

DEPARTMENT OF CIVIL ENGINEERING

TECHNICAL MAGAZINE

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Message from the Head of Department

The Department of Civil Engineering was established in the year 2010, and presently it offers Undergraduate programme in Civil Engineering with a student intake of 30 and Post Graduate programme in Structural Engineering with a student intake of 18. The Department has well qualified faculty and supporting staff in areas such as Structures, Geo-technical, Construction & Management, Environmental and Transportation Engineering. Civil Engineering plays a key role in the development of any field of Engineering.

This field of Engineering enables the students to learn Planning, Analysis, Design, Construction Methods, and Maintenance of Buildings, Roads, Dams, Bridges, etc.

The Department has well equipped modern and advanced equipment in the Advanced Structural Engineering Laboratory, Strength of Materials Laboratory, Hydraulic Engineering Laboratory, Survey Laboratory, Environmental Engineering Laboratory, Soil Mechanics Laboratory, Concrete and Highway Engineering Laboratory, and Computer Aided Building Drawing Laboratory.



**Dr.R. Premsudha,
Professor & Head,
Department of Civil Engineering**

Vision and Mission of the department

Vision of the Department

To produce quality Civil Engineers having domain knowledge embedded with design, analysis, and research capability, ethical and moral values, for the welfare of society and humanity.

Mission of the Department

DM 1: To produce knowledge based Civil Engineers by focusing theoretical and practical studies with field orientation.

DM 2: To engage the students in creating design solutions for real life problems associated with industry and society.

DM 3: To inculcate entrepreneurship culture along with professional ethics among Civil Engineering students and also promote the use of modern tools and techniques for sustainable economic growth.

Program Educational Objectives (PEOs)

PEO 1: Design Techniques: The graduates will be able to apply the concepts of basic geometrical construction, preparation of plans, design of structural elements, specification, and prepare estimates.

PEO 2: Construction Quality & Control: The graduates will be able to build the infrastructure required for the country and apply the tools for quality in construction, cost effective construction materials and methods.

PEO 3: Leadership: The graduates will be able to work as a member and leaders in a team, prepare and present reports, and employ project management tools for the evaluation and review of projects globally.

Program Specific Outcomes (PSOs)

PSO 1: Professional skills: Students shall have skills and knowledge to work on projects on urban and rural housing infrastructure, environment, and sustainability.

PSO 2: Competency: Students shall qualify at the state, national, and international level competitive examination for employment, higher studies, and research.

Program Outcomes (POs)

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Message From Editorial Team

Welcome to an exciting edition of the technical magazine of the Department of Civil Engineering, where innovation, creativity, and technology converge. In this issue, we delve into a wide array of topics, from the latest advancements in construction materials and sustainability to cutting-edge developments in Construction techniques and practices. Our mission with this magazine is to create a platform where ideas can flourish, where students and faculty alike can showcase their work, share their knowledge, and contribute to the ever-evolving world of technology. We believe that through collaboration and the exchange of ideas, we can foster an environment that nurtures innovation and drives progress.

We would like to extend our heartfelt gratitude to all contributors who have taken the time to share their insights and expertise. Your work is the keystone of this publication, and it is your dedication that makes each edition of our Magazine a success.

As you explore the content within these pages, we encourage you to think beyond the boundaries, to question, to innovate, and to contribute to the vibrant tapestry of ideas that defines our institution.

Thank you for your continued support and enthusiasm. We hope you enjoy this issue as much as we have enjoyed putting it together.

