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BIBLIOGRAPHY OF PROJECT REPORTS

ACADEMIC YEAR: 2023-2024

DEPARTMENT: MECHANICAL ENGINEERING (MECH)

Title: Design and Development of a Stride Management Walking Assist Exoskeleton

Author: Krish Solanki, Vignesh Arumugam, Divyesh Panchal, Kalpesh Patel

Project Guide: Yunus Dalal

Abstracts: Knee joint impairments present significant challenges to individuals' mobility and quality of life, arising from diverse conditions such as stroke, spinal cord injury, and osteoarthritis. Conventional solutions, including passive exoskeletons, offer potential relief by augmenting muscle function during ambulation. However, prevailing exoskeleton designs often remain inaccessible due to their high costs, limiting widespread adoption. This report advocates for the development of an affordable passive knee exoskeleton tailored to address the needs of affected populations, particularly the elderly, who face additional burdens associated with aging-related knee discomfort. Passive knee exoskeletons emerge as promising devices to address these challenges. Unlike motorized exoskeletons, passive exoskeletons are designed without powered assistance, focusing instead on providing ergonomic support and augmenting natural movement. These devices integrate springs that work in parallel with the quadriceps femoris muscles, storing mechanical energy during knee flexion and releasing it during extension, thereby aiding in gait improvement. By examining cost-effective design methodologies and leveraging advancements in materials science and biomechanical engineering, this proposed exoskeleton aims to democratize access to assistive technologies, thereby promoting independence and well-being among individuals with knee impairments. Through a comprehensive review of existing research, technological considerations, and socioeconomic implications, this report provides insights into the feasibility and potential impact of implementing such a solution in clinical and everyday settings. Additionally, it outlines strategies for collaboration among stakeholders, including

researchers, clinicians, policymakers, and industry partners, to expedite the translation of innovation into tangible benefits for the target population. Ultimately, this report serves as a roadmap for the development and deployment of cost-efficient passive knee exoskeletons, with the overarching goal of enhancing mobility, alleviating discomfort, and improving overall quality of life for individuals with knee impairments.

Title: Experimental Set-up to Determine Faults in Rotating Systems Using Vibration Analysis

Author: Jonathan Sequeira, Khushi Rathod, Kusal Yadav

Project Guide: Sunil Pansare

Abstracts: Rotating machinery is extensively utilized across industries but is prone to developing faults over time. Early detection of these faults is vital to preventing severe breakdowns and ensuring the system's reliability. Vibrations are a common occurrence in rotating systems, often stemming from mechanical issues like mass unbalance and coupling misalignment. This report introduces an experimental setup tailored for determining faults in rotating systems using vibration analysis. The setup integrates simple sensors and signal processing techniques to identify and categorize faults based on fault signatures. It does so by employing the use of effective and low-cost hardware to acquire and analyze data to demonstrate the principles of Vibration Based Condition Monitoring. The experimental findings validate the efficiency and reliability of the proposed setup in fault diagnosis.

Title: Effect of an Inclined Edge Crack on Static Deflection and Natural Frequency in a Composite Material Cantilever Beam

Author: Aditi Anand Poudwal, Sanskruti Sunil Panaskar, Pranjal Sandeep Raul, Isha Dilip Lagad

Project Guide: Sunil Pansare

Abstracts: Composite materials, comprising multiple components, provide exceptional strength-to-weight ratios, serving critical roles in aerospace, automotive, and construction industries for lightweight and durable structures. The presence of cracks in composite materials poses a significant risk of catastrophic failures. Composites are used in diverse environmental conditions, and studying cracks helps estimate service life, ensuring durability. The Composite material used in our study is MDF (Medium-density fiberboard). MDF is an engineered wood product known for its flexibility for curved surfaces, cost-effectiveness, and knot-free composition, making it ideal for furniture, cabinets, and wall panels. The main aim of our project is to study the effect of an Inclined edge crack on the static deflection and Natural Frequency in a Composite Material Cantilever Beam. This includes examining parameters like crack location, relative crack depth, and crack inclination and how they impact the beam's static deflection as well as Natural Frequency. This study emphasizes investigating static deflection, crucial for understanding structural behavior, alongside analyzing the first four natural frequencies of transverse vibration. Studying static deflection provides insights into structural stability while exploring natural frequencies and mode shapes aids in predicting dynamic responses and resonance phenomena.

