DON BOSCO COLLEGE OF ENGINEERING

Fatorda, Goa – 403602

DEPARTMENT OF MECHANICAL ENGINEERING

PROJECT IDEABOOK

Design and Fabrication of Sea Shell Crusher

Project Domain: Manufacturing/ Design
Project Guide: Dr Suraj Marathe

Project Members

1. Beven Correia
2. Shreyas Silimkhan
3. Sayam Talaulikar
4. Shreetej Kotharkar
5. Yash Paul

Abstract:

The "Design and Fabrication of Sea Shell Crusher" project represents a multifaceted endeavour aimed at addressing pressing environmental concerns associated with the proliferation of discarded sea shells. This comprehensive initiative is driven by a profound commitment to sustainability, innovation, and responsible waste management practices. In response to the escalating global crisis of marine pollution and its adverse effects on marine ecosystems, coastal communities, and human health, this project embarks on a journey to conceptualize, design, and fabricate an advanced apparatus capable of efficiently processing and repurposing discarded sea shells.

The primary objective of this project is to develop a state-of-the-art sea shell crusher that transcends conventional approaches, integrating cutting-edge engineering principles, innovative design methodologies, and sustainable materials. Through meticulous research, analysis, and iterative design iterations, the project team endeavours to create a high-performance, cost-effective, and user-friendly solution that revolutionizes the way sea shells are managed and utilized.

Images of the working Model:

Awards/Participation/Funding Received:

Participated in Technix 2024, National Level Project Competition, Organised by Department of Electronics and Computer Science, DBCE

Essential requirement for operation:
230V AC electric supply and Shells

Development of an IOT based device for real time estimation of bulk density of unboiled Arecanut Kernels

Project Domain: Manufacturing/ Automation
Project Guide: Prof. Ajit Salunke

Project Members

1. Lashon Da Gama
2. Keegan Rodrigues
3. Siddesh Mardolkar

Abstract:

The system discussed in this chapter is designed to measure the bulk density of unboiled arecanut kernels, ensuring they meet the desired threshold porosity indicative of high-quality kernels. It also sorts the sample into acceptable and unacceptable categories. The classification results can be accessed by central grading centers via the cloud using Internet of Things (IoT) and sensors. If the sample is deemed acceptable, the individual kernels are further graded at the center based on their true density.

The IoT application integrated into the quality grading system for arecanut kernels provides real-time monitoring, data acquisition, and control functionalities. This application leverages sensors, a microcontroller, and cloud computing

to ensure precise and efficient quality inspection of arecanut kernel batches based on their bulk density, enabling further analysis with the quality-grading device discussed in the previous chapter.

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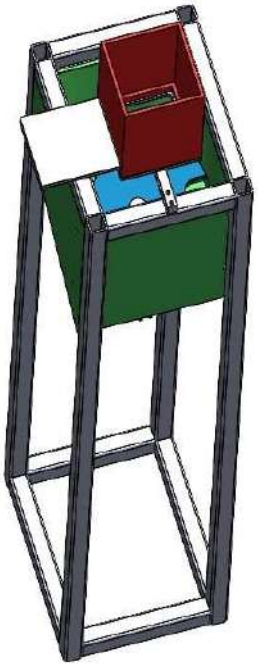
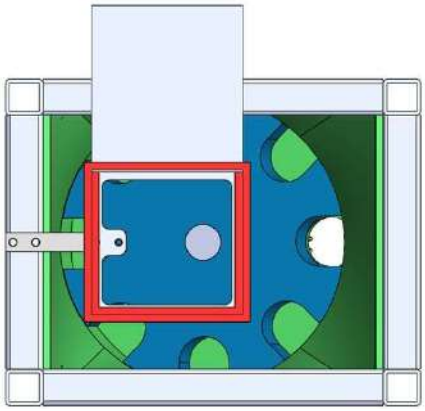
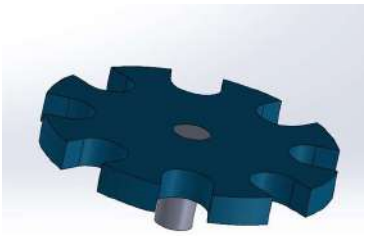
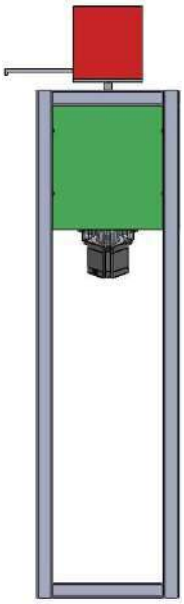
Images of the working Model









Awards/Participation/Funding Received:

- **Nil**

Essential requirement for operation:

i. Power supply

Design and Development of Cycloidal Drive

Project Domain: Machine Design
Project Guide: Prof. Pravin K. Verekar

Project Members

1. Sarthak Naik
2. Shubang Adpaikar
3. Kenworth Fernandes
4. Tejas Shirodkar
5. Parth Maurya

Abstract:

A cycloidal drive is a unique type of speed reducer which provides very high reduction ratio with compact but robust design. Compared to conventional gear drives, like spur and planetary, it can achieve much higher reduction rations of up to 10 times in the same space or stage. In addition to that, it features virtually zero-backlash, higher load capacity, rigidity and high efficiency of up 90%. These properties make the cycloidal drives suitable for many applications where positioning accuracy and performance are important such as robotics, machine tools, manufacturing equipment and so on.

Our objective is design and develop cycloidal gearbox for use in heavy weight lifting robots in industrial automation. Industrial robots that run on motors today use either harmonic drives or are belt driven. Harmonic drives however get wear on the gear teeth and the efficiency is reduced over period of time. Whereas belt drives may slip and fail to lift weights.

Images of the Working Model:

Awards/Participation/Funding Received:

Funding received from Goa State Innovation Council through Department of Science and Technology and Waste Management, Government of Goa.

Applications:

Cycloidal gearbox can be used in heavy weight lifting robots in industrial automation, in Aerospace and Aviation industry, in Automotive Industry, in medical devices, in Military and Defence.