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DESIGN AND DEVELOPMENT OF A WORKING RAILWAY TURNTABLE MODEL USING MOTORS



This Project undertakes the design and development of a working railway turntable model using motors, showcasing the functionality of this critical railway component. The model utilizes a motorized system to rotate a circular turntable, allowing locomotives or railcars to change direction or move to a different track. The project incorporates a gear system, railway tracks, and a locomotive or railcar model to demonstrate the turntable's operation. The turntable's rotation is controlled by a motor, which is powered by a DC power source. The gear system ensures a smooth and precise rotation of the turntable, while the railway tracks are designed to accommodate the locomotive or railcar model. The model can be controlled using a simple control system, such as a button or joystick, allowing users to manipulate the turntable's rotation. Additional features, such as lighting or sound effects, can be integrated to enhance the user experience. This project combines mechanical and electrical engineering principles to create a functional and educational model, providing a unique insight into the workings of a railway turntable. The model has the potential to be used as a teaching tool, allowing students to understand the principles of railway engineering and the operation of railway turntables. Furthermore, the model can be used to test and demonstrate various railway scenarios, such as locomotive or railcar movement, and to evaluate the performance of different turntable designs.

Design and Mechanism

The turntable consists of a circular rotating platform mounted on a central pivot. It is designed to accommodate small-scale railway models for demonstration purposes. The platform is supported by a frame with guide rails to align the tracks. A DC motor or stepper

motor is used to provide controlled rotational movement. A gear reduction mechanism ensures smooth and precise rotation. The motor is connected to a microcontroller (e.g., Arduino or Raspberry Pi) for automation. Electronic control via a microcontroller with programmed sequences for rotation. Sensors (e.g., IR or Hall Effect sensors) to detect positions and stop the rotation at predefined points. User interface through a remote control, mobile app, or manual switches.

Challenges and Limitations:

Ensuring precise alignment of the turntable with the tracks is critical. Use of sensors or mechanical locking mechanisms to achieve accuracy. Smooth acceleration and deceleration require appropriate motor drivers and control algorithms. The turntable should support different train weights without excessive strain on the motor. Proper balancing and support structures are necessary. Efficient power management for uninterrupted operation. Use of slip rings or other methods to avoid tangled wires during rotation.

Benefits

Useful in railway model exhibits, educational demonstrations, and engineering research. Enhancing real-world applications by integrating IoT and AI-based control systems. A scaled-down version is cost-effective for model railways and educational use. Reduces the need for extensive track layouts, saving space and resources.

Future Scope

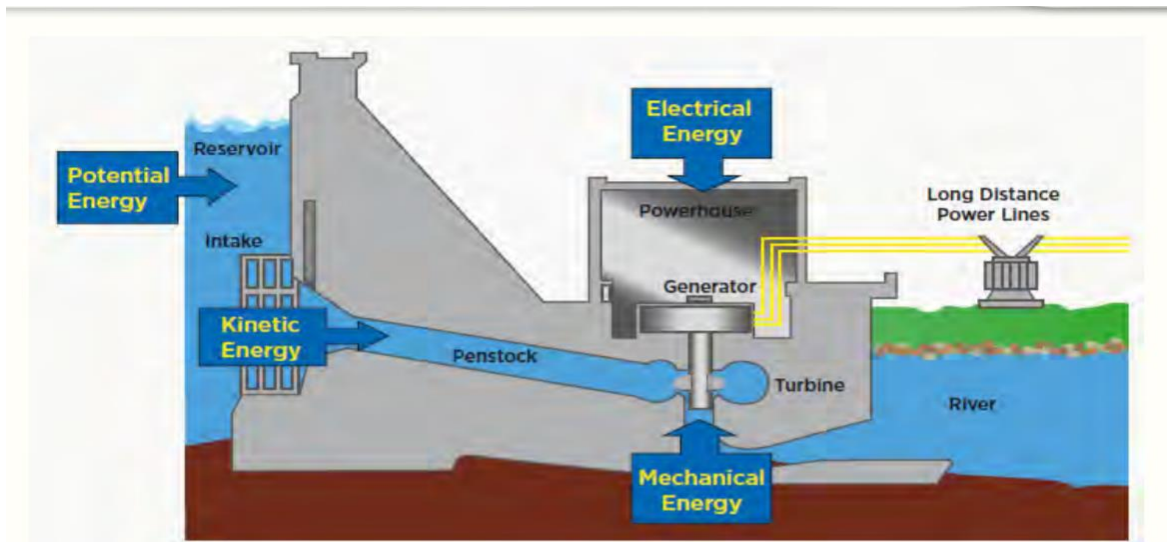
Integration with AI and machine learning for self-operating systems. Remote monitoring and control via smartphone applications. Using renewable energy sources such as solar-powered motors. Adapting the concept for real-world railway turntables to improve efficiency in locomotive management.