Acc.No: PR 2475/MECH39

Title: IoT Based Gas Leak Detection System

Author: Neel Bhalani, Kaushal Achrekar, Bharat Choudhary

Project Guide: Saurabh Vichare

Abstracts: In an era of Industry 4.0 where safety and efficiency are paramount, the development of advanced technologies plays a significant role in ensuring secure environments. One such innovation addressing critical aspects of safety is our IoT-based gas leak detection system. In this report, the development of a device is described that can autonomously navigate in the inspection area with the help of path planning equipped with gas sensors to detect different gases, and this detection system will be connected to a dashboard for various data analysis, real-time monitoring, past records, and studying different behaviours of trends or patterns with the help of machine learning. All this can be accessed through a computer for the user. Also, this device is able to alert the people in the live location where it is inspecting with the help of loud buzzers when any threshold value of gas exceeds. This whole system can also easily be integrated with the existing gas infrastructure, giving it a compatibility factor. Such a robot would reduce human exposure to dangerous environments, improve inspection accuracy and consistency, and facilitate timely maintenance and repairs, ultimately ensuring the integrity and safety of gas infrastructure.

Acc.No: PR 2476/MECH40

Title: Design and Development of SCARA Robot for Assembly and Material Handling Operations

Author: Vivek Ghaskatta,,Siddhant Rebello ,Vishal Chotaliya ,Prathamesh Kadam

Project Guide: Mohsin Dalvi

Abstracts: The pressure to automate production lines is reaching small and medium-sized enterprises (SMEs), but traditional robotic solutions can be cost-prohibitive. This report investigates a promising alternative: SCARA robots equipped with vacuum grippers. By delving into the advantages of SCARA robots (affordability, compact size, and user-friendliness) and vacuum grippers (versatile non-contact handling), the report explores how these technologies can revolutionize material handling within MSMEs. This focus on cost-effective automation empowers MSMEs to streamline their production lines, enhance consistency and efficiency, and ultimately gain a competitive edge. The report not only analyzes the benefits of SCARA robots and vacuum grippers, but also paves the way for further exploration of how these technologies can democratize automation for MSMEs, fostering a more efficient and productive future for the manufacturing landscape.

Title: Analytical and Experimental Study of Ackerman and Davis Steering Mechanism

Author: Madhav Bhavsar, Vaibhav Bavkar, Om Devlekar, Umang Chapla

Project Guide: Rohit Patil

Abstracts: The project aims to design an Analytical and experimental setup for a simultaneous comparative study of Ackermann as well as Davis steering mechanisms. The project will help the mechanical engineering students to understand the actual working of a steering control system in a vehicle. The students will be able to distinguish between the theoretical and practical values of inner and outer wheel angle that complies with steering angle. The setup shows the difference in the connections of the linkages, slider joints with the Rack and Pinion gear box.

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Title: Design and Development of Solar Pain Reliever

Author: Janhavi Timkar, Neil Khade, Vaishnavi Palkar, Darren Dsouza

Project Guide: Farhat Khan

Abstracts: The Solar Pain Reliever is a cutting-edge device that combines renewable energy and therapeutic relaxation. By harnessing the power of the sun, the Solar Pain Reliever utilizes small solar panels to convert sunlight into heat energy to provide gentle and comforting heat therapy. This innovative device offers an eco-friendly alternative to traditional massagers by reducing reliance on electricity grids. The project is a result of thorough research on menstrual and general abdominal pain, its remedy, need for a solution, market survey and technical aspects like use of renewable energy, chemical experimentation, electrical design and ergonomics of product design. It is designed to provide users with a soothing massage experience, relieving muscle tension and promoting relaxation. Its versatile nature allows for indoor and outdoor use, catering to individual preferences and providing flexibility in various settings. With an emphasis on sustainability, it encourages eco-conscious living while enhancing personal well-being. In summary, the Solar Pain Reliever offers a subtle and sustainable solution for relaxation. The product provides users with a therapeutic heat and massage experience while attempting to minimize environmental impact.

