

CIVILIZATION

Department of Civil Engineering -Technical Magazine



Editors

Faculty Advisors:

Prof. C S Misal

Students Panel:

Aryan Chawada (TE Civil- A)

Nikita Bhosale (TE Civil- A)

Civilization is a magazine that speaks volumes about the hard effort taken by the faculty members and students to plunge into the areas of research, environmental awareness and latest technologies. We at the department of Civil Engineering, draw the advantage of being multidisciplinary, leading to diverse projects from students and faculty.

We represent a bouquet of vivid specialties showcased through one magazine "Civilization" This magazine will be published every semester enhancing the zeal within its stakeholders to achieve beyond the established benchmarks. Let's raise the bar of our magazine by being an inevitable part of it.

Our Inspiration



Shri. Shahu Chhatrapati Maharaj
President, AISSM Society's

From Principal's Desk



Dr. D. S. Bormane
Principal AISSMS COE, Pune.

I'm glad to signify that with commencement of this year 2021, AISSMS College of Engineering has completed 28 grand years of its establishment.

AISSMS COE as an outcome of academic excellence achieved is consistently producing University gold medalists and top rankers in different branches of engineering. Faculty is actively involved in research and development. College has number of very high-end analytical, computational and experimental facilities at the disposal of students. We are going to concentrate more upon the Engineering Research activities and use those for students and society welfare.

I am confident that the College is in a position to deliver the best theoretical and practical training to the students and offer the best talent to the employers. I wish all the best to the aspiring students, employers and all other stakeholders in achieving their goals.

**All India Shri Shivaji Memorial Society's
College of Engineering**

Vision:

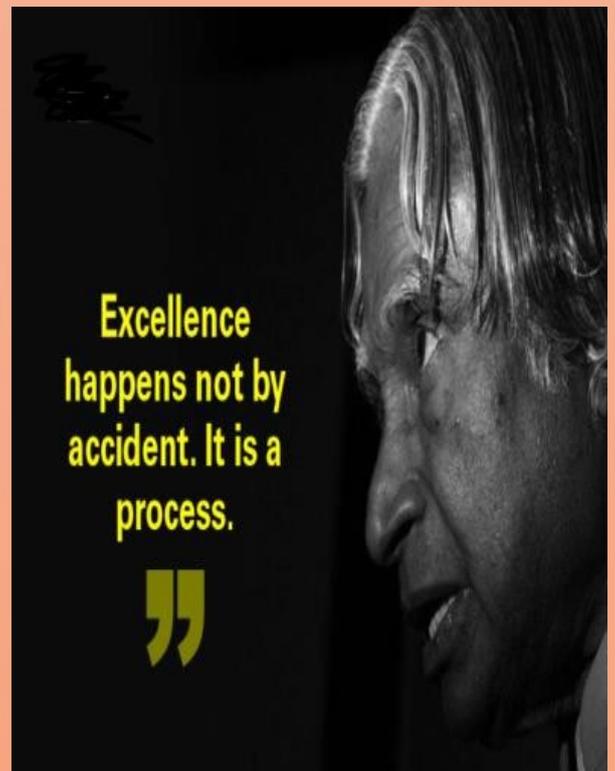
Service to Society through quality education.

Mission:

- Generation of national wealth through academics and research.
- Imparting quality technical education at cost affordable to all strata of the society.
- Enhancing quality of life through sustainable development.
- Achieving the distinction of highest preferred engineering college by stake holders.
- Carrying out high quality intellectual work.

Goals:

- To inculcate learning habits
- To create an environment to make the students creative and innovative
- To promote project based learning.
- To strengthen industry - institute interaction.
- To ensure continuous improvement in quality.
- To develop entrepreneurship skills.
- To nurture the spirit of team work.
- To catalyse all - round development of students.
- To develop technologies for sustainable development.



From Head of Department's Desk...



Dr. P.B. Nangare
Head, Civil Engineering Dept.

It is a matter of great pleasure for me to go through the wonderful contributions made by the students. Hearty congratulations to the editorial team. This magazine is intended to bring out the technical talents in the students and the teachers and to inculcate leadership skills among them. The outside world will come to know about the caliber of the students and the faculty through this magazine.

I extend my thanks to all the contributors for their articles and publications. Reading this magazine would be an inspiration and motivation for all students and staff to contribute even more to the forthcoming issues.

I hope that everyone would continue to give their full efforts to keep the momentum and continue to enhance the standards of the magazine.

Department of Civil Engineering

Introduction

As the students are now geared to explore the vast ocean that invariably allures them and have gamut of Rainbows to be colored, we too as the department also have certain specific Vision & Missions to be accomplished in the precincts of the department

Vision

Nurture the talent in civil engineers to work as global leaders for the development of society.

Mission

- Provide quality education to develop competent civil engineers
- Create awareness among students for sustainable development
- Cultivate the leadership qualities for becoming successful entrepreneurs

Short Term Department Goals:

- To augment infrastructure and processes for improved teaching learning
- To create awareness amongst students for competitive examinations and higher studies
- To establish Research centre

Long Term Departmental Goal:

1. To develop testing facilities & Consultancy
2. To encourage faculties to pursue
3. Doctorate and Post-Doctorate
4. To establish collaboration with the reputed
5. Institutes and industries

Program Educational Objectives

(PEOs):

1. To produce civil engineering's who will be fully aware of the impact of their work on society, both nationally and globally.
2. To achieve a high level of technical expertise to succeed in civil engineering practice and research.
3. To develop civil engineers who acquire professionalism, leadership

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PUBLICATIONS

Stabilization of soil using waste plastic fibre and kitchen

Dr. R D Nalawade

Abstract - Plastic water bottles are utilized as support with lime to work on the versatility and strength properties of the extensive soils. Different research facility tests are directed utilizing plastic waste strips with 0.245%, 0.15%, 0.705%, and 1% extents as soil support and consistent 5% of lime. At long last, huge enhancements in CBR, unconfined compressive strength, and free swell are seen at 5% lime and 0.715% plastic waste strips. This investigation discovered that balancing out sweeping soil utilizing plastic waste strips and lime affects the versatility and strength boundaries of the dirt. This strategy assists with decreasing plastic contamination and limit the expense of stabilizers used to balance out the subgrade soil.

Chinese Journal of Geotechnical Engg, 2022-12-13

Incremental dynamic analysis of building with weak storey at top as TMD

Dr. A A Manchalwar

Abstract: Structures show inelastic non-linear behaviour under cyclic loads associated with natural activities like earthquakes and wind, which impart external kinetic energy to them, consuming the lateral movement of structures, such movement may be responsible for the failure or collapse of these structures. To prevent such a collapse, it is necessary to recognize the non-linear behaviour of the structure and adopt a suitable mechanism to control the response of them and this may be possible by dissipating the seismic energy which imparts on them. The study is devoted to the development of an efficient, feasible and economical tuned mass damper for moderately high buildings. This tuned mass damper (TMD) is in form of a weak storey at the top of the buildings for square and rectangle in the plan. Incremental dynamic analysis (IDA) was implemented to investigate the benefits of TMD on structural behaviour. Using ten earthquakes scaled up to a maximum target multiplier of two, with ten increments, damage measures such as storey drift. The fragility curves in this study are represented by lognormal distribution functions with two parameters (i.e., the mean spectral displacement and the standard deviation) and developed as a function of spectral acceleration (S_a). Comparison of the fragility curves indicated that the TMD is marginally effective in attenuating seismic structural response under various earthquake ground motions.