Conclusion

The design and development of a working railway turntable model using motors demonstrate a practical application of automation in railway operations. Overcoming challenges related to alignment, motor control, and power management ensures a functional and efficient turntable. Future developments can focus on AI, IoT, and sustainability to enhance railway operation further.

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HYDRO POWER PLANT DAM



A hydropower plant dam is a critical infrastructure that utilizes the potential energy of stored water to generate electricity, contributing to the global shift toward renewable and sustainable energy sources. The basic working principle of a hydropower dam involves constructing a barrier (dam) across a river or watercourse, creating a reservoir that stores water at an elevated level. When the stored water is released, its gravitational potential energy is converted into kinetic energy as it flows down through a penstock to turbines. The turbines, in turn, drive generators to produce electrical power, which is then transmitted to the grid for consumption. The efficiency of hydropower systems makes them an important part of the energy mix, providing a stable, reliable source of electricity that can meet fluctuating demand.

Environmental and Social Challenges

However, hydropower dams also present environmental and social challenges. The creation of reservoirs can result in habitat loss for aquatic and terrestrial species, disrupt ecosystems, and cause the displacement of local communities. Fish migration patterns can be interrupted, and water quality may be impacted by changes in flow regimes. Therefore, while hydropower remains one of the cleanest energy sources, it is crucial that careful planning, environmental impact assessments, and mitigation strategies are employed to balance energy production with environmental sustainability and social well-being.

Benefits

In addition to electricity generation, hydropower dams offer various additional benefits, including flood control, irrigation, and water supply management. The reservoirs formed by dams can act as a buffer against seasonal variations in water availability, providing a consistent flow of water for agricultural and municipal needs, even in times of drought. Furthermore,

these plants contribute to economic development by creating jobs and supporting local communities through infrastructure improvements and recreational opportunities.

Overall, hydropower plants are integral to a low-carbon energy future, but their design and operation must prioritize ecological health and local communities to ensure that their benefits are maximized while minimizing negative impacts.

Design and Mechanism

A hydropower dam's design depends on factors such as river flow, terrain, environmental impact, and energy requirements. The working mechanism of a hydroelectric power plant involves converting the potential energy of stored water into electrical energy. Stored water from the reservoir enters through an intake system. Water flows through large pipes (penstocks), gaining speed due to gravity. The kinetic energy of moving water rotates the turbine blades. The turbine is connected to a generator, converting mechanical energy into electrical energy. Transformers step up the generated voltage for efficient transmission. Electricity is transmitted via power lines to homes and industries.

