

March 2024

Mech View

Department Technical Magazine



**DEPARTMENT OF
MECHANICAL ENGINEERING**

VR SIDDHARTHA ENGINEERING COLLEGE

INSTITUTE VISION

To nurture excellence in various fields of engineering by imparting timeless core values to the learners and to mould the institution into a centre of academic excellence and advanced research.

INSTITUTE MISSION

To impart high quality technical education in order to mould the learners into globally competitive technocrats who are professionally deft, intellectually adept and socially responsible. The institution strives to make the learners inculcate and imbibe pragmatic perception and pro-active nature so as to enable them to acquire a vision for exploration and an insight for advanced enquiry.

DEPARTMENT VISION

The Department of Mechanical Engineering endeavours to become a centre of academic excellence and research.

DEPARTMENT MISSION

Prepare graduates by providing a comprehensive knowledge and experience in a state-of-the-art mechanical engineering education to become creative, inquisitive and innovative professional in global environment.

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PEO1: Progress in professional career with a solid foundation in mathematics, science and Engineering sciences.

PEO2: Solve real time engineering problems using professional knowledge and skills resulting in significant societal development.

PEO3: Demonstrate multidisciplinary skills to analyse engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO4: Demonstrate interpersonal skills, leadership and team building to achieve organization goals and pursue lifelong learning and higher education necessary for successful profession.

MECH VIEW

Department Technical Magazine

March 2024

Mech view is a student run magazine publishes the ideas and projects of the final and third year students. The objective of the magazine is to provide a platform for senior students to publish their projects and an avenue for the juniors to brainstorm the ideas. Currently, the publication frequency of the magazine is one issue per year.

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SUSTAINABLE PORTABLE WATER PRODUCTION FROM AMBIENT AIR USING COOLING AND DEHUMIDIFICATION PROCESS

A. Padmasri*, B. Chaitanya*, A. Mohan Sai*, D. Revanth*, M. Akshara*, S. Srinivasa Prasad[#]

Supervisor; *Students

Water scarcity is a critical issue in arid regions like India due to limited rainfall, but humid coastal areas have potential through atmospheric vapor condensation. This paper proposes a water condensation system using thermoelectric coolers powered by solar cells, ideal for remote or drought-affected areas. With global water scarcity affecting millions and the UN predicting a 40% shortfall in fresh water, sustainable solutions like atmospheric water generators (AWGs) are necessary. AWGs convert atmospheric moisture into drinkable water using latent heat and are promising in humid areas like Al Khobar. The proposed AWG system utilizes thermoelectric materials and solar cells to create an affordable, sustainable water generation solution, providing fresh water for domestic and agricultural use. This system can significantly impact water-scarce communities by ensuring access to clean water.

Introduction

Water scarcity affects over 450 million people in 29 countries and may impact nearly half the world by 2032 due to rising populations and limited resources. The atmosphere holds significant water vapor that can help alleviate this issue, particularly in deserts and remote areas where rainfall and water sources are scarce. Currently, 663 million people lack improved drinking water sources, worsened by pollution and global warming. With over 70% of water resources used in agriculture and clean water demand doubling in 20 years, sustainable water harvesting is critical. Research into atmospheric water condensation, using renewable energy like solar and wind power, has increased. Atmospheric Water Generators (AWGs) convert moisture into water using:

1. Thermoelectric cooling (Peltier effect).
2. Desiccants.
3. Vapor compression refrigeration.

This project focuses on using Peltier devices to cool air below its dew point, converting water vapor into liquid droplets.