DESIGN AND DEVELOPMENT OF AUTOMATED SOUND WAVE BASED FIRE EXTINGUISHER

Project Domain: Acoustic waves, fire suppresion
Project Guide: Prof. Chetan Gaonkar

Project Members

1. Roshvor Menino D'Costa
2. Rahul Suraj Kamble
3. Imran Nalavadi
4. Melrico Da Costa
5. Nash Raul Gomes

Abstract:

This fire fighting technique uses sound waves to extinguish flames. By directing sound waves from a specialized speaker and vortex tube, this approach aims to replace traditional methods with a safer, more efficient solution that minimizes environmental impact and enhances fire suppression capabilities across various sectors. This project aims to create an environmental friendly acoustic fire extinguisher that swiftly and safely puts out different fires, minimizing damage to equipment. This involves developing the main unit of the sound wave fire extinguisher using engineering concepts to ensure reliability and efficiency. Systematic testing will be conducted to optimize power levels and frequencies, identifying the most effective range for the fire extinguisher system. We will experimentally evaluate its capabilities in extinguishing various types of fires, including those fueled by liquids, solids, and gasses, ensuring adaptability to diverse fire scenarios. A collimator, made from HDPE, houses a subwoofer and is mounted on a base plate with bearings for controlled movement. Automating the system using two geared DC motors, controlled by an Arduino UNO, adjusts the collimator's direction based on signals from flame sensors detecting fires. Electrical components include an MP3 player, Low Pass Filter, and Mono-Amplifier to emit sound waves through the

subwoofer, disrupting fire oxygen supply. A relay activates and stops sound waves as needed, ensuring efficient fire extinguishing. Taguchi experiments were conducted to determine the optimal settings for a fire suppression system. The experiments were conducted to find optimum collimator length (40 cm), collimator opening diameter (8 cm), and frequency (40 Hz). Based on these experiments, it was found that the system effectively suppresses fires within a range of 45 cm to 50 cm. This demonstrates the system's capability to extinguish liquid-based fires efficiently. The flame sensor detects the presence of fire, triggering the unit to activate and suppress the flames accordingly.

Images of the working Model:

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:

Sub Woofer, mono amplifier, DC motors, Arduino, bearings, AC supply, transformer, tone board, collimator.

Design , Development & Model Testing of Marine Propellers

Project Domain: Marine Engineering
Project Guide: Prof. Swapnil Ramani

Project Members

1. Akhilesh Mahabal
2. Arth Vernekar
3. Bhavesh Narvekar
4. Madhusudan Kamat

Abstract:

The project focuses on Design , Development and Model Testing of Marine Propellers with different blade configuration by varying blade rake angles and expanded area ratios . The main motive is to find Thrust & Efficiency of designed propellers practically by model testing experiment. The design phase includes calculating input design parameters and CAD modelling of the propellers using CAESES design software. The development phase included 3D printing of the designed propellers using stereolithography additive manufacturing technique and manual ship model making . Finally the model testing phase consists of testing the ship model with assembled propellers in water and finding performance parameters .

Images of the working Model:

Awards/Participation/Funding Received:
NIL

Essential requirement for operation:
12 V DC Lead Acid Battery , 12 V Li-ion Battery , 5000 RPM 12 V DC motor , Ultrasonic Sensor with programmed Arduino UNO . Digital Ammeter-Voltmeter display .

Development and Characterization of Bamboo Reinforced Composite

Project Domain: Manufacturing/ Fibre Reinforced Composite
Project Guide: Prof. Gaurish M Samant

Project Members

1. Aden Gomes
2. Adriel Ansel Rebelo
3. Ayres Alroy Pascoal Pereira
4. Bosco John Medeira
5. Savio Franky Medeira

Abstract:

Composites have gained prime importance due to their high strength-to-weight ratios that make them applicable for various useful applications as compared to traditional metals. However, with certain advantages, these composites are a threat to the environment due to their toxic nature and non-biodegradability. Hence, a prime need of the hour is producing green composites made of naturally available fibres and bonding matrix materials. This project aims to produce green composites of three different natural fibres (Bamboo, Coconut Midrib and Areca leaf sheath), locally available in and around Goa, bonded together by Cardanol resin, a derivative of cashew nut shell oil. Silicon dioxide nanoparticles, graphene nanoparticles and single walled carbon nanotubes are added to increase its mechanical properties. Prior to composite manufacturing, the fibres are subjected to chemical treatments such as alkali treatment (NaOH) and Silane treatment to improve bonding properties between fibre and matrix, thereby increasing mechanical properties. A total of twenty-seven composite samples are produced, where nine are produced by Compression Moulding. This composite manufacturing technique utilises application of constant pressure onto the fibres laid in the matrix and results in the production of a composite of uniform thickness. Another set of nine composites are manufactured by vacuum bagging technique which utilises vacuum pressure to cure resin-based composites by removing excess air and resin. The rest nine by hand layup process, wherein fibres are placed in the matrix material by hand and kept for curing. Each sample is a combination of different fibres, treated or untreated, different nanofillers and a matrix to hold them together. Each combination is obtained by the L9 Orthogonal Array (Four-three level factors) of Taguchi's design of experiments. All samples are tested to obtain tensile and flexural properties by performing the tensile test and flexural test. Tensile properties such as Tensile Strength and Modulus of the whole composite can be obtained from the tensile test. Similarly, Flexural properties such as the bending strength

of the whole composite can be obtained from the Flexural test. The obtained properties are statistically analysed and compared with properties of already produced green composites.

Images of the working Model:

Awards/Participation/Funding Received:

First Place at Technix 2024

Essential requirement for operation:
NIL

DESIGN AND DEVELOPMENT OF ORIGAMI BASED ROBOTIC ARM MANIPULATOR

Project Domain: Robotics
Project Guide: Mr. Sachin Turi

Project Members

1. Mr. Ryan Cleto Fernandes
2. Mr. Rollan Fernandes
3. Mr. Adlon Tudor Dias
4. Mr. Trish Dourado
5. Mr. Pinto Maclin

Abstract:

The project aims to innovate the field of robotics with a unique approach that integrates the art of origami into robotic design. This research focuses on creating an origami-inspired robotic arm that excels in pick and place operations, a task essential in various industrial and technological applications. The origami-based design allows for a system that is not only efficient but also highly adaptable to different environments, especially those with limited space. The robotic arm manipulator employs intricate origami patterns, which contribute to its lightweight structure, compactness, and scalability. These features make it an ideal solution for tasks where versatility and ease of deployment are paramount. The project delves into the design process, exploring the selection of suitable origami patterns and materials that ensure the manipulator's functionality and durability

Images of the working Model:

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
230V AC electric supply.