Future Scope

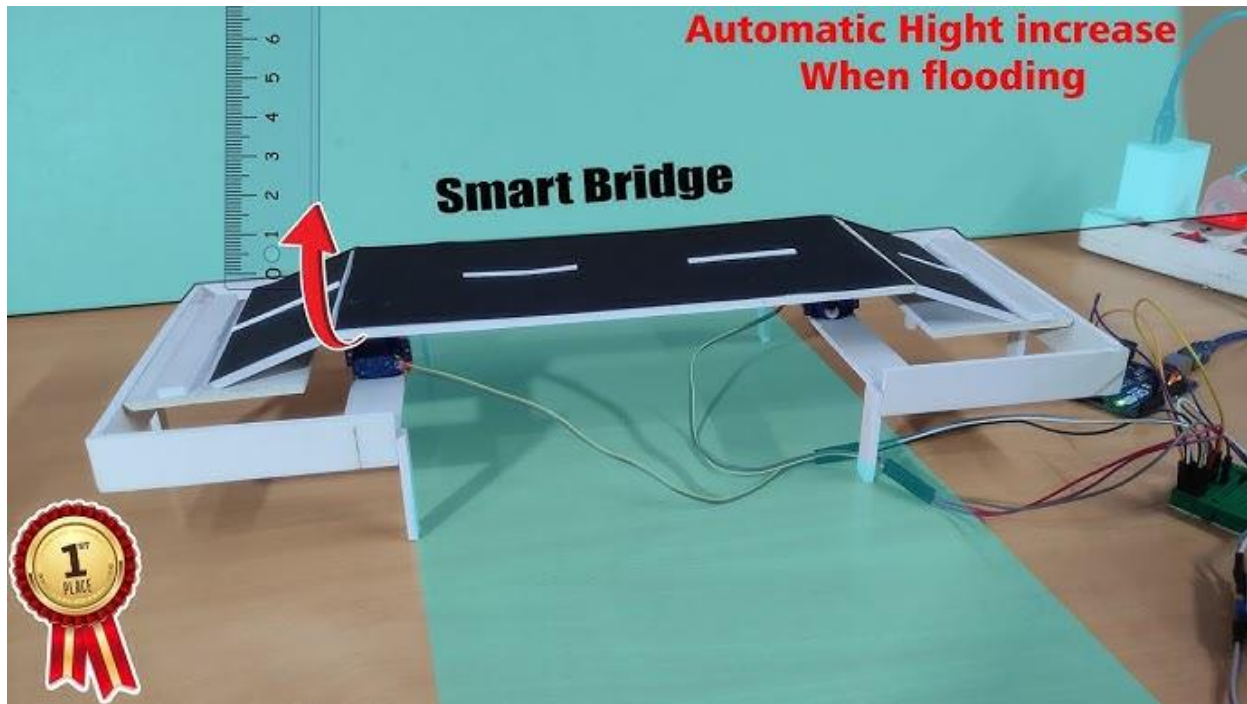
Hydropower remains a key player in the global transition to sustainable energy. The future of hydroelectric dams is shaped by technological advancements, environmental considerations, and integration with other renewable energy sources.

Conclusion

Hydropower remains one of the most reliable and sustainable energy sources, with continuous innovations improving its efficiency and environmental impact. The future of hydropower is centered around smart technology, hybrid renewable energy integration, and climate resilience. While challenges such as ecological concerns and high initial costs exist, advancements in eco-friendly dam designs and digital solutions ensure that hydropower will continue to play a vital role in the global energy mix.

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HYDROGUARD BRIDGE



The Hydro Guard Bridge is a conceptual or emerging technology-based bridge that integrates hydropower generation, flood control, and smart monitoring. It combines traditional bridge infrastructure with hydroelectric turbines, water management systems, and digital monitoring to enhance energy efficiency and climate resilience.

Design and Mechanism

Hydro Guard Bridge using an Arduino UNO, two servo motors, a water sensor, and an alarm to automatically monitor and respond to rising water levels during the rainy season. This innovative system enhances the safety and efficiency of bridges by detecting dangerous water flow and initiating preventive measures without human intervention.

At the core of the system, The Arduino UNO acts as the central controller, processing real-time data from the water sensor placed on or near the bridge. The water sensor continuously monitors the water level, detecting any rapid rise caused by heavy rainfall or flooding. When the water level exceeds a predefined threshold, the Arduino triggers an automatic response: it activates the servo motors attached to the bridge's structural mechanisms. These motors then raise the bridge to a higher level, preventing potential damage from the rising water.

Benefits

Simultaneously, the system triggers an alarm, warning nearby personnel and the community of the flood risk and the need for immediate attention. The alarm serves as an additional safety feature, ensuring that individuals can take necessary precautions or evacuate if required.