Water Generating Methods

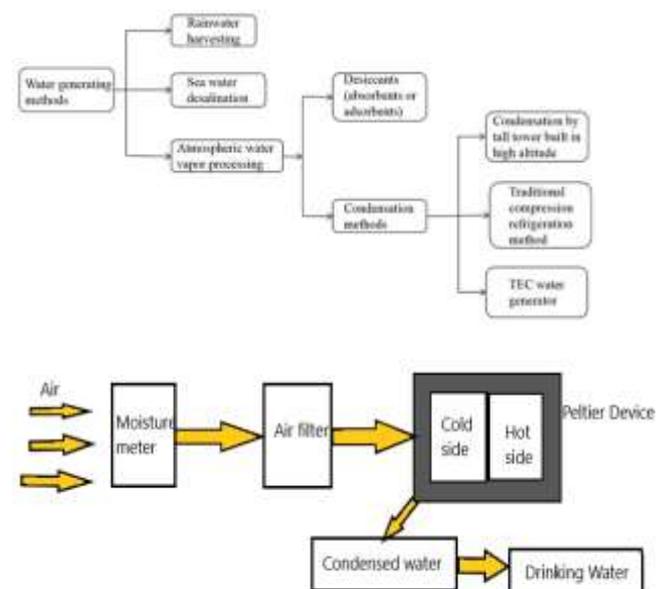


Fig.1 Block Diagram of Atmospheric Water Generator

The world urgently needs alternative water cultivation methods, and producing water from air is a promising solution to meet the increasing demand for fresh water. This technology can provide economical, safe, and great-tasting drinking water, crucial for health and wellness globally. We have designed and developed a prototype system to generate clean (potable) drinking water.

PELTIER DEVICE



Fig.2 Peltier thermoelectric device

The peltier thermoelectric device has two sides(a p-type and an n-type semiconductor), and when DC current flows through the device, it brings heat from one side to other, so that one side gets cooler while the opposite one gets hotter. This is called Peltier effect and electron hole theory. Peltier coolers consist of a Peltier element and a powerful heat sink/fan combination. Peltier elements come in various forms and shapes. Typically, they consist of a larger amount of thermocouples arranged in rectangular form and packaged between two thin ceramic plates. This type of device is so powerful that it can freeze good amount of the water within several minutes.

APPLICATIONS

There are hardly any chances to refuse that this device is portable for its simple design and endurance capability. So, the Atmospheric Water Generator is the device which can be implemented for extreme situation, to use during flood, in desert areas, and in rural areas. It has great advantages as it works like a renewable source of atmosphere water and doesn't need a heavy power source.

CONCLUSION

For water condensation systems in humid regions:

1. Use RO and UV filters for water purification.
2. Employ more efficient Peltier devices beyond the TEC1 model.
3. Implement air filtration with scrubbers for large-scale projects to remove oxides, while keeping the system compact for smaller applications.
4. Explore using these systems as alternatives in refrigeration, leveraging low-power semiconductors to advance cooling technology and potentially reshape power consumption norms in refrigeration.

CONTACTLESS AIR CONVEYOR FOR GOODS MOVEMENT

B. Thimothi *, P. S. Koushik*, M Sai Mahendra*, R Jai Siva Kumar *, M Amar Babu *, Dr C. Mahesh #

Supervisor; * Students

The “Contactless Air Conveyor for Goods Movement” is a project aimed at designing and implementing a system that utilizes air-based technology to move goods without the need for physical contact. This innovative conveyor system has the potential to revolutionize material handling in various industries, enhancing efficiency and reducing the risk of damage to sensitive or fragile items during transportation. The abstract emphasizes the benefits of this contactless approach, which includes smoother movement, minimal wear and tear, and the ability to transport items of different shapes and sizes seamlessly. By utilizing the principles of air propulsion, this project offers a promising solution for efficient, safe, and versatile goods movement.

INTRODUCTION

Conveyors are essential in manufacturing, packing, and goods movement, typically using belts, motors, rollers, or gravity-based systems. Most conventional conveyors experience wear and tear, require high maintenance, and are limited in speed. We propose an advanced conveyor system that addresses these issues by utilizing air pressure to create a contactless transport method. This innovative design offers no physical contact, low maintenance, and high-speed movement. Contactless Operation: Goods are transported without touching the conveyor surface, reducing wear and tear. The conveyor's upper layer is a glossy sheet with precisely drilled holes. Beneath it is a hollow space that acts as an air tank. Compressed air from this tank is released through the holes, lifting and moving goods.

Hole size and spacing are tailored to the size and weight of the items being transported. Larger objects require bigger holes and more powerful air pumps. The system uses air pumps that match the hole size to efficiently move small product boxes. The conveyor is supported by four legs that can be adjusted to create a slope for gravity-based movement. If a slope isn't feasible, pneumatic pistons can be used to initiate movement. Side rails are included to prevent goods from falling off the conveyor during transport.

ADVANTAGES:

No Physical Contact: Reduces wear and tear, leading to lower maintenance and longer equipment life.

High Speed: Capable of moving goods at high velocities due to the lack of friction.

Minimal Moving Parts: Fewer components mean reduced chances of breakdown and easier maintenance.