Asian Journal of Civil Engineering, 28 Dec 2022

Pavement evaluation and applications of Geo textiles in pavements

Dr. R D Nalawade

Abstract: In this review, an exhaustive life cycle cost examination structure was created and used to evaluate the underlying and the future expense of 25 delegate low volume street plan choices. The sub grade should be steady, enduring, appropriately emptied and free out of volume changes because of variety in dampness. If not, it prompts disappointment of asphalt. Typically, asphalt flops because of the reasons, for example, primary, utilitarian, or materials disappointment, or a mix of these. However, in the review region, it is seen that, the asphalt disappointment is under the class of primary disappointment

Chinese Journal of Geotechnical Engg, 2022-12-13

Nonlinear Seismic Analysis of RC Elevated Liquid Storage Tanks,

Dr. M V Waghmare

Abstract: Liquid storage tanks are strategically important due to their essential requirement of service in the post-earthquake situation. Numerical modeling of the liquid storage tank needs special attention and cannot be done in the same manner as that of the conventional buildings. In the present paper, a numerical simulation of the RC elevated liquid storage tank is presented. The staging of the tank is modeled as a multi-degree freedom system, and the container with contained liquid is modeled as a two-mass system. Free vibration analysis of the tank is carried out, and mode shapes are extracted. Further, to study the seismic response of the tank, nonlinear time history analysis is carried out. The tank is subjected to time histories of real earthquake ground motions. The varying level of the liquid in the container is another characteristic feature of tanks. The filled condition of the tank is taken into account by considering the aspect ratio (S), defined as the ratio of height of the liquid to the radius of the container. The response of the tanks with two different aspect ratios viz. 0.5 (broad) and 2.0 (slender) is studied. The linear modal analysis also carried out to understand the significance of nonlinear analysis, particularly in liquid storage tanks. Displacement, velocity, and acceleration response at the bracing levels, as well as at container levels, are obtained. Additionally, the base shear response is also obtained. The effect of aspect ratio on the free vibration analysis and the seismic response of the tanks are presented. Liquid storage tanks are special structures that have typically low fundamental natural frequencies. The nonlinear time history response of the tank showed that the higher displacement and velocity response occurs at the convective level. It is found that the linear modal analysis significantly underestimates the response of the liquid storage tank.

pp 1785-1790 (2022) ASPS Conference Proceedings 1: Vol. 1 No. 6 Proceedings of 12th Structural Engineering Convention-An International Event (SEC 2022), NCDMM, MNIT Jaipur, India

Study Effect of Frequency Content of Earthquake Ground Motions on Structure with varying dimensions

Dr. M V Waghmare

Abstract: An earthquake is a catastrophe which is always a topic of concern for structural designers and civil technocrats. Not only it causes physical damage to the structures but also successful to impart psychological disorder in human minds for long-run. In order to mitigate the devastating effects of earthquake on society, it is eminent to study the dynamic characteristics in detailed manner i.e. to examine how the structure responds owing to the seismic characteristics. The various ground motion characteristic includes time-duration and velocity, frequency content and amplitude, displacement, incremental velocity and incremental displacement, peak ground accelerations (PGAs), etc. Out of these, effect of frequency content and maximum amplitude value of earthquake ground motions on the seismic response of structures is often underestimated. This paper investigates the effect of frequency content and maximum amplitude value on the seismic response of structures which is dominant of all characteristics. The study proceeds with recording time-history of acceleration obtained from conventional unidirectional harmonic shake table. Further, FFT (Fast Fourier Transform) analysis of applied time-history is done and the effect of frequency content and the maximum amplitude value of applied time-history on the seismic responses of structures is investigated and studied. For this, structures with varying dimensions (height, length, and width) are modelled and time-history analysis of structural models has been carried out in SAP2000v19. Seismic responses of analysed structures are represented in the form of fundamental natural frequency, storey displacement, and base shear. It is reported that out of many earthquake indices, frequency content and amplitude of earthquake ground motions are the most dominating. It is reported that the resonance phenomena occurs for the less height structure and thus it shows maximum displacement and base shear responses. Also, as height, length, and width of structure increases; displacement, base shear, and fundamental time-period of structure increases.

pp 793-798 (2022) ASPS Conference Proceedings 1: Vol. 1 No. 3 Proceedings of 12th Structural Engineering Convention-An International Event (SEC 2022), NCDMM, MNIT Jaipur, India| 19-22 December, 2022

Geotechnical characterization of soil slopes a tool in determining

Dr. R D Nalawade

Abstract: In this review, a vigorous geotechnical plan for soil slants (RGDS) approach was proposed, in which the Vulnerability Hypothesis was acquainted with depict unequivocally the vulnerabilities engaged with soil boundaries. The unsure unwavering quality is frequently used to depict the gamble of slant disappointment. The plan strength depicting the harshness between the variety in the framework reaction and the variety of information dubious soil boundaries was assessed by the sign to-commotion proportion.

Chinese Journal of Geotechnical Engg

Dynamic Analysis of Cantilever Retaining Wall

Dr. M V Waghmare

Abstract: Retaining walls are relatively stiff walls used for supporting soil laterally. Study of seismic behavior of retaining wall is important for safe design and to know the behaviour of how the response of soil influences the motion of the structure. This paper presents static and dynamic analysis of cantilever retaining wall by 3D finite element analysis using ANSYS software. Aim of this study is to investigate seismic behaviour of wall. For that purpose, soil modeling is done by direct method of analysis carried out by bonding of wall and soil together. Study contains three-parts, modal analysis is carried out after static analysis, mode shapes and natural frequencies of the wall is calculated and then nonlinear time history analysis is done by using three different earthquake ground motions. The influences of parameter are discussed such as dynamic characteristics of wall and soil, shear stresses, equivalent stresses. From this analysis it is observed that maximum displacement occurs at top of the wall and wall does not fail under given loading condition. The significant effect on seismic behaviour of retaining wall has been found in the soil. Also, the Equivalent (Von Mises) stress distribution for retaining wall supporting clayey soil, the lowest Von Mises stress values are detected near the ground level and increases at bottommost of retaining wall and higher stress detected amongst the base slab and the stem of the retaining wall in the soil cover zone.

SAMRIDDHI, An International Journal, (A journal of Physical Sciences, Engineering & Technology) Volume 14, Special Issue 2, 2022 Print ISSN : 2229-7111 Online ISSN : 2454-5767 (UGC care) Journal no. 64061

An Assessment of Assimilative Capacity, the Current Industrial Air Pollution Load and Supportive Carrying Capacity in the Chakan Region

Kalyani N Kulkarni, Ravindra K Lad

Abstract: Oxygen is the most fundamental and significant component of life on earth, even before the traditional "food, clothes, and shelter" needs. Due to numerous contaminants, the amount of oxygen in the air is decreasing and occasionally exceeds the assimilative capacity limit of the air, resulting in a variety of physical issues for living things as well as other environmental issues and physiological activities. A complete proof approach must be devised to solve this issue. The severity of the air pollution in Delhi has reached a point where anxiety has given way to panic. The national capital has experienced a significant reduction in temperature during the winter season, but regrettably, air pollution levels in the city are still rising. Both the Delhi University and the nearby city of Noida have "extremely poor" levels of suspended particles in the air. Strong local winds aid in the removal of particles, whereas moisture retains contaminants close to the surface. In the near future, the same situation might occur anywhere in the nation. Metro areas and other rapidly growing urban centers are more at risk. The situation may stay the same intensity level or it may get more or less severe, which makes things unpredictable. It is vital that techniques be developed and a solution be found to deal with this problem.