Cost Effective

The dual action of raising the bridge and sounding an alarm makes this system highly effective in mitigating the risks of flooding and preventing structural damage. It provides a cost-effective, low-maintenance solution for rural and urban bridges where constant manual monitoring may be challenging, especially during heavy rains.

Future Scope

With the increasing focus on sustainable urban mobility and climate-resilient infrastructure, HydroGuard Bridges have strong future Potential. Integrated with smart grids for decentralized energy distribution. AI-powered traffic and flood management systems for urban safety.

Conclusion

The HydroGuard Bridge represents the next generation of multi-functional infrastructure, combining transport, renewable energy, and climate resilience. As urbanization and climate risks increase, such hybrid structures will play a crucial role in sustainable development. While challenges like high initial investment and technical integration exist, advancements in AI, materials science, and hydropower efficiency will drive future adoption. Governments, engineers, and city planners must collaborate to scale these solutions, making cities more resilient, energy-efficient, and flood-proof.

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GREEN LIVING: BUILDING ECO-FRIENDLY HOMES INSPIRED BY NATURE



It aims to explore the principles of sustainable architecture by focusing on eco-friendly homes designed with nature as a blueprint. Drawing inspiration from biomimicry and natural processes, green construction aims to minimize environmental impact, enhance energy efficiency, and create harmonious living spaces. The study highlights innovative materials, renewable energy systems, and water conservation techniques integrated into eco-friendly home designs. It also examines case studies of successful green homes, emphasizing their environmental, economic, and social benefits. By merging technology with the wisdom of nature, this research advocates for a transformative approach to residential construction that supports sustainable living and ecological balance.

As global awareness of climate change and environmental degradation grows, the need for sustainable living solutions has never been more urgent. This paper delves into the innovative field of green architecture, focusing on eco-friendly homes that draw inspiration from nature's principles. It explores how biomimicry, renewable resources, and low-impact design strategies are shaping the future of residential construction.

Sustainable architecture and eco-friendly homes are transforming modern living by integrating nature-inspired designs, energy efficiency, and environmental conservation. As climate change concerns rise, green homes provide a long-term solution for reducing carbon footprints and promoting healthier living environments.

Eco-Friendly Home Design

Building a nature-inspired, eco-friendly home involves using sustainable materials, renewable energy, and designs that harmonize with the environment. Orienting homes to maximize sunlight in winter and shade in summer. Cross-ventilation techniques using large windows and open floor plans. Solar panels for electricity and water heating. Wind and geothermal energy for off-grid sustainability. Bamboo, reclaimed wood, and recycled steel for construction. Low-VOC paints and non-toxic finishes for healthier indoor air. Rainwater harvesting for irrigation and household use. Greywater recycling systems for flushing and landscaping. Roof gardens for insulation and air purification. Vertical gardens to reduce heat absorption and improve air quality.

Benefits of Eco-Friendly Homes

Reduced carbon footprint and greenhouse gas emissions. Conservation of natural resources through sustainable materials. Improved air quality with non-toxic materials and ventilation. Lower energy and water bills due to efficient design. Higher property value as demand for sustainable homes increases. Long-term savings on maintenance and repairs.

Future Scope of Green Living & Smart Eco-Homes

As technology advances, eco-friendly homes are evolving into smart, self-sustaining living spaces. Generating as much energy as they consume. AI-powered energy management, water usage monitoring, and smart lighting. Using biodegradable and recycled materials. Absorbing more CO₂ than they emit. Off-grid micro-homes with solar and rainwater harvesting.

Conclusion

Green living is no longer a luxury but a necessity for a sustainable future. By building homes inspired by nature, we can reduce environmental impact, lower costs, and improve well-being. With continuous advancements in sustainable materials, renewable energy, and smart technology, eco-friendly homes will play a crucial role in creating a greener, healthier planet.