Design Fabrication and Analysis of Aqua Silencer

Project Domain: Automobile
Project Guide: Prof. Sharad Shanbhag

Project Members

1. Arkan Mulla
2. Akshay Madan Naik
3. Pawan Parkar
4. Abijith Pulikkal
5. Lerison Pires

Abstract:

This report presents the design fabrication and analysis of an Aqua Silencer. It is mainly dealing with control of emission and noise in automobile exhaust. By using activated charcoal, perforated tube and outer shell it is constructed. An aqua silencer is fitted to the exhaust pipe of engine. The activated charcoal filters the harmful Sulphur and nitrous content produced from the engine. Sound produced under water is less hearable than it produced in atmosphere. This mainly because of small sprockets in water molecules, which lowers its amplitude thus, lowers the sound level. Because of this property water is used in this silencer and hence its name AQUA SILENCER. It is tested in single cylinder 4- stroke petrol engine and the noise and smoke level is considerable less than the conventional silencer. The main pollutants contribute by automobiles are CO, UBHC, NOx and Lead etc., other sources such as electric power generating stations, industrial and domestic fuel consumption, refuse burning, industrial processing. So, it is imperative that serious attempts should be made to conserve earth's environment from degradation. An aqua silencer is an attempt in this direction; it is mainly dealing with control of emission and noise.

Images of the working Model:

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
4-S petrol engine, activated charcoal, Perforated Tube, water etc

Design and Development of a Robotic Knee Exoskeleton for Rehabilitation and Mobility Assistance based on Motion Intention Sensors

Project Domain: Robotics/Biomedical Engineering
Project Guide: Mr. Tanay Rege
Project Co-Guide: Dr. Suraj Marathe

Project Members

1. Aadar Vishwanath Chodankar
2. Aditya Dilip Lotlikar
3. Adler Vaz
4. Sifan Siraj Sayed

Abstract:

The number of daily road accidents in India are on the rise. As a result, there is a direct increase in the number of patients whose lives have been altered and who now have various walking impairments, because they are dependent on others and are confined to wheelchairs, many individuals have a really poor quality of life.

Our project was developed with the intention of Improving these people's lives and reducing their reliance on others for everyday activities such as walking. We were taken aback by how costly these devices are currently on the market, so we set out to develop a low-cost exoskeleton that is easy to mass-produce and also to implement reliable and accurate motion intention sensors to detect the user's intended movements by selecting appropriate sensor technologies, designing the sensor placement, and developing robust algorithms for real-time data processing.. Our goal was to cut the cost in order to make it affordable to people in need and also . Our design aims to address these challenges in an innovative and distinctive manner that is suitable for the user.

To achieve our goal, we have used economical design material so as to achieve a reasonable price for our design

while maintaining a high standard of quality. Also economical and readily available manufacturing processes were used so as to reduce complexity in manufacturing the device.

The Exoskeleton had to be a dynamic product in the sense of functionality, thus it was made so that it can be used in the rehabilitation of leg injuries like anterior Cruciate ligament tear, knee surgery to name a few.

This design can go in for further development later on and be improved financially, technologically and ergonomically for the user.

Images of the working Model:

Awards/Participation/Funding Received:

Awards: 3rd place in Technix 2024, A national level project competition organised by Final year project quality assurance committee in association with Don Bosco Electronics and Telecommunication society (DBEATS)

Funding: Rs 1,07,700 grant given by Department of Science & Technology and Waste Management, Government of Goa.

Essential requirement for operation:
12V DC Battery, 9V Batteries, sEMG Electrodes

ID-1-Design and Fabrication of Cashew Crusher and Juice Extractor

Project Domain: Manufacturing/ Utility
Project Guide: Prof. Sanjeel Naik

Project Members

1. Gandhar Khedekar
2. Aaditya Mardolkar
3. Akshay Naik
4. Sidhant Naik
5. Shubham Rane

Abstract:

In today's era, the cashew industry is facing a grievous problem of labour and the unwillingness of new workforce to learn the skill of cashew fruit processing. The processing part is basically separating the cashew seed from the cashew apple by twisting it and then using unhygienic methods to extract the juice and hence it is time consuming and unhygienic for consumption. Since the job is not benefiting them on the long term the new workforce is unwilling to do the same hence the farmer has to pay extra money for the same work. In the traditional process cashews are collected and dumped in a cemented pit where the person stomps on the dumped cashew to extract the juice depending on quantity of cashew available until pulp remains. The pulp is bounded by the rope and a heavy rock is placed on top of the cashew stack, by this process are juices are extracted.

The present project proposes to make a multi-operational cashew fruit processor where in the machine will take the cashew apple as input, the machine consists of mechanically operated parts such as chopper and pressing mechanism .In first stage cashew apples are fed into the hopper which then pass through the chopper, where shredding of cashew apples takes place. The shredded cashew is then passed through channel to extractor body. This process goes on till the extractor body is filled with pulp. In the second stage of extraction the pressing mechanism is used to squeeze the pulp until the complete juice is extracted and the remaining dried waste is used as manure for agriculture.

Images of the working Model:

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
230V AC electric supply,

ID-2- Performance Evaluation of a Geared Electric Drive for a Two wheeler

Project Domain: Automobile/Energy System
Project Guide: Prof. Sharad M Shanbhag

Project Members
1.Mr. Jolton Mueban Rodrigues
2.Mr. Griffen Anthony Pereira
3.Mr. Omkar Mangesh Naik
4.Mr. Joshua Juvenil Fernandes
5.Mr. Alsmio Joyston Vaz

Abstract:
The increased demand for electric bikes is the subject of this study. Our focus is on the automobile industry, where we are converting out-dated Conventional Motorcycles to electric Bikes. The major goal of this study is to present an accurate picture by linking the many energy sources that humankind has access to humanity. In order for humanity to progress in today's civilized environment, they must travel. And in order to accomplish this, each person's journey should be as quick and effortless as possible. Hence, EV's provide a much smoother and more comfortable ride as compared to most of the traditional IC engine vehicles. This study is concerned with the construction of an electric bike test rig that will run on electricity as primary energy by using a variable power supply for performance testing.

Images of the working Model:

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
BLDC Motor, Gear box, chassis etc .