Versatile Movement: Adjustable incline and air-based propulsion allow for flexibility in various industrial settings.

DESIGN AND ANALYSIS

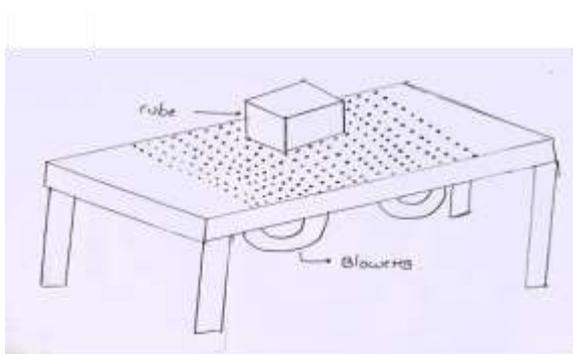


Fig.1 Schematic of design

- Mass of the moving Product $M = 0.25\text{kg}$
- Weight of the moving product $W = 0.25 * 9.81 = 2.5\text{N}$
- Assuming weight considering factor of safety = 3.5N
- Area of moving weight $AW = 0.03\text{ m}$
- Pressure developed by weigh $PW = 3.5 / 0.03 = 116.6\text{N/m}^2$
- The Dimensions of moving Weight = $20\text{L} * 15\text{Wcm}$
- Length of frame = 64cm
- Width of frame = 25cm
- The each Hole diameter is $H = 4\text{mm}$
- Area of Each hole $AH = 1.25 * 10^{-5}\text{m}^2$

COST OF COMPONENTS

Item Name	Cost in Rs
Blower	1000
Iron frame	1600
Wooden board	400
Acryallic sheet	600
Paint	500
Plastic tubs	400
Total	4500

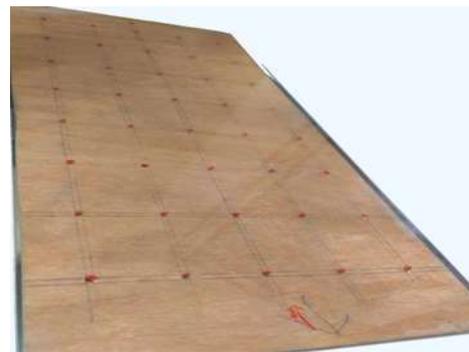


Fig. 2 Bench with drilled holes



Fig.3 Blower

CONCLUSION

Contactless air conveyors are a versatile and efficient way to move goods. They are clean, low-maintenance, and can be used to transport a wide variety of goods. However, they can be more expensive than traditional conveyors and require more complex installation and maintenance.

SOLAR, WIND, THERMO ELECTRIC POWERED MOBILE CHARGER

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The “Contactless Air Conveyor for Goods Movement” is a project aimed at designing and implementing a system that utilizes air-based technology to move goods without the need for physical contact. This innovative conveyor system has the potential to revolutionize material handling in various industries, enhancing efficiency and reducing the risk of damage to sensitive or fragile items during transportation. The abstract emphasizes the benefits of this contactless approach, which includes smoother movement, minimal wear and tear, and the ability to transport items of different shapes and sizes seamlessly. By utilizing the principles of air propulsion, this project offers a promising solution for efficient, safe, and versatile goods movement.

INTRODUCTION

The innovative concept of a solar, wind, and thermoelectric-powered mobile charger represents a ground breaking solution in the field of renewable energy and portable device charging. In a world where mobile devices have become an integral part of our daily lives, the need for convenient and sustainable charging methods has never been greater. This innovation seeks to address this need by harnessing the power of three distinct renewable energy sources to ensure a consistent and eco-friendly supply of energy.

Only contributes to carbon emissions but also limits charging accessibility in remote or off-grid locations. The solar, wind, and thermoelectric-powered mobile charger, on the other hand, taps into the natural energy resources available in our environment to provide a clean and efficient charging solution. In this introduction, we will

explore the key components of this innovative system, its environmental benefits, and its potential to revolutionize the way we charge our mobile devices. We will delve into the principles behind solar, wind, and thermoelectric power generation and examine how they are combined in a single, versatile unit. Moreover, we will discuss the broader implications of this technology for reducing our carbon footprint and increasing energy access in remote or underserved areas.