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(Indexed in - Scopus, GS, Elsevier, WOS, LOCKKS, Open J-Gate)*

Experimental investigation of Magneto-rheological damper

Dr. M V Waghmare

Abstract: In recent years, intensive research works are concentrated on the development of semi-active control devices. A semi-active control system can also be explained as a system that mainly requires a small external power source for functioning and applies the motion of the structure to generate the control forces. A semi-active control system typically begins from a passive control system, which is followed by a change to permit the flexibility of mechanical properties. The mechanical properties of the semi-active control devices may be modified depending upon the response from the excitation and/or from the calculated reaction. Magneto-rheological (MR) dampers are a type of a semi-active control device that, in the presence of Magneto-rheological (MR) fluid, responds to the applied vibrations. This type of damper has copper winding in it, forming an electronic circuit internally with a combination of MR fluids. The effectiveness of MR damper greatly depends on the command voltage to the copper winding. In the present study, the response of MR Damper to the command voltage, and the excitation frequency is experimentally evaluated. MR damper is supported by a wall mounting rigid fixture and connected to a shake table by a fixing unit. The voltage is varied from 0 V - 10 V with an interval of 2 V. Command voltages is applied to the MR damper with the help of voltage regulator and digital multi meter. The effect of excitation frequency is also studied (1 Hz – 8 Hz). While conducting the experimental work, acceleration values are obtained through the Data acquisition system. These acceleration values are integrated to get the velocity and displacement response. The relation between the displacement, velocity, acceleration of the MR damper, and the frequency of shake table and command voltage is studied. From the experimental work, it is observed that the displacement response of the damper is effectively controlled by increasing the command voltage

pp 1607-1613 (2022) ASPS Conference Proceedings 1: Vol. 1 No. 5 Proceedings of 12th Structural Engineering Convention-An International Event (SEC 2022), NCDMM, MNIT Jaipur, India| 19-22 December, 2022

STUDENT'S ARTICLES

QUANTUM COMPUTES

For most of our history, human technology consisted of our brains, fire, and sharp sticks. While fire and sharp became power plants and nuclear weapons, the biggest upgrade has happened to our brains. Since the 1960s, the power of our brain machines has kept growing exponentially, allowing computers to get smaller and more powerful at the same time.

But this process is about to meet its physical limits. Computer parts are approaching the size of an atom. To understand why this is a problem, we have to clear up some basics.

A computer is made up of very simple components doing very simple things. Representing data, the means of processing it, and control mechanisms. Computer chips contain modules, which contain logic gates, which contain transistors. A transistor is the simplest form of a data processor in computers basically, a switch can either block or open the way for information coming through.

This information is made up of bits, which can be set to either 0 or 1. Combinations of several bits are used to represent more complex information. Transistors are combined to create logic gates which still do very simple stuff. For example, an AND gate sends an output of 1 if all of its inputs are 1, and an output of 0 otherwise. Combinations of logic gates finally form meaningful modules, say, for adding two numbers. Once you can add, you can also multiply, and once you multiply, you can basically do anything. Since all basic operations are literally simpler than first-grade math, you can imagine a computer as a group of 7-year-olds answering really basic math questions. A large enough bunch of them could compute anything from astrophysics to Zelda. However, with parts getting tinier and tinier, quantum physics is making things tricky.

In a nutshell, a transistor is just an electric switch. Electricity is electrons moving from one place to another. So, a switch is a passage that can block electrons from moving in one direction. Today, a typical scale for the transistor is 14 nanometer, which is about 8 times less than the HIV virus diameter, and 500 times smaller than a red blood cell.

As transistors are shrinking to the size of only a few atoms, electrons may just transfer themselves to the other side of a blocked passage via a process called QUANTUM TUNNELING. In the quantum realm, physics works quite differently from the predictable ways we're used to, and traditional computers just stop making sense. We are approaching a real physical barrier for our technological progress. Scientists are trying to use these unusual quantum properties to their advantage by building quantum computers to solve this problem.

In normal computers, bits are the smallest unit of information. Quantum computers use qubits which can also be set to one of two values. A qubit can be any two-level quantum system, such as a spin and a magnetic field, or a single photon. 0 and 1 are this system's possible states, like the photons horizontal or vertical polarisation. In the quantum world, the qubit doesn't have to be just one of those, it can be in any proportions of both states at once. This is called superposition. But as soon as you test its value, say by sending the photon through a filter, it has to decide to be either vertically or horizontally polarized. So as long as it's unobserved, the qubit is in a

superposition of probabilities for 0 and 1, and you can't predict which it will be. But the instant you measure it, it collapses into one of the definite states. Superposition is a game-changer.

Four classical bits can be in one of two to the power of four different configurations at a time. That's 16 possible combinations, out of which you can use just one.

Four qubits in superposition, however, can be in all of those 16 combinations at once. This number grows exponentially with each extra qubit. twenty of them can already store a million values in parallel.

A really weird and unintuitive property qubits can have is Entanglement, a close connection that makes each of the qubits react to a change in the other's state instantaneously, no matter how far they are apart, this means when measuring just one entangled qubit, you can directly deduce properties of its partners without having a look. Qubit manipulation is a mind-bender as well. A normal logic gate gets a simple set of inputs and produces one definite output. A quantum gate manipulates an input of superpositions, rotates probabilities, and produces another superposition as its output.

So a quantum computer sets up some qubits, applies quantum gates to entangle them and manipulate probabilities, then finally measures the outcome, collapsing superpositions to an actual sequence of 0s and 1s. What this means is that you get the entire lot of calculations that are possible with your setup, all done at the same time.

Ultimately, you can only measure one of the results and it will only probably be the one you want, so you may have to double-check and try again. But by cleverly exploiting superposition and entanglement, this can be exponentially more efficient than would ever be possible on a normal computer.

So, while quantum computers will probably not replace our home computers, in some areas, they are vastly superior. One of them is database searching. To find something in a database, a normal computer may have to test every single one of its entries. Quantum algorithms need only the square root of that time, which for large databases, is a huge difference the most famous use of quantum computers is ruining IT security.

Right now your browsing, email, and banking data is being kept secure by an encryption system in which you give everyone a public key to encode messages only you can decode. The problem is that this public key can actually be used to calculate your secret private key. luckily, doing the necessary math on any normal computer would literally take years of trial and error. But a quantum computer with exponential speed-up could do it in a breeze.

Another really exciting new use is simulations. Simulations of the quantum world are very intense on resources, and even for a bigger structure such as molecules, they often lack accuracy. So why not simulate quantum physics with actual quantum physics??

Quantum simulations could provide new insights on proteins that might revolutionize medicine. Right now, we don't know if quantum computers will be just a specialized tool or a big revolution for humanity. We have no idea where the limits of technology are, and there's only one way to find out.

--Nikita Bhosale TE Civil A)

SUSTAINABILITY EVALUATION OF GREEN BUILDING ENGINEERING BASED ON ARTIFICIAL INTELLIGENCE AND ENERGY CONSUMPTION

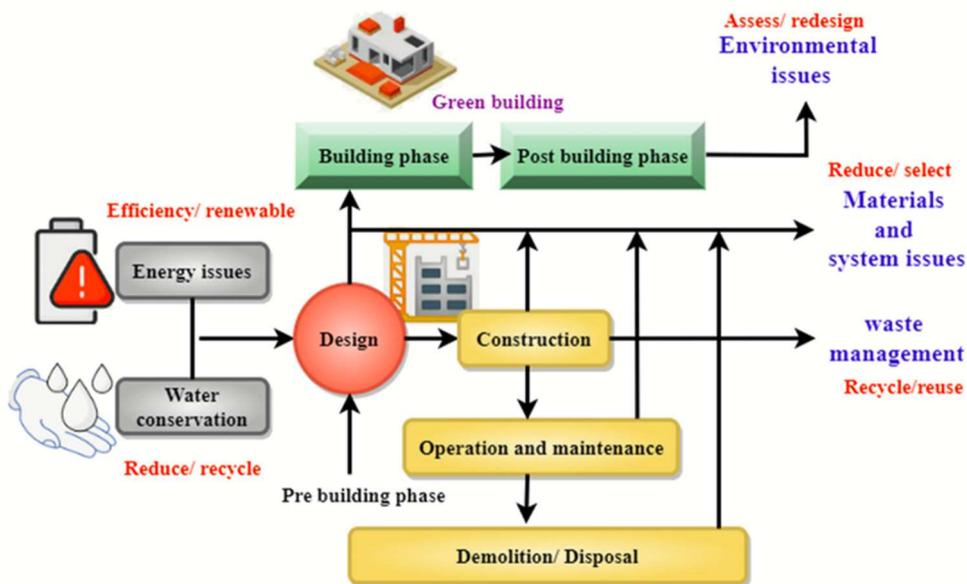
Abstract: A green building is a structure that avoids or eliminates negative environmental impacts and generates environmental benefits through its design, construction, or functioning. The use of ecologically friendly building materials increases the quality of life. The overuse of electronic equipment hinders the achievement of the overall green aim, even if smart buildings are a beneficial stimulus for sustainability. Demand-side management and green building energy consumption prediction are connected and depend on accurate estimates of how much energy a facility will need. While several approaches have been offered for predicting energy use, each method has advantages and disadvantages, and there is always room for improvement. This paper suggests the **Artificial Intelligence-based Energy Management Model (AI-EMM)** in green building. Adaptable to human choices, it can act intelligently to increase user comfort, safety, and energy efficiency. One of the key components of the AI-EMM model is a universal infrared communication system and subsystems for smart user identification and monitoring of the internal and exterior surroundings. Long Short-Term Memory (LSTM) models are used to enhance energy consumption. A green building's energy usage data is analysed using the suggested approach. For a better interior climate, studies examining the relationship between Heating, Ventilation, and Air Conditioning (HVAC) system should focus on airside design optimization. According to the findings, economic gains and environmentally sustainable building coexist harmoniously. A green or sustainable building is one whose structure and characteristics preserve or enhance the local environment. The experimental outcome of the AI-EMM achieved a high-performance ratio of 94.3%, less energy consumption ratio of 15.7%, accuracy ratio of 97.4%, energy management level of 95.7%, and prediction ratio of 97.1%.