By,
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ECO-FRIENDLY WATER PURIFIER



Nowadays wherever we see in Metropolitan City, the Population is highly increased when compared to other normal Villages. Due to the increase of population, water demand is also high, Parallely we face the water scarcity problem also. In this project, by implementing eco-friendly water filters, we can mainly reduce the water scarcity, reduce the waste and promote a sustainable future while ensuring no water is wasted in this process.so these natural filters will help to purify water without creating any additional process. It's also environment friendly and promotes recycling and reduces the overall waste.

An eco-friendly water purifier is designed to provide clean, safe drinking water while minimizing environmental impact. These purifiers use natural materials, renewable energy, and sustainable filtration methods to remove contaminants without excessive energy consumption or chemical waste.

Water purification is essential for safe drinking water, but traditional purifiers often rely on electricity, plastic filters, and chemical treatments, which can be harmful to the environment. Eco-friendly water purifiers use sustainable materials, renewable energy, and natural filtration methods to provide clean water while minimizing environmental impact.

Design and Mechanism

An eco-friendly water purifier is designed to provide clean, safe drinking water while minimizing environmental impact. These purifiers use natural materials, renewable energy, and sustainable filtration methods to remove contaminants without excessive energy consumption or chemical waste.

Design Consideration of Eco-Friendly Water Purifier

A sustainable water purifier integrates biodegradable materials, gravity-based filtration, and renewable energy sources for a low-carbon footprint. Use minimal or no electricity (solar-powered or gravity-based). Avoid chemical treatments that can harm the environment. Utilize sustainable and biodegradable materials. Have a long lifespan and reduce plastic waste.

Natural micropores filter out bacteria and sediments. Absorbs impurities, chlorine, and heavy metals. Removes suspended particles and organic matter. Provide antibacterial properties for disinfection. No electricity needed; water flows through natural filtration layers. Uses sunlight to kill bacteria and viruses without chemicals. Ideal for off-grid, rural, or disaster-prone areas.

Benefits

Reduces plastic waste by eliminating disposable filters. It minimizes electricity usage, reducing carbon footprint. It is used to biodegradable materials, preventing pollution. Eliminates harmful bacteria, viruses, and heavy metals. Chemical-free filtration, avoiding chlorine or fluoride residues. Retains essential minerals in water. Lower operational costs with minimal electricity consumption. Longer lifespan compared to conventional RO (Reverse Osmosis) filters. Cost-effective solution for remote and rural communities.

Future Scope of Sustainable Water Purification

The demand for eco-friendly water solutions is growing due to environmental concerns and water scarcity. AI-powered smart water filters that optimize filtration efficiency. Graphene-based nanofilters for enhanced purification. Self-cleaning filtration systems to reduce maintenance. Hybrid purifiers integrating solar, wind, and mechanical energy sources.

Conclusion

Eco-friendly water purifiers are a step towards sustainable living and environmental conservation. By using natural filtration methods, renewable energy, and biodegradable materials, these purifiers provide clean water without harming the planet. As technology advances, we can expect even more efficient, affordable, and accessible solutions for green water purification.

**By,
Jothi.S,
Deepika.A,**

INNOVATIVE ECO-FRIENDLY ALTERNATIVE TO TRADITIONAL BRICK: PLASTIC BRICK



The construction industry is increasingly seeking innovative and eco-friendly alternatives to traditional building materials to address environmental challenges and sustainability goals. This study focuses on the development and implementation of plastic bricks, an innovative alternative to conventional clay bricks. Plastic bricks are made by recycling waste plastic, offering a sustainable solution to the growing problem of plastic pollution and evaluating their environmental impact and cost-effectiveness. These bricks are lightweight, durable, cost-effective, and possess excellent insulating properties, making them suitable for residential, commercial, and industrial construction. This project contributes to a circular economy and paves the way for environmentally conscious building practices and to develop sustainable plastic bricks from recycled plastic waste, providing a solution for plastic waste management and promoting affordable housing and infrastructure development. By transforming plastic waste into valuable building materials, this project seeks to reduce plastic waste in landfills and oceans, promote sustainable construction practices, and create new job opportunities in the plastic brick production and construction industries.