Fig.1 Solar Panel

COMPONENTS AND ITS WORKING

- Solar panel (6V, 80mA) – 2
- Wind Turbines

- Thermoelectric Generator
- Micro USB cable -1
- LM317 Voltage Regulator - 1
- BC547 NPN Transistor -1
- Small Breadboard
- Potentiometer (10K)
- 1N5819 Diodes - 2
- Resistors 100 Ohms & 150 Ohms - 2
- 5.6V 1N4734A Zener Diode – 1



Fig.2 Peltier Module

- The each Hole diameter is $H=4\text{mm}$
- Area of Each hole $AH = 1.25 * 10^{-5}\text{m}^2$

MOBILE PHONE CHARGER CIRCUIT DIAGRAM

The circuit diagram shown below consists of voltage and current regulation along with the over-voltage protection circuit. The connections are as follows: the anode terminal of the diode (D1) is connected to the positive terminal of the solar panel, and the cathode terminal of the diode (D2) is connected to the input pin of the LM317 voltage regulator. The output terminal of the LM317 is connected to the anode terminal of the diode (D2), and the cathode terminal of the diode (D2) is connected to the cathode terminal of the Zener diode. The anode

terminal of the Zener diode is connected to the base of the BC547 transistor through a 100 Ohm resistor. The collector terminal of the BC547 transistor is connected to the output pin of the LM317 voltage regulator through a 150 Ohm resistor. The emitter terminal of the BC547 transistor is connected to the GND. The adjust pin of the LM317 is connected to the potentiometer's variable end and the collector terminal of the BC547 transistor. One of the potentiometer's fixed end is connected to the GND. The wire connected to the VCC pin of the micro USB cable is connected to the cathode terminal of the Zener diode and the wire connected to the GND pin of the USB cable is connected to the GND.

CONCLUSION

In conclusion, the solar, wind, and thermoelectric-powered mobile charger represents a pioneering solution to the increasing demand for sustainable and versatile energy sources. With a focus on efficiency, user-friendliness, and environmental consciousness, the charger's adaptability to diverse conditions makes it a promising advancement in renewable energy integration. As we move forward, exploring market feasibility and commercialization opens avenues for wider adoption, marking a significant step towards reducing reliance on non-renewable energy and promoting a greener, more sustainable future.

AUTOMATED CLOTHESLINE

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Supervisor; * Students

This paper presents an automated clothesline system designed to enhance the convenience and efficiency of drying clothes. Traditional drying methods require manual intervention and are weather-dependent. The proposed system uses humidity and rain sensors, along with a motorized mechanism, to manage the clothesline based on weather conditions. When rain is detected, the clothesline retracts to protect clothes, and extends when conditions are suitable for drying. A timer function optimizes drying time during sunny periods. This system reduces human intervention, improves drying efficiency, and is ideal for urban households with limited drying space. Experimental results confirm its effectiveness and potential as a smart home technology.

INTRODUCTION

In today's fast-paced world, household convenience and efficiency are highly valued. Traditional clothes drying are manual and weather-dependent. The automated clothesline system addresses these challenges by using sensors and automated controls to manage the clothesline based on weather conditions. It detects rain and high humidity, retracting or extending the clothesline as needed. This automation saves time, reduces manual labor, and ensures clothes remain dry during unexpected weather changes, making it highly relevant and beneficial for modern urban living.

METHODOLOGY

1. System Design: Plan the layout and design of the automated clothesline system. Consider factors like available space, the

number of clotheslines needed, and power source options.

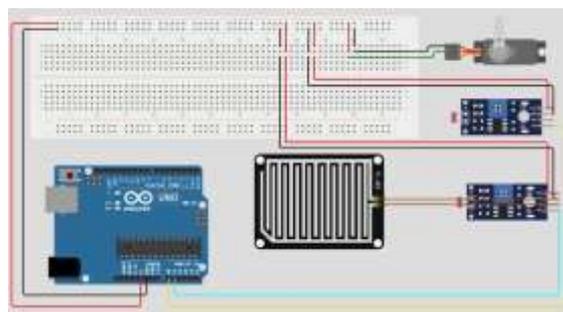


Fig.1 Schematic of the circuit board

2. Motorized Mechanism: Install a motorized pulley or winch system that moves the clotheslines up and down. This can be controlled manually or automatically.

3. Sensor Integration: Add sensors to monitor environmental conditions such as humidity, temperature, and sunlight. These sensors will help determine when it's optimal to hang clothes for drying.