RELEVANCE TO CIVIL ENGINEERING

- **Artificial Intelligence:**
Use of A.I. in civil engineering now a days made the construction industry to work with ease
- **Energy Saving:**
This Technology helps us to understand the usage of Energy Consumption
- **Green Building:**
Use of technology to make sustainable green building by saving energy

GREEN AND SUSTAINABLE BUILDING

Green and sustainable building lifecycles are shown in Fig. 1 with the primary factors of sustainability related to each phase. A green building's environmental impact is assessed and minimized at every stage of its lifespan, including the construction process. To maintain the green and sustainability criteria, the many stakeholders (such as building designers, contractors, end-users, etc.) must work together to ensure that each of their turfs and interests is represented throughout each step. This chapter provides an in-depth look at the green and smart building technologies and how they might help create more environmentally friendly and economically viable cities. Even though smart buildings are a beneficial stimulus for sustainability, excessive usage of electronic equipment puts a hold on achieving the overall green aim goal of providing people with a smart and eco-friendly lifestyle,



ARTIFICIAL INTELLIGENT DECISION-MAKING CONTROLLER

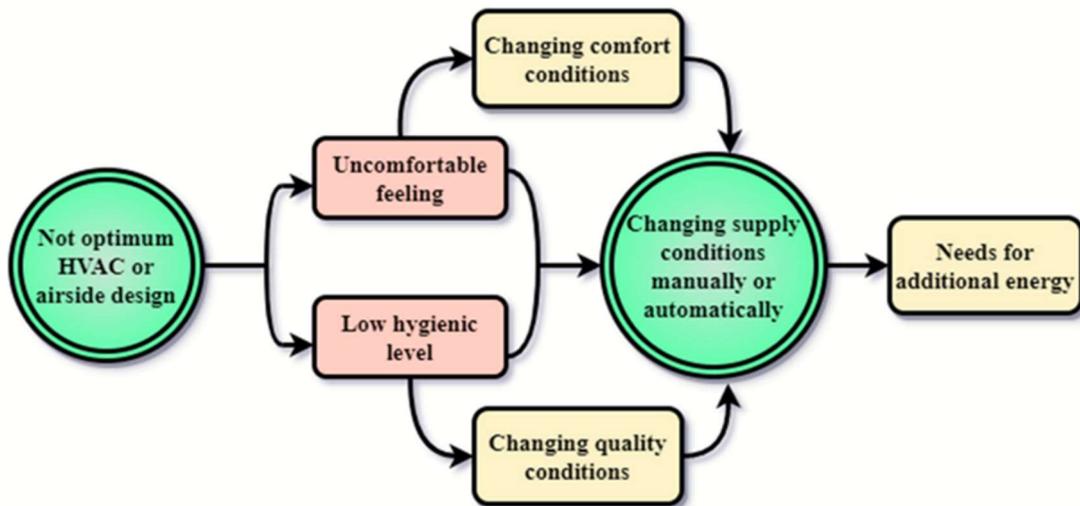
Fig. 2 shows an artificial intelligent decision-making controller in a green building. Artificial Intelligence (AI) has a decision-making process tailored to each user's needs and climatic circumstances observed at the user's home or office. Artificial intelligence (AI) is a pre-programmed system that caters to individual users' preferences for various services in various contexts. It allows us to change the temperature, humidity, lighting, ventilation speed, audio setup sound level, TV programme, electrically controlled curtain position, and shower temperature.

Artificial Intelligence (AI) first uses predefined categories to identify users in the application area (such as managing directors, directors, managers, engineers and other offices) before assigning those users to a priority level. AI can identify specific user preferences from a predefined internal data store. Artificial intelligence (AI) algorithms allow computers to predict future events based on massive volumes of data. Artificial Intelligence (AI) can be used in construction to forecast project cost overruns, the danger of on-site accidents, and the requirement for ongoing maintenance. Iterative processing and optimization techniques training enable machines and computer programmes to emulate human intelligence and learn from their own experiences. AI chooses the appropriate service settings and transmits them to the appropriate appliances based on the prioritized preferences of the users. Real-time interior and exterior weather and physical factors, such as temperature and humidity, light and sound levels and motion detection, are also studied by AI systems. As a result of these findings, Artificial Intelligence (AI) modifies the automation guidelines to maximize energy efficiency and user satisfaction.

FACTORS CONTRIBUTING TO WASTE ENERGY

Fig. 3 shows the factors contributing to waste energy. It is difficult to design an airside HVAC system that provides comfort, air quality, and the most efficient use of energy. Maintaining a specified amount of temperature, humidity and dust in a confined area is the primary goal of air conditioning. Consistent with its intended function, a conditioned space

must meet certain requirements. Air conditioning does more than just cool or heats a room. Comfort demands of the conditioned space occupants are met by the treatment of air to control temperature and humidity, as well as cleanliness and distribution. The process of air conditioning involves treating the air to manage its temperature, humidity, cleanliness, and distribution concurrently to fulfil the criteria of a conditioned area. Therefore, air conditioning is a whole heat exchange operation, including controlling air velocity, thermal radiation, and quality and removing foreign particles and vapours from the airstream



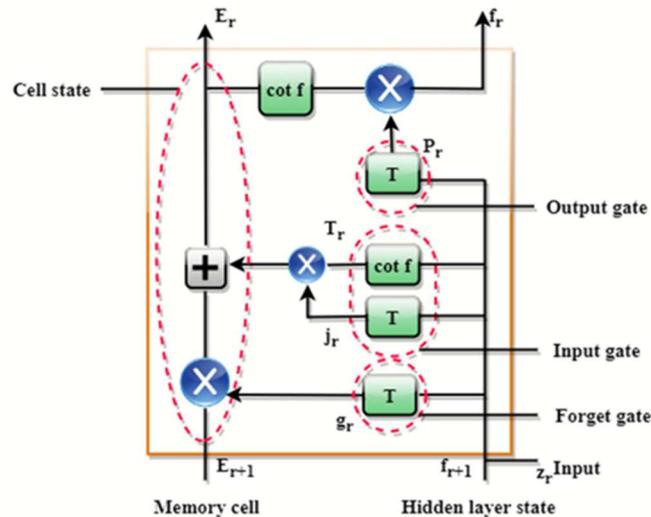
3.4 STUDIES ON THE ENVIRONMENT

1. Relying on supply circumstances to conserve energy is not worth the effort. Researchers are getting unrealistic findings because of this pattern. HVAC systems waste a significant amount of energy. Therefore, it is important to find out why this is happening. Indeed, a well-designed airside layout can immediately save energy.
2. Indoor air quality characteristics such as humidity ratio and pollutant concentration are critical for convenience and comfort.
3. It is necessary to redesign the airflow distribution pattern to improve the ventilation systems' performance. For example, there is no definite answer to the problem of recirculation or dead zones when it comes to air-conditioned buildings.