Acc.No: PR 2479/MECH43

Title: Design and Development of PLC Based Sorting Machine

Author: Ashton Quadros, Darryl Pinto, Ryan Colaco, Satyam Pathak

Project Guide: Sanjay Ghaskatta

Abstracts: Efficient sorting of metallic and non-metallic objects is paramount in modern manufacturing and recycling operations to enhance productivity and resource utilization. This report outlines the design and implementation of a sorting machine controlled by a Programmable Logic Controller (PLC) tailored precisely for this purpose. The proposed sorting system utilizes sensors to discern between metallic and non-metallic objects on a conveyor belt and employs the PLC for real-time decision making and control. As objects traverse through the system, sensors scan them, distinguishing between metallic and non-metallic materials. Upon detection, the PLC analyzes the sensor data and activates actuators to redirect the objects into separate collection bins based on their material composition.

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Title: Testing and Analysis of Natural-Glass

Fibre Composite for Wind Turbine Blades

Author: Omkar Narkar, Chris Coelho, Komal Nagda, Nick Lopes

Project Guide: Ravindra K. Garmode

Abstracts: Natural fibers as reinforcements in wind turbine blade composites offer an exciting pathway towards sustainable energy solutions. This study explores the selection, analysis, and testing of a natural-glass fiber composite to evaluate its suitability for wind turbine applications. The research begins with a selection process of natural fibers utilizing Multi-Criteria Decision Making (MCDM) techniques. Through systematic evaluation, the most suitable fiber, jute fiber, is identified for further analysis. Subsequently, specimens are tested virtually using ANSYS software to assess their performance under different loads and to find the best combination and stacking sequence for the jute-glass composites. Once the test specimens are manufactured, they undergo destructive testing to ascertain the actual physical characteristics of the composites. Comparative analysis of composites reveals an 80/20 natural-glass fiber blend as the most promising option for wind turbine blades, promoting both affordability and sustainability in wind energy systems. This study investigates the potential of natural fibers to enhance the economic and environmental viability of wind energy.

Acc.No: PR 2481/MECH45

Title: Design and Implementation of a User-Follower Robot For Load Transfer

Author: Arjun Bedi, Ronan Tauro, Kris Noguera, Kalyani Joshi

Project Guide: Mohsin Dalvi

Abstracts: Human-following robots have gained increasing attention in recent years due to their potential to improve human-robot interaction and assist with tasks in various domains. This work provides an overview of the development of a novel

human-following robot designed to enhance mobility and interaction between humans and robots. Our human-following robot utilizes a combination of sensor technologies, including cameras, LiDAR, and ultrasonic sensors, to detect and track human subjects. This multi-modal sensor enables precise and reliable tracking in various environments, including crowded public spaces, homes, and workplaces.

Title: Water Jet Cutter

Author: UTKARSH KANKARIA, ANSELL OLIVEIRA, NEEL PATEL

Project Guide: RAVINDRA K GARMODE

Abstracts: Water jet cutting technology has revolutionized modern manufacturing processes by offering a precise and versatile method for cutting various materials, including metals, ceramics, and composites. This paper provides an in-depth analysis of the operational principles of water jet cutters, focusing on both pure water jet cutting and abrasive water jet cutting techniques. Furthermore, the paper examines the efficiency of water jet cutting in terms of intricate shapes, minimal material wastage, and the absence of heat-affected zones, emphasizing its superiority over traditional cutting methods. Environmental sustainability is a significant focus, with an evaluation of the minimal environmental impact of water jet cutting, considering its negligible production of hazardous waste and minimal release of harmful fumes. The paper also discusses potential advancements and emerging applications of water jet cutting technology, highlighting its crucial role in promoting sustainable manufacturing practices and minimizing ecological footprints in the industrial sector.

Title: Study and fabrication of paper shredder machine

Author: Yash Thakur, Soniyal Bhavighar, Kunal Dodiya, Atul Sharma

Project Guide: Magesh Nadar

Abstracts: Paper shredder machines play a critical role in safeguarding sensitive information by destroying documents and ensuring data privacy. This project provides an overview of paper shredder technology, its historical development, working principles, types of paper shredders, and their applications. It also discusses key considerations for selecting the right paper shredder for various purposes, including security levels, capacity, and shredding methods. Additionally, the environmental impact and safety aspects of paper shredding are addressed. The paper sheds light on the evolving landscape of paper shredder technology and the role it plays in contemporary data protection.