4. Automation Logic: Develop software that processes data from sensors and uses algorithms to decide when to raise or lower

the clotheslines. Consider factors like weather forecasts and energy efficiency.

5. Maintenance: Establish a regular maintenance schedule to ensure the system remains in good working condition.

6. User Training: Educate users on how to operate and make the most of the automated clothesline system.

7. Scaling and Customization: Depending on user feedback and requirements, consider scaling the system for larger installations or adding customization options.

8. Regulatory Compliance: Ensure that the system complies with local regulations safety.

APPLICATIONS

1. Residential Use: They are commonly used in homes, especially in urban areas with limited outdoor space, to efficiently dry laundry.

2. Apartment Complexes: Automated clotheslines are often installed in apartment buildings to provide tenants with a convenient and space-saving laundry drying solution.

3. Commercial Laundries: Laundromats and commercial laundry facilities can benefit from automated clotheslines to optimize drying processes.

4. These systems can be used to ensure guest laundry is efficiently dried without taking up excess space.

5. Campsites and RV Parks:

Automated clotheslines are useful in outdoor settings for campers and RV owners, offering a convenient way to dry clothes.

6. Hospitals and Care Facilities: In healthcare settings, automated clotheslines can help maintain cleanliness and hygiene by efficiently drying linens and uniforms.

7. Industrial Applications: Some industries, such as food processing or pharmaceuticals, use automated clotheslines to dry specialized clothing worn by workers.

8. Research and Development: In laboratories and research facilities, controlled drying processes are critical, and automated clotheslines can be employed for this purpose.

CONCLUSION

The automated clothesline system advances household automation by addressing challenges in traditional clothes drying. It uses sensors to monitor humidity, rain, and temperature, and a motorized mechanism to retract or extend the clothesline, automating the drying process for enhanced convenience and efficiency. Experimental results show the system's effectiveness in protecting clothes from rain and optimizing drying time. This innovation reduces manual intervention and is a valuable addition to smart home technologies, especially for urban households with limited drying space. It exemplifies how modern technology can improve everyday household tasks, promoting a smarter, more efficient lifestyle.

PROTECTION FOR BALCONNIES

K.Pranay Rahul* , B.Bhanu Teja* , B.Ravi Teja* , G.Ravi Teja* , Dr.M.Sumalatha#

Supervisor; * – Students

The "Protection for Balconies" project aims to enhance safety and durability in balcony structures across residential and commercial buildings. This initiative addresses key concerns related to safety hazards, weather resistance, and structural integrity. The project involves designing and implementing advanced protection solutions, such as high-quality railing systems, weather-resistant coatings, and effective drainage systems. By integrating innovative materials and technologies, the project seeks to mitigate risks such as falls, structural damage, and deterioration caused by environmental factors. The ultimate goal is to ensure a safer, more durable, and aesthetically pleasing balcony environment, contributing to the overall well-being and satisfaction of building occupants.

INTRODUCTION

Balconies are a significant architectural feature in both residential and commercial buildings, offering outdoor space and enhancing property value. However, they are also prone to various risks, including safety hazards and environmental damage. Addressing these issues is crucial to ensuring the longevity and usability of balcony spaces. The "Protection for Balconies" project focuses on developing and implementing advanced protection measures to tackle common problems such as falls, structural degradation, and weather-related damage. By leveraging innovative materials and design solutions, this project aims to enhance safety, durability, and aesthetic appeal, ultimately creating a more secure and enjoyable balcony experience for all users.

COMPONENTS USED

- Arduino Uno
- IR-sensors
- MQ-3 sensor
- Servo motor
- Plywood (for structure)



Fig. 1 MQ-3 and IR Sensors

BENEFITS OF PROTECTIVE BALCONY GRILLS:-

Protective balcony grills offer numerous advantages, including:

- Ensuring the safety of residents, particularly children and pets. Enhancing security by deterring break-ins and intruders.

- Contributing to the overall aesthetic appeal of the property.
- Increasing property value, making it an investment in both safety and aesthetics.

CHOOSING THE RIGHT GRILL:-

- Selecting the appropriate balcony grill involves considering several factors, including:
 - Budget constraints and cost considerations.
 - Matching the grill's style with the property's aesthetic.
 - Material durability and maintenance requirements.
 - A step-by-step guide to making an informed decision.