3.5 LSTM NETWORKS' INTERNAL MEMORY UNIT

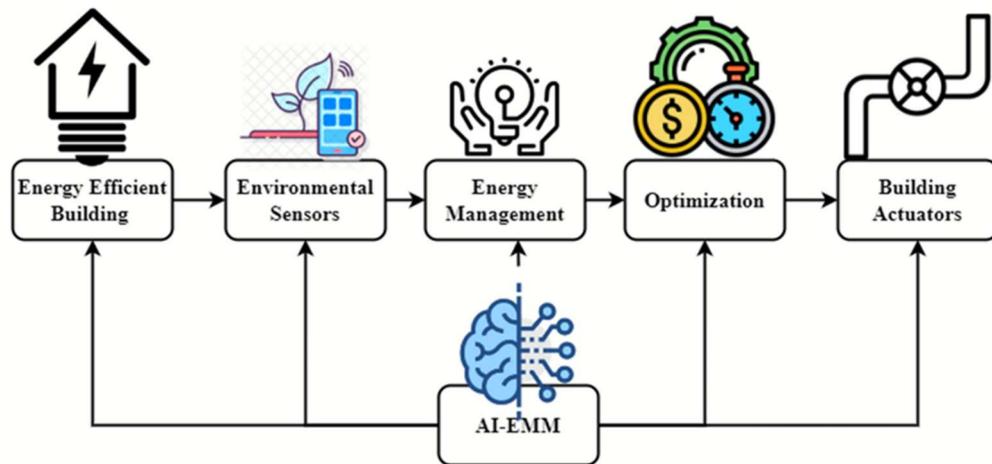
Fig. 4 shows the LSTM network's internal memory unit. This work suggested a hybrid model incorporating LSTM to enhance building energy consumption prediction. With the right input characteristics and data, the suggested model can continually adapt to external changes and retain good predicting ability. This research examines how binary building aspects affect energy use. Binary features better describe non-linear data

relationships, enhancing model accuracy and generalization. Using a threshold mechanism, the LSTM addresses the issue of gradient disappearance, and it can be used to analyse and forecast long-term dependent data. As a result, LSTM is considered a cutting-edge approach to solving time series prediction issues. Four layers of memory interact uniquely in the LSTM algorithm. The storage capacity of a network is increased by LSTM, which monitors the output, the current input, and the status of the previous unit.



3.6 STRUCTURE OF ENERGY MANAGEMENT

As a result of the limited resources available for power production amount of energy used in buildings must be minimized. Secondly, the level of user comfort must be maintained. Multi objective optimization is a process in which many goals are pursued at the same time to enhance the user's comfort while the same time is minimizing power usage. The suggested design for an energy conservation system focuses on this notion as its primary goal. There is a schematic of an energy-efficient structure in Fig. 5. As a result, there must be a trade-off between energy efficiency and user satisfaction. The control system in all residential buildings is critical to ensuring that energy consumption and user comfort are kept to a minimum. Thermal comfort is measured by the average temperature of a building's interior, whereas visual comfort refers to how aesthetically pleasing the space is to the user. An additional cooling or heating system is required to keep the building at a reasonable temperature. Illumination systems and Co2 concentrations are used to maintain visual comfort in a building, while Co2 concentrations are utilized for air quality control. All of these amenities are considered to preserve the user's overall comfort. In our research, we considered all three characteristics to ensure that residential buildings are as comfortable as possible for their occupants



3.7 COMFORT OPTIMIZATION IN GREEN BUILDING

The construction of a green retrofit provides a substantial opportunity to improve energy efficiency and achieve green development objectives. There is, however, a competing criterion between energy-saving c_1 and thermal comfort enhancement c_2 when generating ideal design solutions for building conversion. A comfort optimization is presented to evaluate different design choices and balance many goals in building green retrofit. To begin, an energy consumption and c_3 comfort level of the building is developed. Using this information, a multi-objective optimization is used to identify essential building factors and provide alternative designs for building retrofits based on green standards. After that, the best design options for thermal comfort and energy demand are found.

3.8 GREEN BUILDINGS' SUSTAINABILITY

Fig. 6 depicts the many ways a green construction handles sustainability. Sustainable green building considers factors such as land efficiency, reduced greenhouse gases, resource efficiency, design efficiency, water efficiency, comfort efficiency, waste management efficiency, material efficiency, indoor environment and energy efficiency. Structures that employ less energy-demanding materials for construction are known as Energy Efficient Structures. New technologies and techniques must be used to provide the same or better service while using less water to achieve water efficiency. Green supply chain management and green building operations are combined in this paper to reduce the use of materials and encourage more effective and efficient energy use. Water is currently used and ensures the prevention and avoidance of any waste and to perform environmentally-sensible building design.

The building's environmental and electricity savings are ensured through a single, low-maintenance, low-operating-cost design. Reduce dependence on non-renewable resources like coal, oil, etc. Using renewable energy in a coordinated manner saves money while creating a cleaner atmosphere. As a means to improve the quality of the interior environment, installing an operable window lets in more sunshine to help clear the air of harmful pollutants. Water conservation is a key part of green building design is the reduction in water waste via the use of rainwater collection. With adequate plumbing, water can be recycled and utilized more effectively. The use of long-lasting materials decreases the amount of material that is thrown

away. Green architecture may create a healthy atmosphere by reducing the usage of energy resources such as coal and gasoline, which contaminate the environment.



CONCLUSION

Commercial and residential buildings may benefit from AI-EMM which is being developed as a plug-and-play device for easy installation. As a result, the automation of AI-EMM is based on multi-user preferences with smart user identification and observations of environmental variables as inputs to increasing user comfort and the highest possible energy efficiency. A better model for predicting building energy use has been developed this model still has to be improved further. In the future, researchers may approach their work from two directions. Feature selection may be accomplished in a variety of ways.

All that is used in the present investigation is a straightforward correlation analysis approach. A neural network called an LSTM is used in the suggested hybrid model. To improve the model's generalization capability and prediction accuracy, researchers will in the future use additional training data and enormous quantities of energy consumption data to train their networks. The limits in this sector are directed at strategies and ideas such as enhancing the performance of sustainable buildings. The simulation test results AI-EMM achieved a high-performance ratio of 94.3%, less energy consumption ratio of 15.7%, accuracy ratio of 97.4%, energy management level of 95.7%, prediction ratio of 97.1%. In the future, researchers will concentrate on reducing sophisticated energy modelling tools' inputs and processing time while maintaining accuracy.

-Nikita Bhosale (TE Civil A)

- Aryan Chawada (TE Civil A)

A CRITICAL STUDY ON LOW-COST HOUSING

Generals

Low-cost housing can be considered affordable for lowland moderate- income earners if household can acquire a housing unit (owned or rented) for an amount up to 30 percent of its household income. In developing countries such as India, only 20% of the population are high-income earners, who are able to afford normal housing units. The low-income groups in developing countries are generally unable to access the housing market. Cost effective housing is a relative concept and has more to do with budgeting and seeks to reduce construction cost through better management, appropriate use of local materials, skills, and technology but without sacrificing the performance and structure life. It should be noted that low-cost housings are not houses which constructed by cheap building materials of substandard quality. A low-cost house is designed and constructed as any other house with regard to foundation, structure and strength. The reduction in cost is achieved through effective utilization of locally available building materials and techniques that are durable, economical, accepted by users and not requiring costly maintenance. Economy is also achieved by postponing finishing and implementing low-cost housing technologies in phases. High efficiency of workers, minimize waste in design and apply good management practices, can also be achieved.

Housing Scenario in India: -

India is a populous country where approximately 70% of the people reside in rural areas. These people are migrating to urban settlements in search of jobs and better living standards. The exhibit 1 below shows the state-wise and category-wise housing shortage in India. 99% of the housing requirement is in the Economically Weaker Section (EWS) and the Low-Income Housing (LIG) space.