ID-03- Design And Development Of Forklift Attachment For All Terrain Vehicle

Project Domain: Manufacturing / Material Handling
Project Guide: Prof. Tanay Rege

Project Members

1. Mr. Sigmund Joseph Dsouza
2. Mr. Kelan Reay Barreto
3. Mr. Sheehan Terence D'costa
4. Mr. Lyzander Nehemiah Gomes
5. Mr. Joshua Gomes

Abstract:

This project report presents the design, analysis, and fabrication process of a forklift attachment developed for Powerland Agro Tractor Vehicles' Tachyon all-terrain vehicle (ATV).This project aims to enhance the utility and versatility of the Tachyon, enabling it to excel in industries such as farming and mining, where traditional industry-grade forklifts face limitations due to uneven terrain.The forklift attachment features a two-pulley system, utilizing the factory-fitted electric winch of the Tachyon, which enables it to lift and transport heavy loads eciently.Through the utilization of Solidworks, a computer-aided design (CAD) software, detailed 3D models of the attachment were created, ensuring seamless integration into Tachyon's existing construction with little to no more modifications. Finite element analysis, performed using Ansys software, assessed the structural integrity and performance of the forks under various loading conditions.

This analysis not only facilitated design improvements but also aided in selecting appropriate materials for fabrication. The collaboration with Powerland Agro Tractor Vehicles' manufacturing plant ensured precise fabrication, adhering to

industry standards. Close monitoring of the manufacturing process guaranteed that the attachment was accurately produced, maintaining compatibility with the Tachyon. Thorough testing of the completed forklift attachment verified its functionality, load-bearing capacity, and overall performance. The results demonstrated successful integration with the Tachyon, highlighting its ability to lift and transport loads effectively across uneven terrains encountered in farming and mining environments. This project addresses the need for a versatile forklift solution in industries such as farming and mining, where conventional industry-grade forklifts face challenges due to uneven terrain. By equipping the Tachyon ATV with the forklift attachment, the utility of the vehicle is significantly increased, providing operators with a reliable and efficient tool to handle heavy loads. The innovative design and successful implementation of this attachment empower users in diverse industries to overcome terrain-related limitations and greater flexibility in their operations. The use of Solidworks CAD software ensured precise and accurate design modeling, further contributing to the project's success.

Images of the working Model:

Project fabricated for Precitek Engineers, Kakoda – Goa

Awards/Participation/Funding Received: NIL

Essential requirement for operation:

All Terrain Vehicle , electric winch , pulleys , and load to be lifted.

ID-4-Injection Moulding Machine For Small-Scale Industry

Project Domain: Manufacturing
Project Guide: Prof. Sharad M Shanbhag

Project Members

1. Mr. Clayton Fernandes
2. Mr. Vipul Naik
3. Mr. Atif Ahmed
4. Mr. Yash Arolkar
5. **Mr. Vignesh Prabhu****

**** Not Eligible**

Abstract:

Now a day production rate of the Industries has been increasing rapidly. All the industries try to achieve the maximum result and try to improve their product qualities and product functions. To improve the quality of the entire process and raw material has to be considered and their characteristics in different conditions and his will help to attain the maximum results. The injection moulding machine is highly priced type of machine which cost a lot of money because of this their maintenance is very important. So while testing the new composite plastic as a raw material in injection moulding machine in order to understand their characteristics, will be slightly risky because the plastic may cause the problem inside the machine because of their characteristics under different circumstances and it will damage the injection moulding machine ultimately costing a lot of money waste in maintenance and repairing of machine. So one of the aim of this project is to check the characteristics of different types of plastic composite materials without any risk of loss of money. This machine is comparatively cheap, easy to use, low maintenance and easy to maintain

Images of the working Model:

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
230V AC electric supply, PID controller, raw material etc.

Performance Evaluation of a Geared Electric Drive for a Two wheeler

Project Domain: Automobile/Energy System
Project Guide: Prof. Sharad M Shanbhag

Project Members

1. Mr. Jolton Mueban Rodrigues
2. Mr. Griffen Anthony Pereira
3. Mr. Omkar Mangesh Naik
4. Mr. Joshua Juvenil Fernandes
5. Mr. Alsmio Joyston Vaz

Abstract:

The increased demand for electric bikes is the subject of this study. Our focus is on the automobile industry, where we are converting out-dated Conventional Motorcycles to electric Bikes. The major goal of this study is to present an accurate picture by linking the many energy sources that humankind has access to humanity. In order for humanity to progress in today's civilized environment, they must travel. And in order to accomplish this, each person's journey should be as quick and effortless as possible. Hence, EV's provide a much smoother and more comfortable ride as compared to most of the traditional IC engine vehicles. This study is concerned with the construction of an electric bike test rig that will run on electricity as primary energy by using a variable power supply for performance testing.

Images of the working Model:

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
BLDC Motor, Gear box, chassis etc

ID-6-Design and Fabrication of Glass Bead Peening Machine for Aluminium Components

Project Domain: Manufacturing/ Surface Treatment
Project Guide: Prof. Avil Allwyn Dsa

Project Members

1. Jason Carvalho
2. Samson Coutinho
3. Aditya Shirgaonkar
4. Royston Costa
5. Felron Fernandes

Abstract:

This report presents the design and fabrication of a specialized machine for glass bead peening of aluminium components. Glass bead peening is a surface treatment process that imparts compressive stresses and improves the fatigue life of materials. The objective of this project was to develop a cost-effective and efficient machine capable of uniformly peening aluminium components using glass beads. The design phase involved a thorough analysis of existing machines, selection of suitable components, and consideration of safety aspects. The machine was designed to accommodate different sizes and shapes of aluminium components while ensuring consistent peening results. Key design considerations included an adjustable peening intensity, controlled bead flow, precise shot targeting, and easy maintenance.

Images of the working Model:

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
230V AC electric supply, Compressed Air, Glass beads, and component to be peened.

