels that absorb the sun's light weight and convert it into heat and electricity. Passive solar energy, on the opposite hand, makes use of the sun's rays to heat dwellings.

by rigorously putting windows and endoergic materials. The windows permit energy to flow in, and therefore the heat absorbed minimizes the necessity for electricity to heat the house throughout colder months.

#### 2) Biodegradable Material:

Custom development materials add to the development of waste products and perilous synthetic compounds that require numerous years to corrupt, so abusing short-lived materials is ecologically responsible on account of assembling development property. Bamboo, lumber, plant structure (a style of parasite), antiquated lino, and natural paints region unit are all immediately short-lived and don't have to end up in an exceptional marsh. They need an incidental ecological effect since they separate rapidly while not creating pollutants. The tank is provided on the chassis by which the amount of Weed-Killer (chemical) is discharged from the tank hose to nozzles to spray by the arrangement of slider crank mechanism.

### 3) Green Insulation:

At the point when it includes the advancement of structures and houses, one in everything about preeminent major problems is protection. Encasing's region unit divider channels that needn't bother with the usage of pricey or finely completed materials. Because it lessens the need for quality completions.

Below Fig. shows the front view, left view, top view and isometric view of the

### 4) Cool Roofs:

The Cool Roofs Regional Unit is a sort of Sustainable style that means to repeat heat and sunlight eliminated from the structure. By limiting heat assimilation and warm emittance, it helps with keeping up with customary space temperatures in homes and structures. Cool

rooftops utilize intelligent coatings and explicit tiles that retain less heat



It recreate the heft of elective energy, bringing summer temperatures by up down to fifty degrees Celsius. Cool rooftops moreover downsize dependence on air-con and, subsequently, energy utilization, prompting lower added substance gas discharges from power plants.





## DIFFICULTIES OF SUSTAINABLE CONSTRUCTION

Although the benefits of supportable development are clear, making the switch is anything but a simple one. Utilizing the accepted procedures sets aside time and arrangement. To start utilizing economical methodologies, preparation should be carried out, which includes time and cash. Another hindrance that numerous organizations might confront is the genuine essential expense of a manageable turn of events. Regardless of proof unexpectedly, the predominant conviction is that reasonable structure is more costly and costs more than whatever is really requested. In any case, as open attention to ecological issues develops, more development organizations are changing to supportable development, with green structure action on the ascent, Also insufficient standards for secondary materials and lack of consensus on end-of-waste status. challenges in comparing construction products using environmental criteria. economic feasibility hindered by unfavourable market conditions and a dearth of financial incentives. limited awareness within the construction industry lack of appropriate data input,limited experience with

the tools,difficulty of using the tool, the calculations and integrating it into the design and construction processes, requiring details for various elements and from all of those suppliers to do this for a whole installation.

## CONCLUSION:

The adoption and advancement of sustainable buildings have become progressively critical because of the hindering effect of conventional development processes. Manageable development assists with shielding the climate, however, it is likewise essential for the future prosperity of people in the future.

The impediments of reasonable development can be relieved by making extra motivating forces for designers, constructors, and shoppers of economic structures who utilize practical rules in their activities.





## SMART CITIES AND IOT INTEGRATION



**Mr. Vishwatej Patil**  
(Class – 2<sup>nd</sup> year Civil. Engg.) Student)

initiatives have become vital for creating livable, sustainable, and inclusive urban spaces. By integrating technology and data-driven solutions, smart cities aim to:

### Enhance Efficiency

Smart cities optimize the use of resources such as energy, water, and transportation systems, resulting in improved operational efficiency and reduced waste. IoT-enabled sensors and devices collect real-time data, enabling city authorities to make informed decisions and optimize resource allocation.

### Improve Quality of Life

Smart cities focus on improving the quality of life for their residents. Through IoT, cities can enhance public services, including transportation, healthcare, public safety, and waste management. Intelligent systems and data-driven insights enable proactive planning and faster responses to citizen needs, leading to improved living conditions.

### Role of IoT in Driving Urban Development

IoT devices, such as sensors and cameras, are deployed across cities to collect real-time data on various parameters, including traffic patterns, energy usage, air quality, and waste management. This data empowers city planners

and administrators with actionable insights to optimize operations, enhance services, and improve urban planning.

### How AI is used in self-driving cars

Self-driving cars have become possible primarily thanks to computer vision and deep learning. CV uses high-resolution cameras and lidars that detect what happens in the car's immediate surroundings. As a result, car systems can react to possible obstacles and avoid accidents. Of course, CV is not enough. You also have to teach car systems how to drive according to traffic rules. And this is where machine learning, backed up by deep learning, steps into the game.