Construction Techniques & Technologies

Using various types of housing techniques, we can build affordable and sustainable house. The various techniques are as follows:

1.Design of Individual Building

- Aesthetics and luxury less important design factor.
- Simple rectangular plan.
- Minimum staircase and circulation area.
- Optimum storey height.
- Optimum opening area.

By considering above points the efficient building design is produced and the cost of building will be reduced by 20%

2.Components of Building: -

❖ Hollow Concrete Blocks

- Concrete blocks are rectangular concrete masonry units either, solid (other than units used for bonding, such as a half-block) or hollow (open or closed cavity). Concrete blocks come in modular sizes and vary by country. Yet, their size and mass will be such that one can handle them easily. Moreover, to avoid confusion with slabs and panels, the height of the blocks should not exceed either its length or six times its width.

- They are the standard sized rectangular hollow blocks made of cast concrete of high or low density. For high-density blocks, Portland cement and aggregate, usually sand and fine gravel are used as a raw material. For low density blocks, industrial wastes, such as

fly ash or bottom ash are used as the primary raw materials and are often called cinder blocks /breeze blocks in different parts of the world

According to the ‘**Research Designs & Standards Organization of Indian Railways**’ the nominal dimensions of concrete block are as follows:

- Length: 400, 500 or 600 mm
- Height: 200 or 100 mm
- Width: 50, 75, 100, 150, 200, 250 or 300 mm

3.Low-Cost Construction Technologies: -

It is found that cost-effective and alternative construction technologies, which apart from reducing construction cost by the reduction of quantity of building materials through improved and innovative techniques, can play a great role in providing better housing methods and protecting the environment. It should be noted that cost-effective Construction technologies do not compromise with safety and security of the buildings. Mostly follow the prevailing building codes. The detail procedures of each step used for the case study are as follow:

- Arch Footings: -
- Rat Trap Bond:
- Filler Slab:
- Flooring:
- Mivan Technology

Comparison

Low-Cost Housing	Conventional Housing
Almost saves 40% cost	Expensive as compared
Environment friendly	Uses more resources
Faster Construction	Slower as compared
Local resources are utilized	Local resources are utilized & requirement others sources also
Suitable for small family	Suitable for any size depending upon budget

Conclusion:

From the thoroughly studies and analysis, we concluded that;

➤ The affordability of a Residential building can be brought to the range of Low and medium class income people through adopting to improved Building Technologies and proper usage of Natural resources.

➤ The cost of a building can be reduced up to 30-40%

➤ The strength of the building is not compromised in Low-cost Housing and in fact the buildings are made more effective.

➤ As explained by using various alternative materials cost of Construction will reduce up to 19%. By using various technologies as explained the cost reduction is up to 20 to 30 %.

➤ People will get all primary and basic services at their affordable price.

Congestion will be reducing

- *Saurabh Relekar (TE Civil B)*

STUDY ON LABOUR SAFETY IN CONSTRUCTION INDUSTRY

Abstract: Construction industry has accomplished extensive growth worldwide particularly in past few decades. For a construction project to be successful, safety of the structures as well as that of the personnel is of utmost importance. The safety issues are to be considered right from the design stage till the completion and handing over of the structure. Construction industry employs skilled and unskilled labourers subject to construction site accidents and health risks. A proper coordination between contractors, clients, and workforce is needed for safe work conditions which are very much lacking in Indian construction companies. Though labour safety laws are available, the numerous accidents taking place at construction sites are continuing. Management commitment towards health and safety of the workers is also lagging. A detailed literature study was carried out to understand the causes of accidents, preventive measures, and development of safe work environment. This paper presents the results of a questionnaire survey, which was distributed among various categories of construction workers in Kerala region. The paper examines and discusses in detail the total working hours, work shifts, nativity of the workers, number of accidents, and type of injuries taking place in small and large construction sites.

Introduction

1.1 Generals

Construction industry has accomplished extensive growth worldwide particularly in past few decades. For a construction project to be successful, safety of the structures as well as that of the personnel is of utmost importance. The safety issues are to be considered right from the design stage till the completion and handing over of the structure. Construction industry employs skilled and unskilled laborer's subject to construction site accidents and health risks. A proper coordination between contractors, clients, and workforce is needed for safe work conditions which are very much lacking in Indian construction companies. Though labor safety laws are available, the numerous accidents taking place at construction sites are continuing. Management commitment towards health and safety of the workers is also lagging. A detailed literature study was carried out to understand the causes of accidents, preventive measures, and development of safe work environment. This paper presents the results of a questionnaire survey, which was distributed among various categories of construction workers in Kerala region. The paper examines and discusses in detail the total working hours, work shifts, nativity of the workers, number of accidents, and type of injuries taking place in small and large construction sites. In India, construction industry is the second largest employer when compared to agriculture. Throughout the world, the construction area of civil engineering is one of the most hazardous industries. The number of fatal accidents taking place at the construction sites is quite alarming and the major cause was found to be fall of persons from height and through openings. In the present scenario, the Indian construction industry is quite large and complex involving latest technology as well as man power. On a par with the development of construction industry, drawbacks in terms of safety and health aspects are also witnessed. The Indian construction labour force is 7.5% of the total world labour force and it contributes to 16.4% of fatal global occupational accidents [3]. In the construction industry the possibility of a fatality is five times more likely than in a manufacturing industry, whereas the risk of a major injury is two and a half times higher. India has the world's highest accident rate among construction workers.

Construction site safety is an aspect of construction related activities Case C

Case Study

concerned with protecting construction site workers and others from death, injury, disease, or other health-related risks. ... The leading causes of construction site fatalities are falls, electrocutions, crush injuries, and caught-between injuries.

- In India the construction industry is the largest among the non- farming sector to generate jobs. But it also is a large contributor of grievous injuries and deaths of its workers in the country. The construction area of civil engineering is one of the most hazardous industries worldwide.

Data Collection

Data collection was done by collecting 127 questionnaires from 52 sites. These included 28 small industries and 24 large industries. In small industries, only G+0 and G+1 building construction was found on sites. Data was collected from 11 number of G+0 building site and 17 number of G+1 building sites. In large industries, data collection was done from 8 residential buildings, 12 commercial buildings and 4 educational buildings, 9 numbers of \leq G+2 buildings, 9 numbers of $G+3 \leq$ G+6 buildings and 6 numbers of \geq G+7 buildings. Only day works were found on small industries sites.

Conclusion of case study

- 1) Safety is a management initiative. Due to various reasons this was found lacking on majority sites surveyed.
- 2) The rate of occurrence of accidents in small industries is 33.97%
- 3) The rate of occurrence of accidents in large industries is 15.4%
- 4) The overall aspects of safety are neglected at construction sites. In particular, the most critical factors like safety policy, awareness among the workers and falling hazards are neglected

- *Niraj Memane (TE Civil B)*

MOVABLE BRIDGE

Introduction

Movable bridges are designed and constructed to change its position and occasionally its shapes to permit the passage of vessels and boats in the waterway. This type of bridge is generally cost effective since the utilization of long approaches and high piers are not required. When the waterway is opened to vessels and ships, traffics over the bridge would be stopped and vice-versa. Moveable bridge is a bridge that can change position (and even shape in some cases) to allow for passage of boats below. This has a lower cost of building because it has no high piers and long approaches but its use stops the road traffic when the bridge is open for river traffic.

The oldest known movable bridge was built in the 2nd millennium BC in the ancient Egypt. History also knows for one early movable bridge built in Chaldea in the Middle East in 6th century BC. Since then they were almost forgotten until Middle Ages when they again appeared in Europe. Leonardo da Vinci designed and built bascule bridges in 15th century. He also made designs and built models of swing and a retractable bridges. Industrial revolution allowed for new technologies like mass-produced steel and powerful machines and it is no surprise that new types of modern movable bridges appeared in 19th century. They are built even today but many movable bridges that are still in use in United States are built in early 20th century. In time, some of them are repaired with lighter materials and their gears are replaced with hydraulics.