ID-7-Piezoelectric Power Generation in Tyres

Project Domain: Renewable energy/ Manufacturing
Project Guide: Prof. Sanjeel Naik

Project Members

1. Abhishek Pawar
2. AazamKhan Dasankop
3. Agnelo Fernandes
4. Selwyn Fernandes
5. Ashish Achari

Abstract:

This project aims to explore the potential of piezoelectric power generation in tires as a sustainable and economical solution for generating electrical current. We intend to transform the mechanical energy created during tire rotations into electrical energy by strategically putting piezoelectric elements inside the tire. The goal of this project is to harness this energy and use it to power various systems within the car, minimising the need for conventional power sources and increasing the sustainability of power production. Our concept aims to harness the latent energy that is often lost during tire motions by incorporating piezoelectric materials. We can create a steady electrical current that can be used to power numerous electronics within the car by converting this mechanical energy to electrical energy. This novel strategy has the potential to improve energy efficiency and lower carbon emissions, making the transportation system more sustainable. By utilising a self-sustaining energy source, our idea also intends to address the financial element of power generation. We may be able to lower the operational expenses related to conventional power generation techniques by utilising the piezoelectric effect, which doesn't require additional fuel or maintenance. This may lead to more cost-effective and environmentally friendly power generation in automobiles. The overall goal of this project is to use piezoelectric materials' ability to transform mechanical energy into electrical energy to create a cost-effective and

sustainable method of generating power inside tires. By meeting this goal, we may open the door to an automobile sector that is greener and more efficient in the future, encouraging sustainable behaviours and lowering our carbon footprint..

Images of the working Model:

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
NIL

ID-10-Design and Fabrication of Test Rig for Measurement of Transmissibility in Vibrating Systems

Project Domain: Design
Project Guide: Prof. Chetan Gaonkar

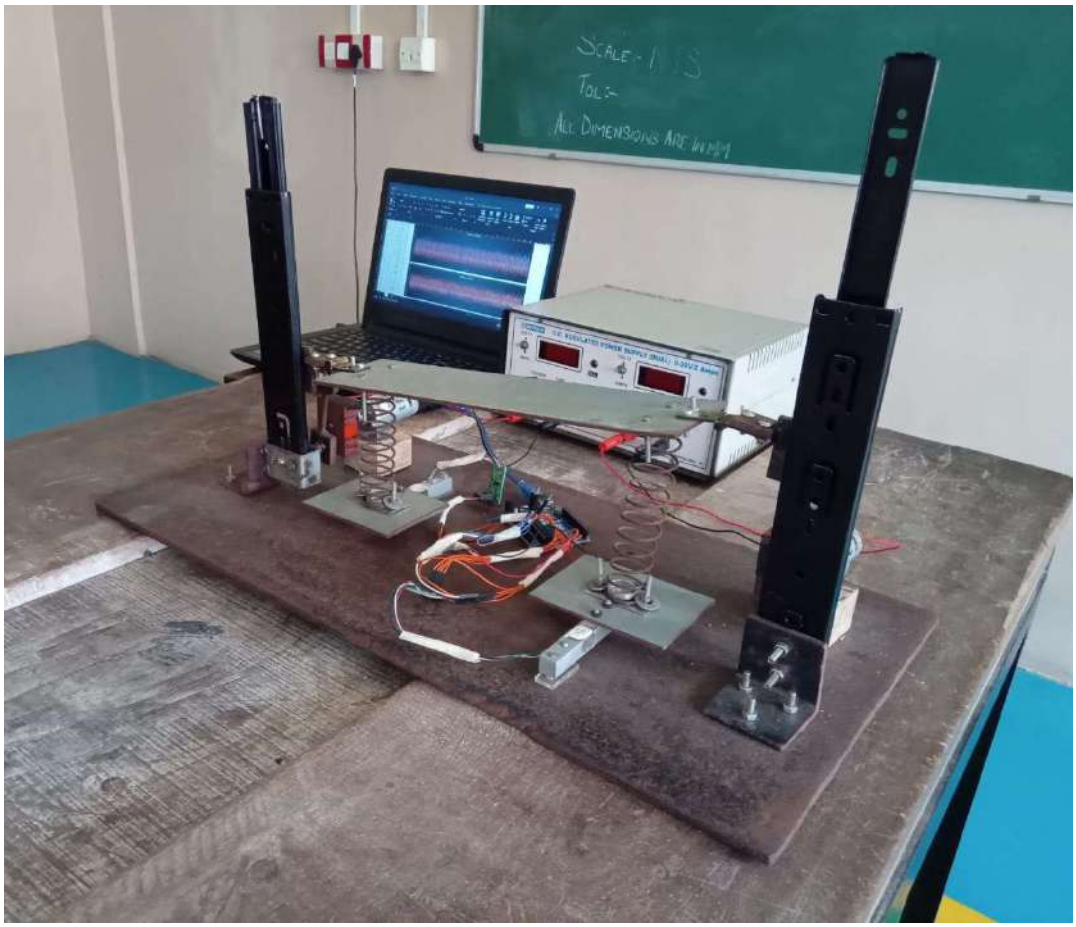
Project Members

1. Varun Vinay Prabhu Dessai
2. Vishwesh Dinesh Manerkar
3. Bikas Rampravesh Yadav
4. Rahul Kumar Yadav
5. Yael Chester Menino Jesus Pereira

Abstract:

Any machine during their operation generate vibration due to the dynamic acting on the machines due to operating conditions, structure and ageing of the machine. This vibration may create noise, abrasion in the machine parts, mechanical fatigue, degrade performance, transfer to other machines via floor or walls and may cause complete shutdown of the machine. For students, in order to better understand the implications of vibration, applications and importance of vibration testing and analysis, this test rig is an important tool. The intent of this approach to design a vibration test rig is to enhance the knowledge about vibration and its characteristics to provide practical experience to engineering students. The test rig facilitates the means to conduct the study of concept of Force Transmissibility. Opensource code will be used to acquire data from the load cell.

Images of the working Model:



Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
DC regulated power supply, connecting wires and tachometer.

ID-13-Design and Development of UAV for harvesting Coconut

Project Domain: Manufacturing/ Surface Treatment
Project Guide: Prof. Gaurish M Samant

Project Members

1. Josten Dsouza
2. Samarth Savalkar
3. Clive Rodrigues
4. Delton Fernandes
5. Artika Vernekar

Abstract:

Precision agriculture has seen numerous advancements in recent times, including the use of unmanned aerial vehicles (UAVs) or drones. Drones are aircraft that operate without human pilots and can be remotely controlled or programmed to fly autonomously using embedded systems and onboard sensors such as GPS. In agriculture, drones have many applications, including precision farming, monitoring crop variability and even harvesting coconuts. Manual coconut harvesting is a dangerous and labour-intensive task, with a high risk of injury to the climbers. Furthermore, there is a shortage of skilled coconut tree climbers, making it challenging to harvest coconuts.