For our study, we have chosen a HDPE plastics as the base material. Plastic waste was collected from a scrap shop and our college hostel. Based on our literature survey, 1 kg of plastic melts at a temperature of 120–140°C. Once melted, it is mixed with 2 kg of sand. The

prepared mixture is poured into the mould in three layers, with compaction done using a tamping rod to remove air voids and ensure uniformity. After compaction, the mould is left to dry for 12 hours. Once dried, the brick is carefully removed from the mould and subjected to testing. The results demonstrate that plastic bricks can achieve performance comparable to or even superior to traditional bricks, while also offering a greener and more sustainable alternative.

By,

C.Devika,

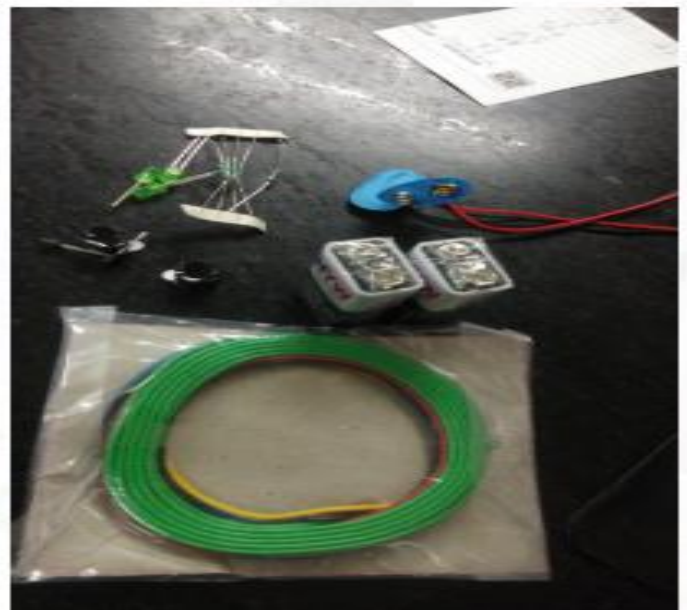
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INNOVATIVE SAFETY WALLS FOR THEFT PREVENTION IN BUILDINGS



The construction of a safety wall in buildings to protect assets or valuable items against theft is a crucial initiative to enhance security and safeguard property. Additional features, such as motion-detecting lights, hidden compartments, and advanced locking mechanisms, are considered to further enhance security. The safety wall serves as a physical barrier to prevent unauthorized access and is complemented by modern technological solutions, including surveillance systems, alarm sensors, and reinforced materials.

This study focuses on designing and implementing safety walls with integrated alarm systems to mitigate theft risks and provide secure environments for residential, commercial, and

industrial applications. The project explores innovative construction techniques and materials to ensure the wall's durability, resistance to tampering, and adaptability to various site conditions. The main objectives of the project are to identify security vulnerabilities, optimize wall designs to deter intrusion, and incorporate cost-effective measures without compromising performance. By addressing the growing need for theft prevention in construction and property management, this project aims to reduce property losses, improve safety, and establish a scalable framework that can be tailored to different types of buildings.

As part of this project, a precast reinforced concrete (RC) slab of dimensions 300×250 mm was constructed and subjected to drying and curing. A mastic pad (rubber pad) was used to protect the system from short circuits. For the safety alarm connections, components such as a BC 547 transistor, a 100-ohm resistor, connecting wires, a 12-volt battery, an alarm buzzer, and a breadboard were used. The alarm system, once assembled, was connected to the reinforcement within the wall. If anyone attempts to break the wall, the breaking tool makes contact with the reinforcement, triggering the alarm system to produce sound. This alerts the occupants and neighbouring houses, providing an effective theft deterrent. The outcome is a sustainable and reliable solution that not only deters theft but also boosts occupant confidence and peace of mind.

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