Types of movable bridges:

Various types of movable bridge are available.

- Bascule bridge
- Vertical lifting bridge
- Swing bridge
- Rolling Bridge
- Retractable Bridge
- Submersible Bridge
- Folding Bridge
- Tilt Bridge

CASE STUDY

Monitoring of the Sunrise

Movable Bridge Mustafa Gul and F. Necati Catbas

ABSTRACT: Movable bridges experience major deterioration as compared to regular fixed bridges due to their complex structural, mechanical, and electrical systems [1] and even a minor malfunction of any component can cause an unexpected failure of bridge operation. The implemented system is able to monitor the structural mechanical and electrical systems of the bridge. For the sake of brevity, sample results from one study for monitoring of open gear using video cameras are presented.

Test Structure and Measured Data

In this section, the design and implementation of a monitoring system on the Sunrise Movable Bridge in Ft. Lauderdale (Figure 1) is presented. The selected representative movable span (constructed in 1989) is the west-bound span of two parallel spans on Sunrise Boulevard in Ft. Lauderdale (Catbas et al. 2009) [3]. It has double bascule leaves, with a total length of 117 ft, width of 53.5 ft each 70-ft long, and 40-ft wide, carrying three traffic lanes. The bridge opens in 30 min

The data acquisition system (DAS) is a critical component of a structural health monitoring system that includes sensors, data acquisition systems, signal processing, synchronization, and storage of the data. In this real-life bridge monitoring application, the data acquisition equipment is installed in permanent protective and temperature-humidity-controlled-enclosures located in both machinery rooms at each side of the bridge. The sensors are connected by weatherproof cables and specially designed connectors. Since the two leaves of the movable bridge are physically separated from each other, wireless communication is provided to ensure the data transmission between the leaves of the bridge, and two GPS units are used for synchronization. The instrumentation plan is designed to monitor the most critical electrical, mechanical, and structural components. The original sensor installation consists of an array of 162 sensors (adding up to more than 200 channels). These sensors are installed to monitor structural, mechanical, and electrical components of the bridge. In addition, a weather station to monitor the environmental factors is also installed

Methodology and Results:

Due to the extensive nature of this project, several studies were conducted using the monitoring data collected from this bridge. The following is a brief list of such studies but interested readers are referred to several papers and reports related to this project (all the references, e.g. papers and reports, could not be included in this short report and more references can be obtained from the websites of the authors of this text). For the sake of brevity, only the lubrication monitoring of open gear using vision based methods and related results were presented in this report.

1. Monitoring of structural elements using strain data
2. Monitoring of structural elements using video and strain data
3. Monitoring of gear boxes using vibration data
4. Monitoring of open gears using video data

CONCLUSION

The project presented in this case-study report yielded several important results for the bridge owner that was successfully used for improving the maintenance operations of the movable bridge. Since the movable bridge under consideration included several different structural, mechanical, and electrical components to be monitored, we had to use several different sensors and data analysis methodologies to interpret the data. Therefore, this was a very challenging application that needed a significant effort for coordination and project management with involvement of several people with different backgrounds. At the end, the project turned out to be very rewarding considering the success of the project from both academic and practical points of view. For example, the report showed that the level of lubrication of the open gear can be successfully assessed using the proposed monitoring system, which was an important finding for the infrastructure owner for their maintenance planning and scheduling offering significant cost savings.

- *Shubham Shirgave (TE Civil B)*

BASE ISOLATION SYSTEM USED FOR EARTHQUAKE

INTRODUCTION:

For many centuries, the human species has been developing. They have developed a number of innovations that benefit society. They still need to make disaster predictions. include EARTHQUAKES. History has shown that the greatest threat of producing a natural disaster is an earthquake. The earth's surface vibrates or shakes during an earthquake. Seismic waves are produced in the Earth's lithosphere as a result of the release of energy in the form of vibrations. It might be weak (which has no impact on humans) or powerful in intensity (which is violent enough to destroy buildings and cities). These strong earthquake waves can shift the ground, which leads to structures collapsing. They not only wreak destruction but also have an impact on the local economy. They not only create destruction but also have an impact on the local economy in earthquake-prone locations. The relationship between the soil and the structure breaks down as a result of the displacement brought on by the earth's seismic waves. The earth's surface can no longer support the weight of the structure.

which presents a risk and poses the greatest threat to human life.

METHODOLOGY AND APPLICATIONS

Base isolation is a technique for separating a building's foundation from the earth's surface. The method that uses bearing capacity and damping qualities is called seismic base isolation. All seismic waves are absorbed by dampers during earthquakes. It lessens the waves' energy and slows down the floor's acceleration.

1. Working Principle of Base Isolation

The fundamental idea underlying base isolation is that the structure's or a building's response is altered such that the ground below can move with little to no motion being transmitted to the structure above. Only in an ideal system is a complete separation feasible. In the scenario that occurs in the real world, a vertical support is required to transfer the vertical loads to the base.\

Since the acceleration created in the structure is the same as that of ground motion, the relative displacement of the ground and the structure is zero for an absolutely rigid, zero period structure. In contrast, a perfect flexible structure would not experience any acceleration; as a result, the relative displacement of the structure would be equal to the displacement of the ground.

There is no such thing as a fully rigid construction. Earthquakes have maximum acceleration and displacement, which oscillate between 0 and 17 g's. The range of accelerating and displacement time during an earthquake. When the structure's (or a building's) acceleration exceeds that of the earth, the structure cannot withstand the acceleration.

MATERIALS USED FOR BASE ISOLATORS:

Lead rubber bearings were developed as base isolators in the 1970s. They consist of three basic components- a lead plug, rubber and steel, which are generally placed in layers. A. Rubber The rubber provides flexibility through its ability to move but return to its original position. At the end of an earthquake, if a building hasn't returned to its original position, the rubber bearings will slowly bring it back. This might take months, but it will return to its original position. B. Lead Lead was chosen because of its plastic property-while it may deform with the movement of the earthquake, it will revert to its original shape, and it is capable of deforming many times without losing strength. During an earthquake, the kinetic energy of the earthquake is absorbed into heat energy as the lead is deformed. C. Steel Using layers of steel with the rubber means the bearing can move in a horizontal direction but is stiff in a vertical direction.

BASIC REQUIREMENTS OF AN ISOLATION SYSTEM ARE

1. Flexibility
2. Damping
3. Resistance to Vertical or other service loads

ADVANTAGES

1. Apart from protecting structures from seismic activities, base isolation also protects them from GSA blast loads as the ability to move reduces the overall impact of the blast on the structures.
2. Base isolated structures are predictable, hence reliability of them is very high as compared to conventional structural components.
3. Need of strengthening measures such as frames, bracing and shear walls are cut down by reducing the earthquake forces transmitted to the building.
4. Simplification of seismic analysis as compared to the conventional structures by allowing reduction in structural elements.
5. In case of large concentrated In an substituted.unexpected seismic activities, damage is only isolation system, where elements can be easily
6. Base isolation can also be retrofitted to suitable existing structures. Moreover, the building can remain serviceable throughout the construction.

DISADVANTAGES

1. Base isolation can't be done on every structure, for example: it is not suitable for structures resting on soft soils.
2. Becomes less efficient for high rise buildings.
3. Unlike other retrofitting, base isolation cannot be applied partially to the structure.
4. Implementation in an efficient manner is difficult and often requires highly skilled labourers and engineers.
5. Base isolation can't be done on every structure as it is not suitable for structures resting on soft soils.
6. It becomes less efficient for high rise buildings

APPLICATIONS:

1. The earthquake energy is prevented from entering the structure by decoupling the latter from the ground motion, thereby reducing both the ductility demand and inter-storey drifts.

2. The natural frequency of structure depends on the factors like mass,height and stiffness of the structure. If the earthquake frequency is high or matches with the natural frequency of the structure, the building may oscillate violently. Base isolators reduce the stiffness of structure thereby reducing the natural frequency which minimises the oscillations due to earthquakes.