To address these challenges, a drone-mounted cutting mechanism was designed, including a harvesting mechanism, a quadcopter configuration frame, suitable landing gear, brushless direct current motors with propellers producing 28 kg thrust and a lithium-polymer battery with a capacity of 20000 mAh. A First-Person View (FPV) camera and transmitter are also installed to monitor the harvesting process, reducing the operation time.The quadcopter frame is made of carbon fibre, with a base plate and landing gear, allowing for precise harvesting of coconuts from high-raised trees.

The cutting mechanism system is generally attached below the base plate of the UAV, containing the grinder cutter or

water jet harvesting mechanism. The grinder harvesting mechanism consists of a 18000rpm dc brushed motor, angle grinder blade mount, 1.8m aluminium square tube of 1x1 inch cross section, 1.5mm copper wire, 2200mAh 3 cell lipo battery 11.1Volts, relay module, FS-iA10B Radio receiver, abrasive metal cutting blade and a servo motor. The contact type harvesting mechanism cannot be taken too close to the coconut tree as there is a possibility of the propellers getting stuck in its leaves, hence we opted for the non-contact type harvesting mechanism.

Images of the working Model:

Awards/Participation/Funding Received:

Essential requirement for operation:
230V AC electric supply, 10 L water, etc

ID-15-Development & Characterization of Green Composite from Cashew Nut Shell Oil.

Project Domain: Manufacturing/ Surface Treatment
Project Guide: Prof. Gaurish M Samant

Project Members
Amston Sanches
Ashish Tarale
Lemuel De Cunha
Nathan Mazarello
Chirag Naik

Abstract:
Composites have gained prime importance due to their high strength-to-weight ratios that make them applicable for various useful applications as compared to traditional metals. However, with certain advantages, these composites are a threat to the environment due to their toxic nature and non-biodegradability. Hence, a prime need of the hour is producing green composites made of naturally available fibres and bonding matrix materials. This project aims to produce green composites of three different natural fibres (Bamboo, Coconut Midrib and Areca leaf sheath), locally available in and around Goa, bonded together by Cardanol resin, a derivative of cashew nut shell oil. Silicon dioxide nanoparticles, graphene nanoparticles and single walled carbon nanotubes are added to increase its mechanical properties. Prior to composite manufacturing, the fibres are subjected to chemical treatments such as alkali treatment (NaOH) and Silane treatment to improve bonding properties between fibre and matrix, thereby increasing mechanical properties. A total of twenty-seven composite samples are produced, where nine are produced by Compression Moulding. This composite manufacturing technique utilises application of constant pressure onto the fibres laid in the matrix and results in the production of a composite of uniform thickness. Another set of nine composites are manufactured by vacuum bagging technique which utilises vacuum pressure to cure resin-based composites by removing excess air and resin. The rest nine by hand layup process, wherein fibres are placed in the matrix material by hand and kept for curing. Each sample is a combination of different fibres, treated or untreated, different nanofillers and a matrix to hold them together. Each combination is obtained by the L9 Orthogonal Array (Four-three level factors) of Taguchi's design of experiments. All samples are tested to obtain tensile and flexural properties by performing the tensile test and flexural test. Tensile properties such as Tensile Strength and Modulus of the whole

composite can be obtained from the tensile test. Similarly, Flexural properties such as the bending strength of the whole composite can be obtained from the Flexural test. The obtained properties are statistically analysed and compared with properties of already produced green composites.

Images of the working Model:
Nil

Awards/Participation/Funding Received:

Goa State Innovation Concil Prototyping Grant of Rupees 20,000/-

Essential requirement for operation:
NIL

ID-18- Design and Development of Mobile Pick and Place Material Handling System

Project Domain: Manufacturing / Material Handling
Project Guide: Prof. Tanay Rege

Project Members

1. Dhruv Bhende
2. Sachit Fal Desai
3. Shivam Pandey
4. Velenco Da Gama
5. Yash Phal Dessai

Abstract:

The project focuses on the design and development of a mobile material handling system that can be used to pick and place objects in industries. The current system includes the use of forklifts that are present in many industries but are less useful in small-scale industries as they are used to lift weights above 100kg. Hence, we have designed a mobile pick-and-place material handling system that can be used in small-scale industries to lift materials weighing 100kgs and below. This will eliminate the use of bare hands and will support the worker ergonomically with ease, thereby reducing the risk of health hazards. The system comprises a mobile platform featuring a telescopic arm and a permanent magnet, both of which are utilized for picking up and placing objects. The arm's movement is controlled by a piston driven by a hydraulic system. Additionally, the magnet's vertical motion is governed by a winch and pulley mechanism

Images of the working Model:
Project fabricated for Precitek Engineers, Kakoda – Goa

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
NIL

ID-19-Design and Fabrication of Automatic Painting Machine for Walls

Project Domain: Automation/ Service sector
Project Guide: Prof. Sachin Turi

Project Members

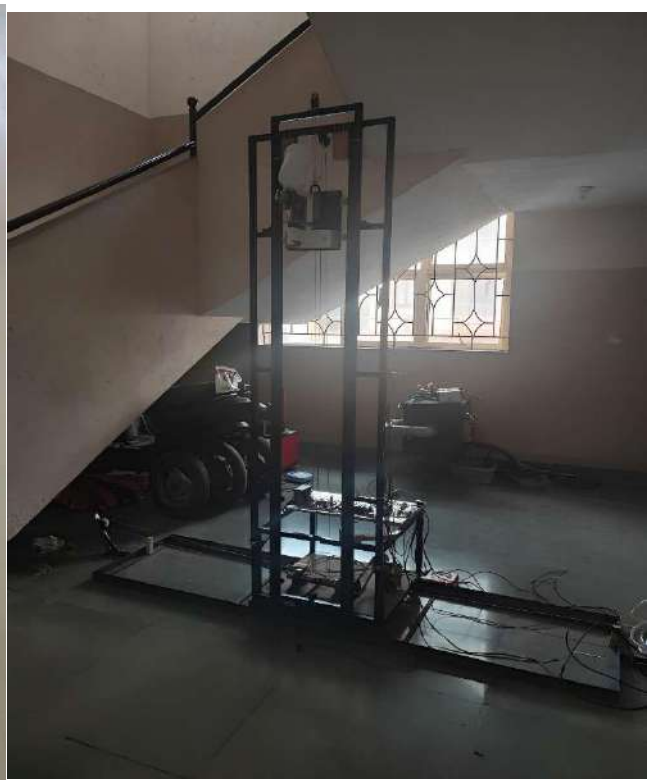
1. Simron Rodriguez
2. Suryakant Phadte
3. Veron Dias
4. Abdul Aziiz Salman Mohammad
5. Kaushik Gaude