### Benefits of self-driving cars

Self-driving cars are a huge milestone not just from the technological standpoint but also from the operational point of view. You see, these vehicles have everything it takes to make our everyday work accelerated and facilitated.

### With self-driving cars:

- Companies running them can save time and money (e.g., drivers can focus on more complicated work) and even operate 24/7, all year round.
- The number of accidents decreases (AI algorithms are never tired, intoxicated, or sleepy)



## 3D PRINTING IN CONSTRUCTION



**Ms. Namarata Doke**  
(Class – 2<sup>nd</sup> year Civil. Engg.)

### Introduction

The construction industry is slow to embrace new technologies. In recent years, though, 3D printing has emerged as a promising solution to many of the industry's challenges. 3D printing, also known as additive manufacturing, is a process of laying down cross-sectional layers of material one after another until the complete object is built. This technique has been used for decades in the automotive and aerospace industries, among others. Its potential for construction, however, has only recently been explored. Technology has the potential to revolutionize the way we design and build structures, making construction faster, more efficient, and more sustainable. Figure above shows a 3D printer that is employed in the construction industry:

In this article, we will explore the benefits and challenges of 3D printing technology for construction. We'll also consider the different 3D printing methods

that may be applied to the construction industry, and answer some frequently asked questions.

How is 3D Printing Technology Used in Construction?

The 3D printing systems created specifically for construction are commonly known as "construction 3D printers." A construction 3D printing (C3DP) project typically starts with a 3D digital model of the structure that needs to be constructed. The model is virtually sliced into layers. The printing robot or gantry system then follows a pre-programmed path to deposit each layer of material, tracing the layer outlines and extruding material until it has completed the whole slice. Once one layer is complete, it begins the next on top of the first, and construction continues like this until the full structure is built. It may use materials such as concrete, metal, or polymers to form this 3D structure.

The most common 3D printing technology for construction involves a robotic arm that extrudes concrete while moving back and forth. Powder binding and additive welding are other methods used for 3D printing in construction. Powder binding involves the solidification of powder layers to create the desired object. Additive welding was demonstrated in Amsterdam with the printing of a functional, full-scale metal bridge. To date, 3D printing has been used to print houses, offices, and other structures..



## AUTONOMOUS CONSTRUCTION EQUIPMENT



**Mr. Pawar Mahadeo**  
(Class – 3rd year Civil. Engg.) Student)

The world is entering an age of robotics. Industrial robots have worked in the manufacturing sector for decades, and now they appear in everything from airports to agriculture. Construction could be the next industry to undergo an automation transformation. Construction work is well-suited for autonomous machinery. Tasks are typically repetitive, physical, precise and time-sensitive, and most don't require out-of-the-box or creative thinking. These types of jobs are typically what manufacturers automate first, yet the industry has to fully embrace this advancement. As the sector's shortcomings become more apparent and technology advances, this trend is starting to shift.

Here's a closer look at how teams today are using autonomous construction equipment:

### Examples of Autonomous Equipements

Perhaps the most common form of automation in construction is in small robots like drones. These may be less impressive than fully automated heavy machinery but serve a crucial

role in safety and efficiency. Since they represent a smaller investment, they're also an ideal way for teams to dip their toes into automation.

Autonomous heavy machinery Recent advances have made autonomous heavy machinery a viable option for construction teams, too. Caterpillar, one of the most recognizable names in the industry, claims it's already hauled 2 billion metric tons with self-driving trucks. These machines first appeared in the mining sector but have since moved into construction sites. Most of these machines work by using a system of cameras and sensors. Data from LiDAR, cameras, GPS, RFID, and even vibration and temperature sensors guide them throughout the workplace safely and efficiently.



## Message by Head of Department



**H.O.D**  
**Mr. Shrenik. D .Kandale**

*My vision is to develop constructive thinking and analytical capabilities of every student of Civil Engineering Department. Our department is committed to provide students with a strong, broad based fundamental engineering education and prepare the students for a career in the industry, teaching and national laboratories. We also plan to develop entrepreneurial skills in students through internship programmes so that they would drive the spirit of growth of our economy and would be able to generate employment opportunities for other qualified and skilled people.*

*I personally look forward to integrate my experience of over 8 years in teaching and research into the learning systems and the collective efforts of the faculty of the department and build a comprehensive methodology that encompasses whatever that matters for nurturing the minds of our students. I look forward for preparing my students to face the challenges; the technology and engineering sector would offer in the future and succeed in offering technological solutions for the betterment of the society and our nation. I am happy to know that the Department of Civil Engineering, Brahmdevdada Mane Polytechnic Belati*

*Solapur published a newsletter of the Department. I appreciate the department for such an initiative to provide a platform for communicating the innovative ideas of the students and faculty members. Wishing all our students brilliant and bright future.*