Title: The foldable Fruit kart with built- In Preservation

Author: Rohit ament, Sakshi Marchande, Aditya Panchal, Harsh sawant

Project Guide: Yunus Dalal

Abstracts: In a time when the demands on the vegetable vending industry are always changing, the ongoing difficulties that vendors worldwide encounter have created a critical need for creative solutions. This abstract presents a novel idea aimed at creating The Foldable Fruit Kart with Built-In Preservation, which is intended to tackle these important issues. The suggested project entails developing a cutting-edge kart with a special foldable design akin to a scissor mechanism. The Kart's collapsible feature increases its compactness, which makes it easier to store and transport. In addition, the kart will include a method of preservation designed to increase the longevity of fruits and vegetables. Aluminum oxide beads and potassium permanganate will be used in this preservation technique, which provides an effective long-term production preservation solution. Vegetable merchants will be empowered by the fold-able design, which will allow them to efficiently handle and store fruits and vegetables for up to seven days. Aluminum oxide beads and potassium per-manganate will be added to further improve the preservation process; for best results, change the beads every 15 days. This invention should greatly lower spoiling rates and improve fresh product preservation, which will ultimately lead to more sustainable and efficient vegetable vending practices.

Acc.No: PR 2485/MECH49

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Title: Study and fabrication of friction stir welding machine

Author: Jeril Dsouza, Adrian Rodrigues, Jeff Fargose

Project Guide: Magesh Nadar

Abstracts: Friction stir welding (FSW) has emerged as a promising solid-state joining technique for various materials, offering advantages over conventional fusion welding methods. This paper presents a comprehensive study and fabrication of a friction stir welding machine designed for versatile applications across industries. The research encompasses an in-depth analysis of FSW principles, process parameters, tool design, and material considerations. The machine's fabrication involves a systematic approach, integrating mechanical, electrical, and control systems to ensure precision and efficiency in welding operations. Key components, including the spindle, tool holder, workpiece fixture, and drive mechanisms, are meticulously designed and fabricated to withstand the high forces and temperatures generated during the welding process. Furthermore, advanced control systems are implemented to regulate key parameters such as rotational speed, traverse speed, and axial force, optimizing weld quality and integrity. Experimental validation of the fabricated machine is conducted through weld trials on different materials, including aluminum alloys, steel, and composite materials, demonstrating its capability to produce high-quality welds with excellent mechanical properties. The study not only contributes to the advancement of friction stir welding technology but also provides valuable insights for the design and fabrication of custom FSW machines tailored to specific industrial requirements.
Keywords: Friction stir welding, Fusion, Tool, Tool holder, Spinder

Acc.No: PR 2486/MECH50

Title: An Experimental Study on Double Pipe heat exchanger withDifferent Cross-Section Areas

Author: Shamil Netoghar, Dolson Butti, Veron Koli ,Francis Pereira

Project Guide: Saurabh Vichare

Abstracts: In industrial processes, heat exchangers are frequently used to transfer heat back and forth between two process fluids. While the power transfer and shock equations for two-tube transformers are widely understood, maximizing the value based on these equations can be challenging. This study describes a technique for creating the best possible model for various electronic devices using a challenging geometric programming problem. The diameter of the inner pipe, the outer pipe, and the effectiveness of the two electrical devices can all be improved by finding a solution to this problem. The length of the electrical conduit deviates from the specified length while keeping the flow rate constant.

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Title: Electronic Hill Assist System

Author: Kunal Pathare, Alister Fernandes, Harsh Kamath, Tejas Pyarelal

Project Guide: Yunus Dalal

Abstracts: The Hill Assist System described in these abstract leverages modern technology to enhance automotive safety and driver assistance. The system is equipped with an ESP8266 microcontroller and an ADXL345 accelerometer, enabling it to precisely sense the slant orientation of a vehicle, particularly on hilly terrains. This data is crucial for the automatic application of brakes when the system detects that the vehicle is parked on an incline. To achieve this, the system employs the SG90 Servo Motor Mechanism to actuate the brake mechanism. When the system detects that the car is on a slope, it engages the motor to gently apply the brakes, preventing the vehicle from rolling backward, ensuring safety during uphill starts. Thistechnology not only aids in preventing potential accidents but also offers convenience to the driver, reducing the stress associated with hill stars. Overall, this Hill Assist System showcases the effective integration of microcontrollers and sensors for intelligent and automated vehicle safety features.

Acc.No: PR 2488/MECH52