Abstract:

The rapid advancement of Automation technology has revolutionized various industries, including Construction industry which is one of the major industries around the world. This project focuses on the Design and Fabrication of an automated wall painting machine, aiming to enhance efficiency and precision in the painting process. The machine combines mechanical, electrical, and control systems to automate the traditionally manual task of wall painting. In this project, a comprehensive literature review was conducted to analyse existing automated wall painting machines/prototypes and identify their limitations. Based on the research, a simple and easy to use machine was designed and fabricated, integrating key components such a frames that can cover a 3m wall height, a paint dispensing system, motion control facilitated by rope-pulley mechanisms, and a easy to use machine. Extensive testing and optimization were performed to ensure optimal performance and user-friendliness. The results demonstrate that the automated wall painting machine effectively reduces labour-intensive work, minimizes human error, and increases overall productivity. The machine exhibits precise control over paint application, ensuring uniform coverage and reducing wastage. The successful realization of this project opens new possibilities for automation in the construction industry. The automated wall painting machine offers significant benefits, including

time and cost savings, improved quality, and increased safety. Further enhancements can be explored, such as incorporating AI algorithms for automatic surface scanning and adaptive painting techniques. In conclusion, the design and fabrication of the automated wall painting machine have proven to be a significant advancement in the field of construction automation. This project contributes to the ongoing efforts in streamlining processes and achieving greater efficiency in the construction industry. The machine's successful implementation underscores its potential to revolutionize wall painting practices and inspire further innovation in automated systems.

Images of the working Model:



Awards/Participation/Funding Received: NIL

Essential requirement for operation: Power supply, Compressed Air and Paint

ID-20-Design, Analysis and Fabrication of Impedance Tube to Measure Acoustical Properties of Materials

Project Domain: Design and analysis
Project Guide: Prof. Chetan Gaonkar

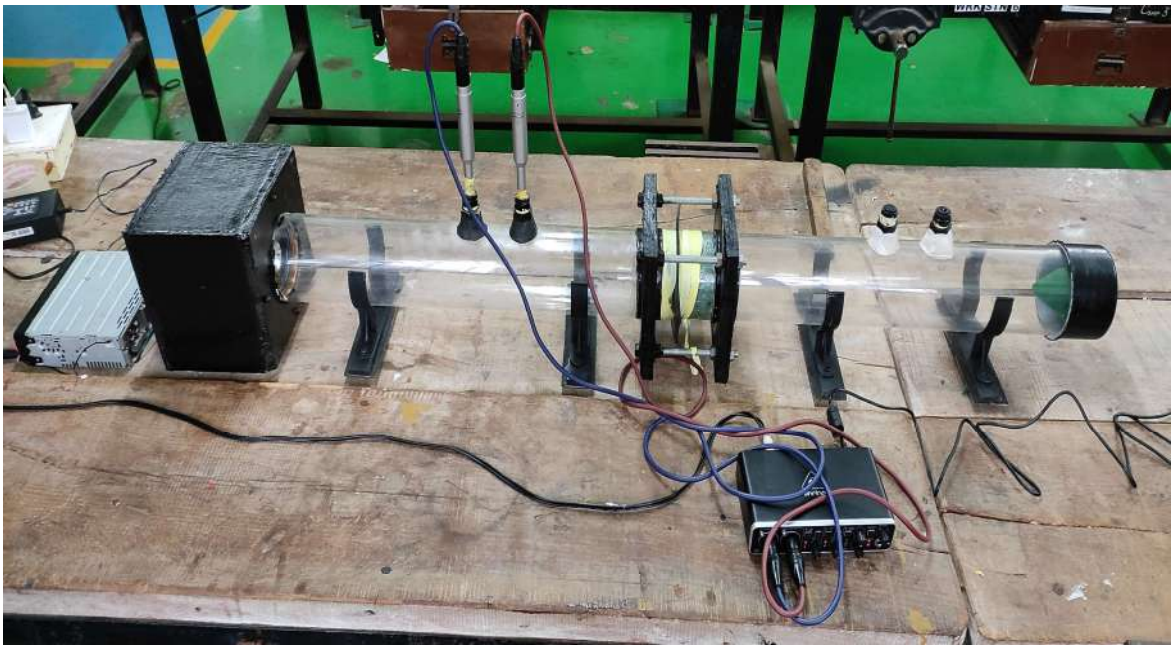
Project Members

1. Sigmond Savio Borges
2. Dylan Agnelo Mascarenhas
3. Alcon Joss Ferrao
4. Jaison De Melo
5. Brice Coutinho

Abstract:

The design, analysis, and fabrication of impedance tubes for measuring the acoustic properties of materials have become increasingly important in various industries. Acoustic properties play a crucial role in optimizing product designs, improving performance, and enhancing user experiences. Impedance tubes provide a specialized apparatus that allows for accurate characterization of sound transmission, reflection, and absorption. Several commercial impedance tubes are currently available for measuring the acoustic properties including absorption coefficient and transmission loss of materials based on current standards. They are well-built with quality materials and have proven to produce consistent results for industrial and other applications. The objective of this work is to develop a low-cost alternative to this tube for educational use where cost is a primary issue for promoting hands-on educational activities. We have used an acrylic tube for smoothness and visibility of the sample material. The other components such as speaker, amplifiers and microphones used are cost effective to help reduce the cost of the entire setup.