3. As Base Isolation reduces the earthquake forces transmitted to the structure, there is no need of strengthening the structure by providing the frames, shear walls, bracings, etc

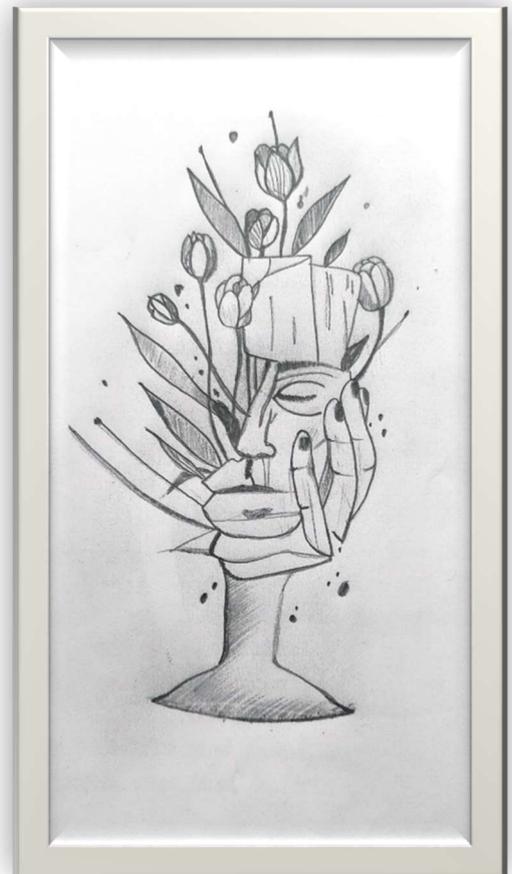
CONCLUSION:

After going through all these studies and literature reviews it is found that it is hard to give protection to the structure by just making the building strong. If the base isolation system completes the whole requirements, then it can solve almost all of the earthquake issues. Study of lead rubber bearing is the most important method in base isolation as compared to other two methods. It is applicable to low to medium buildings and also protects the building from earthquake forces. It gives needed flexibility to the structure and by using these bearings it stands against ground motion with high frequencies. All the types of the Base isolation system are discussed with the application and the information is given for the materials and methods for the system

- *Tejas Rokade (TE Civil B)*

STUDENTS' CREATIVITIES

Drawing Sketches



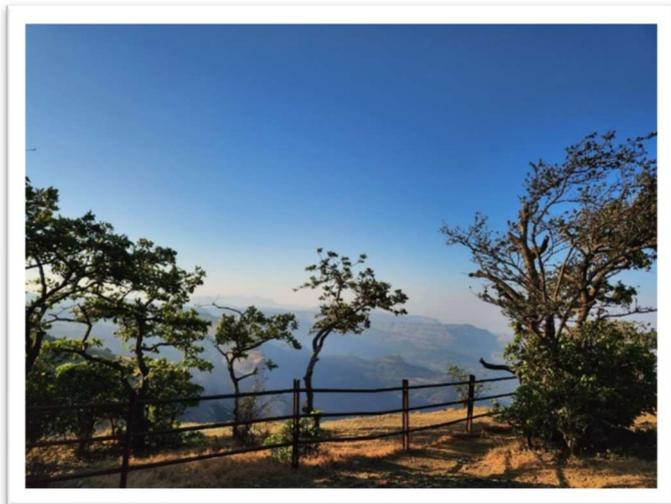
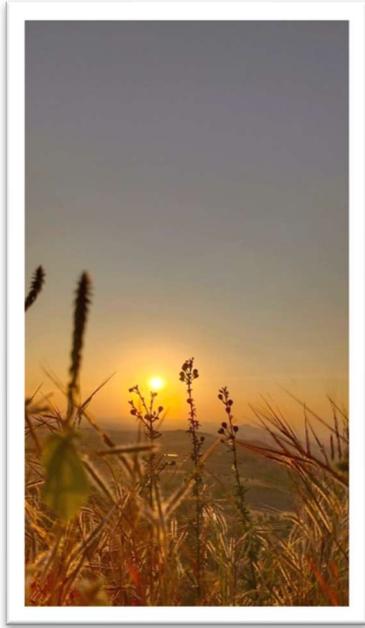
Komal Gargam (TE Civil A)

Posters Related to Environmental Issues



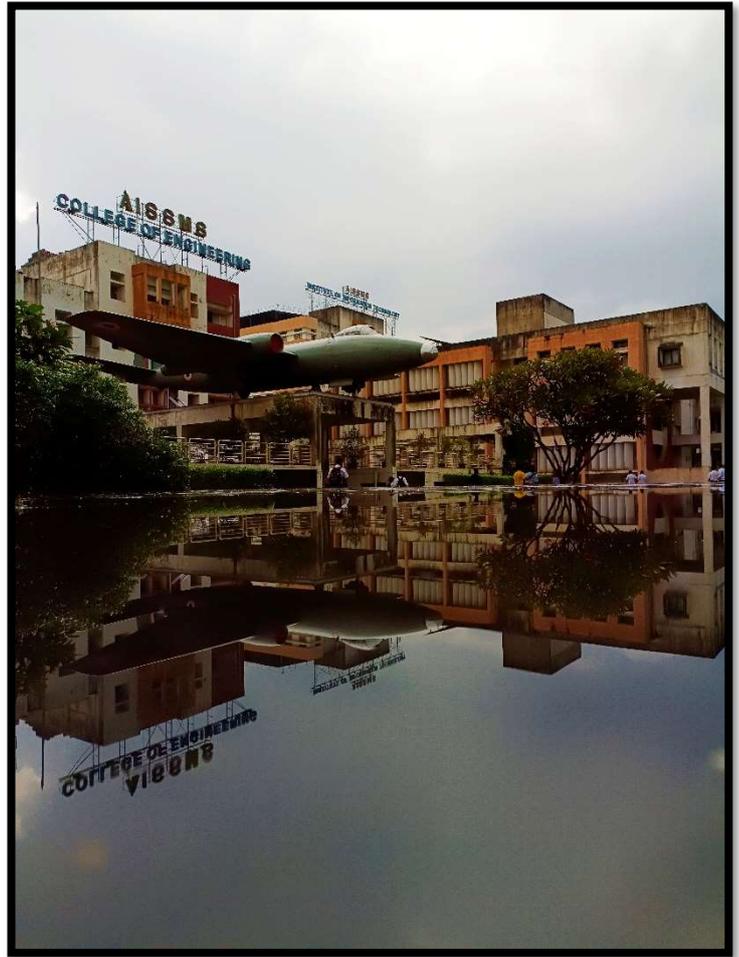
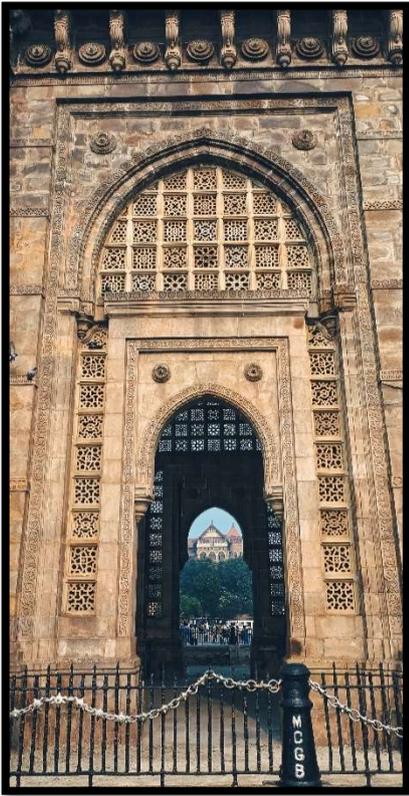
Kiran Phadtare (TE Civil A)

Nature captured through Photography



-Nikita Bhosale (TE Civil A)

Architecture captured through Photography



- Vaishnavi Godbharle (TE Civil A)