INSTALLATION PROCESS:-

This section outlines the process of installing protective balcony grills, including:

- Pre-installation preparation and measurement.
- Attachment methods and techniques.
- Comparing the advantages of hiring professionals versus a DIY approach.
- Safety precautions during installation.

MAINTENANCE & DURABILITY:-

1. Regular Inspections: Conduct periodic inspections to identify signs of wear, damage, or deterioration. Focus on key components such as railings, flooring, and drainage systems.

2. Weather-Resistant Materials: Use

materials specifically designed to withstand environmental conditions. Opt for rust-resistant metals, UV-stable coatings, and moisture-resistant composites.

3. Effective Drainage: Ensure that the balcony has a well-designed drainage system to prevent water pooling and potential damage to the structure. Regularly clean drainage channels and ensure they are free from obstructions.

CONCLUSION

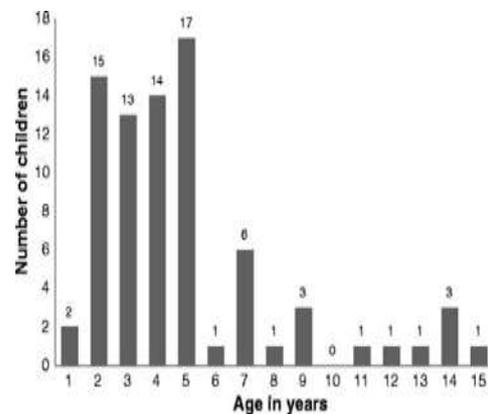


Fig.2 Graph representing risk of falling children from windows or balconies

Real-world examples of successful balcony grill installations are presented in this section, highlighting diverse design choices made by homeowners and property managers. Visual representations and photographs of these installations. Children under 5 years old and those living in Sharjah Emirate were at high risk of falling from windows or balconies. Majority of those who fell from higher levels died. Many children were not alone in the apartments when they fell.

SEED SOWING AND SPRAYING

AGRICULTURE ROBOT

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The development of a seed sowing and spraying agriculture robot addresses the growing need for efficient, precise, and automated solutions in modern farming. This robot integrates advanced technologies to perform two critical agricultural tasks: seed planting and pesticide/fertilizer spraying. The design includes a multi-functional mechanism with a sowing unit equipped to handle various seed types and an adjustable spraying system for accurate distribution of chemicals. Fabrication involves the use of durable materials and robotics technology to ensure reliable performance under diverse field conditions. By automating these processes, the robot aims to enhance productivity, reduce manual labor, and minimize resource wastage, ultimately contributing to more sustainable agricultural practices.

INTRODUCTION

In contemporary agriculture, the quest for efficiency and sustainability has led to the adoption of innovative technologies. One such advancement is the development of agricultural robots designed to automate essential tasks, including seed sowing and spraying. Traditional methods of planting seeds and applying pesticides or fertilizers often involve significant labor and are prone to inconsistencies. This not only impacts productivity but can also lead to inefficiencies in resource usage. The seed sowing and spraying agriculture robot is a response to these challenges, aiming to revolutionize farming practices. By integrating precision engineering with automated control systems, this robot provides a solution that enhances planting accuracy and ensures even distribution of

chemicals. The robot's design incorporates features such as adjustable sowing mechanisms and optimized spraying systems, making it adaptable to various crops and field conditions. Through its implementation, the robot promises to streamline agricultural processes, reduce human labor, and contribute to more environmentally friendly farming practices.

SEEDING:



Fig.1 Seed Sowing Robot

The seeding component of the robot automates planting with precision mechanisms, handling various seed types and depths. It adapts to different crops and soil conditions, reducing labor and seed wastage while improving planting accuracy and overall crop yield.

SPRAYING

The spraying component of the robot ensures precise application of pesticides and fertilizers. It features adjustable nozzles for even coverage and accurate dosage, reducing chemical wastage and environmental impact while enhancing crop health and productivity.



Fig.2 Spraying Agricultural Robot

WORKING PRINCIPLE

A seed sowing and spraying robot automates precision planting and spraying. It includes a seed hopper and dispenser for storing and dispensing seeds at predefined intervals, ensuring correct depth and spacing. A control unit ensures efficient seed distribution. The robot also has a spraying tank and nozzles for applying liquids like

pesticides and fertilizers, controlled by a DC pump. Powered by electricity or batteries, it maintains precise control over planting and spraying, enhancing farming efficiency, reducing human labor, and improving crop yields.