## Editors Desk



**Prof.**  
**Mr. D.P. Gawade**

*It brings me immense joy & pleasure to introduce the 2nd edition of the academic .It gives me immense pleasure to present the very first issue of "THE SPARK" magazine of the Department of Civil Engineering. It is the talent and outcome of our students which is reflected through this. This is one of the best platforms for our students to present multifaceted personalities and innovative ideas.*

*I take this opportunity to thank our respected Principal Dr. S.B.Joshi,*

*HOD Mr.Kandale S.D. and all the Mechanical faculty members for their incessant inspiration and kind support.*

*I believe that this edition will prove to be a success. I express my heartfelt gratitude to the editorial committee for their relentless efforts, the young writers for their valuable articles and all those who have been a part of "THE SPARK".*



We have signed the MOU with following industries:

- + Siddhanath sugar factory
- + Mauli landmark
- + Furde Construction
- + Amar Construction

## Industrial Visits

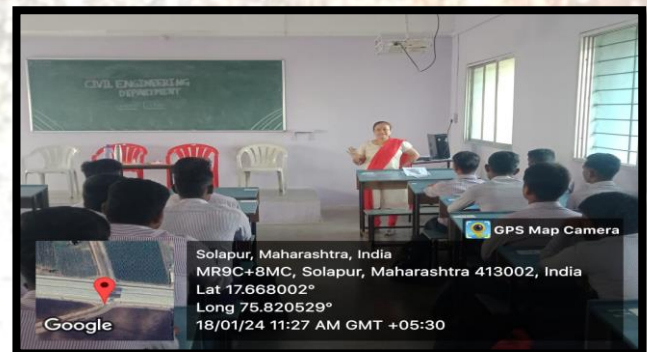


*Water Treatment Plant Pakni Solapur*



*Ujani Dam Solapur*

## Guest Lecture



*Mrs Mangal Sutar on “Civil Engineering services provided by PWD”*

*Civil Engineering Department Placed Students*



*Ajay K Karande*  
*(B.G.SHIRKE Pune)*



*Mosin Y Patel*  
*(B.G.SHIRKE Pune)*



*Shahid M Patel*  
*(B.G.SHIRKE Pune)*

*Congratulations!*



*Vipul G Chavan*  
*3<sup>rd</sup> Year 2<sup>nd</sup> rank*  
*82.50%*



*Onkar N Babar*  
*3<sup>rd</sup> Year 2<sup>nd</sup> rank*  
*78.60%*



*Mahadeo S Pawar*  
*3<sup>rd</sup> Year 3<sup>rd</sup> rank*  
*77.30%*



*Namrata D Doke*  
*2<sup>nd</sup> Year 1<sup>st</sup> rank*  
*75.11%*



*Vishwatej A Patil*  
*2<sup>nd</sup> Year 2<sup>nd</sup> rank*  
*75.00%*



*Md. Tafi J Bagwan*  
*2<sup>nd</sup> Year 3<sup>rd</sup> rank*  
*72.28%*



**Industrial Visits**



**STP Degaon on 28<sup>th</sup> Nov 2022**

**Brahmastra - 2K22**

- ❖ Paper Presentation organised by Civil Engineering Department on 11<sup>th</sup> Nov, 2022.
- ❖ Poster Presentation organised by Civil Engineering Department 11<sup>th</sup> Nov, 2022.



**Guest Lectures**



**Guest Lecture on Geotechnical Engineering By Ms.Mamdyal K.R, A.G Patil Polytechnic Solapur**

**News Letter 2022-23**



**Department News Letter Volume 10 Issue 02 published on 26<sup>th</sup> January 2023**

**First Year Toppers 2021-22**



**Vipul Chavan 79.63%**



**Mahadev Pawar 71.87%**

**Second Year Toppers 2021-22**



**72.13% (1<sup>st</sup>) Rodage Om Bharat**



**65.38% (2<sup>nd</sup>) Narkhedkar Onkar Nandkishor.**

**Third Year Toppers 2021-22**



**80.67% (1<sup>st</sup>) Sayyad Abubakar Siddiq Mansur**



**80.22% (2<sup>nd</sup>) Jadhav Prajwal Ambadas**



**78.89% (3<sup>rd</sup>) Sarwade Prafull Gangaram**

**Student Achievements**



**Laxman Mhmane(CE- 5I): 1<sup>st</sup> Winner in Wrestling Competition at S.M. Polytechnic, Akluj Solapur.**



**Shravani Pingale & Sanchi Kamble (CE-3I): 3rd Prize Winner in Poster Presentation Competition at B. M. Polytechnic, Solapur**