MAJOR COMPONENTS:-

- 1) Arduino Uno
- 2) Motor Driver
- 3) Motor
- 4) 4LPM DC Pump
- 5) Nozzle
- 6) Battery
- 7) NRF24LO1
- 8) Buck Converter
- 9) PCB Board

CONCLUSION

The design and fabrication of a seed sowing and spraying agriculture robot enhance efficiency in farming operations. By automating these tasks, the robot reduces labor, increases precision, and ensures consistent application of seeds and chemicals, leading to improved crop yield and sustainable agricultural practices.

MECHANICAL AND THERMAL PROPERTIES OF 3D-PRINTED BIODEGRADABLE COMPOSITES

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Supervisor: * Students

Recent research on natural fiber-reinforced materials focuses on creating eco-friendly products by incorporating waste jute into PLA filaments, enhancing additive manufacturing. This study explores the impact of pulverizing PLA granules on filament production, comparing it with non-pulverized PLA in terms of thermal and mechanical properties. The findings aim to demonstrate how material size affects the performance of natural fiber-reinforced filaments in 3D printing.

INTRODUCTION

Composite materials, combining materials with different properties, offer enhanced strength and stiffness relative to their low weight and are used across industries such as aerospace and automotive. While synthetic polymer composites face environmental issues due to non-biodegradability, natural fibres provide a sustainable alternative with advantages like renewability and biodegradability, though they suffer from moisture sensitivity and lower durability. The main types of composites are polymer matrix, metal matrix, and ceramic matrix composites.



Fig.1 Jute Fibres and PLA Granular

JUTE FIBER PROPERTIES:

Property	Values
Density (g/cm ³)	1.3-1.46
Tensile Strength (MPa)	393-800
Youngs Modulus (GPa)	1.5-1.8
Elongation (%)	10-30
Moisture Absorption	12

PLA PROPERTIES:

Property	Values
Density (g/cm ³)	1.21-1.25
Tensile Strength (MPa)	21-60
Youngs Modulus (GPa)	0.35-3.5
Glass Transition Temperature (°C)	45-60
Melting Temperature(°C)	150-162

A twin-screw extruder feeds raw materials

into a heated barrel where intermeshed screws convey, mix, and melt the material. It then shapes the material through a die, followed by cooling, cutting, and collection. The machine offers precise control over processing parameters to achieve specific product characteristics.

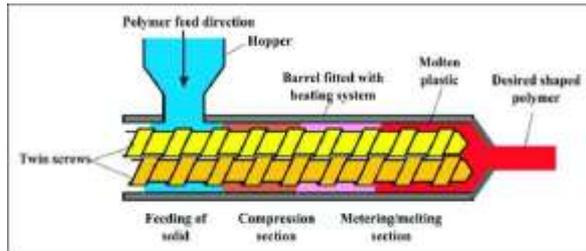


Fig.2 Twin-screw extruder machine schematic

Twin-screw compounding in the plastics industry involves precise control of temperature, pressure, and shear forces to blend and shape polymers and additives. Effective temperature management ensures consistent material properties, as shown by maintaining specific set points along the extruder barrel. Moisture removal from PLA is crucial to prevent issues like steam bubbles, nozzle clogs, and brittleness, ensuring high print quality and material integrity. This process is vital for producing customized plastic products with desired characteristics.

Operating Parameters of 3D Printing Machine

Speed	50mm/sec
Nozzle temp	210
Bed temp	60
Layer height	0.2
Infill	50%



Fig.3 PLA Extruder

3DPRINTING

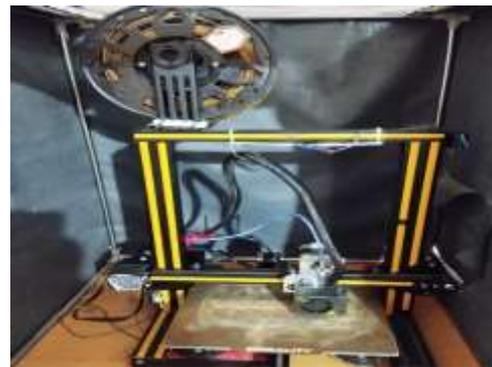


Fig.4 3D Printer

CONCLUSION

The mechanical and thermal properties of 3D-printed biodegradable composite PLA and jute fiber show significant improvements. The addition of jute fiber enhances the composite's tensile strength, impact resistance, and flexibility while maintaining biodegradability. The thermal stability of the composite is also improved, making it more suitable for various applications.

DEVELOPMENT OF FIBER OPTIC BASED LIGHTING SYSTEM

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Supervisor; * Students

This article presents an overview of fiber optic based lighting system. It discusses about the working and applications using sun light. The development of a fiber optic-based lighting system presents a cutting-edge solution for efficient, flexible, and aesthetically pleasing illumination. This system utilizes optical fibers to transmit light from a central source to various endpoints, offering

INTRODUCTION

Day lighting is crucial for improving indoor environments and reducing electric lighting power consumption in office buildings. Solar energy is popular in low-carbon buildings, and day lighting systems can reduce electric lighting by 50-80%. Day lighting systems can improve visual comfort, provide psychological benefits, and even cure diseases. Traditional fiber-based day lighting systems were implemented on a small scale, but optical fiber day lighting systems use sun tracking and focusing techniques to transmit outdoor sunlight into interior spaces. These systems can deliver natural light remotely to shaded rooms, basements, and decorative lighting in areas where fire and electricity are strictly prohibited. Optical simulation results show that day lighting systems with combined daylight and LED light have better efficiency than traditional lighting systems.

WORKING

The idea behind the system is to capture sunlight and then focus it over the bundle of

optical fibers. As parabolic reflector focused sunlight onto a small area, it did not insert maximum light into optical fibers.

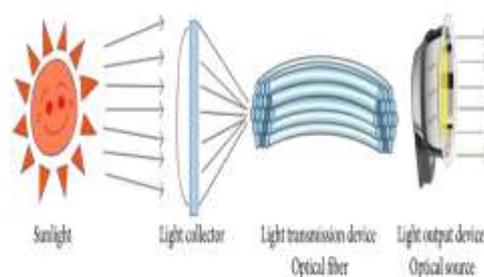


Fig 1. schematic diagram of our model

The light needed to be achieved over the fiber bundle with uniform light flux. Each fiber should have the same intensity of light for the uniform distribution of light. To this end, we proposed a design in which collimated light is produced to solve the above issue. As the Sunrays incident on the circular plate containing plano-convex lens it converges maximum light with certain uniformity into the fibers. Inside the fibers total internal reflection takes place and light emerges to outer side i.e., the part from which the light must be emitted outside. To

support the bunch of fibers we used wooden plate is made. At the other end as there will be concave lens (Diverging) to spread out the light throughout

OUR PROTOTYPE



Fig.2 Proto type

ADVANTAGES OF OPTICAL FIBRES AND LENS

1. *Longer Distance:*
2. *Resistance to Electromagnetic Interference:*
3. *Small Size:*
4. *Light Weight:*
5. *5 Simpler Installation*
6. *6 Easy Maintenance*

RESULTS

TIME	LUX -WITH OPTICAL FIBRES	LUX-WITHOUT OPTICAL FIBRES
Morning (9:00-11:00) AM	800	20
Afternoon (12:00-02:00) PM	1800	50
Evening (03:00-05:00) PM	600	10

Table 2.1 The table shows the average lux value with and without optical fibres



Fig.3 The graph shows the amount of light passing through the lens measured with and without optical fibres.

CONCLUSION

- If we compare the experimental values with the lux levels of different places and industries, the amount of light obtained through the optical fibres is useful for almost any industry.
- Our prototype can be used in parking lots, offices, showrooms and many more depending on the room and sunlight.

PROGRAMME OUTCOMES

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.

PO2 Problem analysis: Identify, formulate, research literature, and analyse engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences.

PO3 Design/ development of solutions: Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health & safety, and the cultural, societal, and environmental considerations.

PO4 Conduct investigations of complex problems: Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 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.

PO6 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.

PO7 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.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work: Function effectively as an individual and as a member or leader in teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions.

PO11 Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

PO12 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.

PROGRAMME SPECIFIC OUTCOMES

PSO1: Apply their knowledge in the domain of thermal systems to solve engineering problems using modern technological tools.

PSO2: Develop and implement new ideas related to product design and manufacturing for societal and industrial needs using modern CAD/CAM/ CAE tools.



DEPARTMENT OF MECHANICAL ENGINEERING

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