Images of the working Model:



Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
Microphones, Speakers, Car stereo system, Audio interface, Laptop and materials to be tested

ID-22-Design and Fabrication of Rotating Fire Protection System

Project Domain: Manufacturing and Automation
Project Guide: Prof. Sachin Turi

Project Members

1. Subhav Borker
2. Ayush Tari
3. Abigail Barreto
4. Melfy Correia
5. Schuler Fernandes

Abstract:

Fire disasters can be big contributors to economic losses of a company and its workplace. Fire hazard prone zones especially household fires in row houses and buildings where the fire can spread in a chain form leading to multiple houses catching fire. The aim of a fire protection system is to protect a building's occupants and minimize the damage associated with fire. But there are many cases where there's a delay in the arrival of emergency services to douse the fire. Meanwhile, at the site of the fire, there can be many people desperately waiting to be rescued. Even a couple of minutes are enough for the fire to spread at a very fast rate. Although to counter this problem, some buildings have fire hose systems at the ground level to aid the delay of the spread of the fire. But not everybody has the expertise and the physical ability to control the force of water pressure that comes out from them. In order to find a more practical solution we are trying to come up with a simpler manned device that can be used to extinguish fires more efficiently and feasibly with respect to human capabilities.

Images of the working Model:

Awards/Participation/Funding Received:

NIL

Essential requirement for operation:
6V Batteries (4 nos.), 12V Motor (2 nos.), 24V Motor, Arduino UNO, Cam, Fire Extinguisher Ball

INDUSTRIAL PIPE CLEANING ROBOT

Domain/Area of Interest: Automation / Robotics

Project Members:

Sujay Shirodkar
Osburn Vas
Leny Cardozo
Savio Gracias
Stevan Fernandes

Project Guide:

Prof Ajit Salunke

Brief Idea of project: The 3 track microcontroller based robot is used to remove dirt, mud, aggregates, scales etc. from inside of the pipes which find application in process industries. It has in built vision system for inspection, IR sensors for obstacle avoidance and limit switches for safety interlocks can clean pipes of 10 to 14 inch diameter. Forward cleaning action is accomplished by high pressure water jet anda rotary nylon brush.

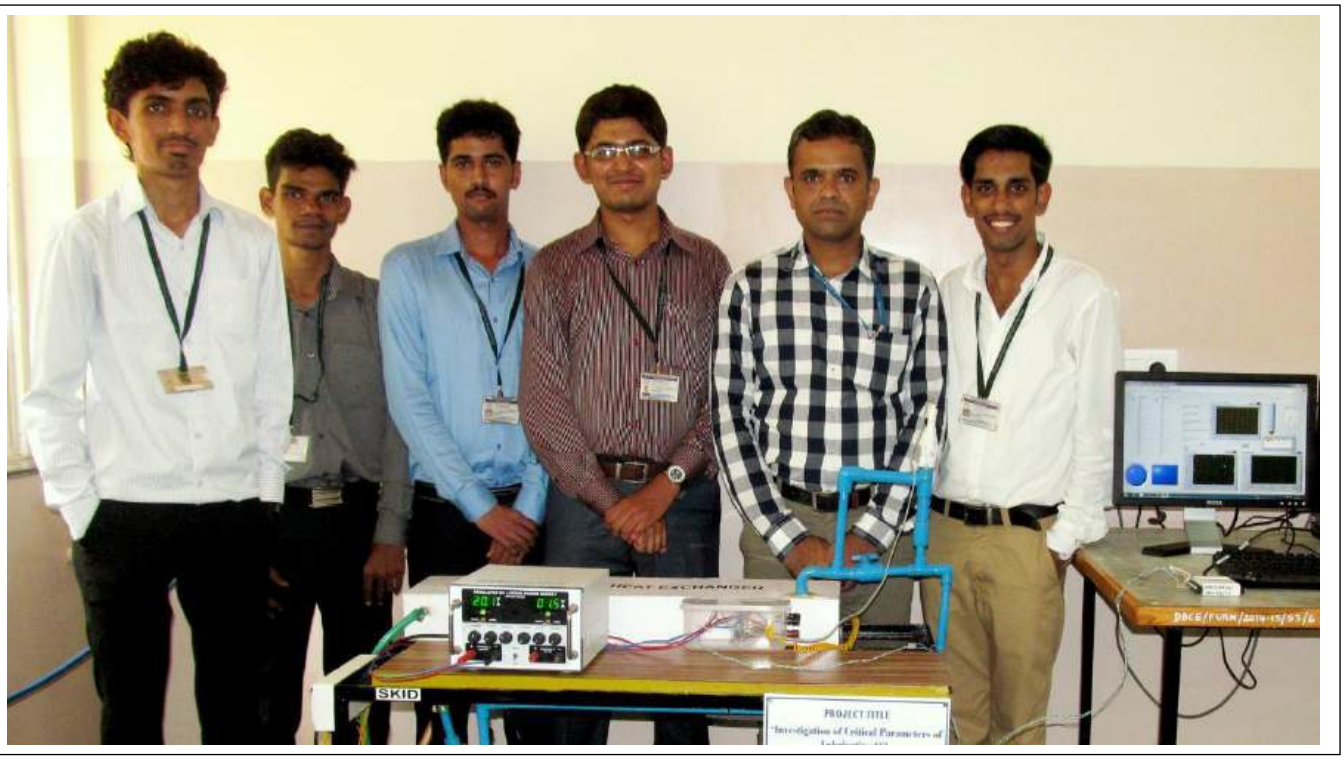
***Applications*:** The device finds application across industries like chemical, fertilizer, pharmaceutical, dairy etc. for cleaning of standard pipes used for various processes.

Awards and Participation:

- Research paper published in 3rd Biennial International Conference on Nascent Technologies inEngineering (ICNTE 2019) held at Fr. C. Rodrigues Institute of Technology Mumbai.
- Featured in Clean India Journal magazine and The Navhind Times & Gomantak Times.

Working Model:

ONLINE MONITORING OF LUBRICATING OIL OF JOURNAL BEARING OF STEAM POWER PLANTS



Domain/Area of Interest: Software based Process Control

Project Members:

Kedar Acharya
Saidatt Kamat
Mandeep Chari
Vivek Patil
Suraj Betkikar

Project Guide:

Prof Ajit Salunke

Brief Idea of project: Using virtual instrumentation and Lab view software, the device can acquire real time data of viscosity and acid contents of Lubricating oil of hydrodynamic Journal bearing of temperature and acidity sensors respectively with a NI 6009 DAQ Card. The critical parameters are monitored online in order to provide information on quality of oil.

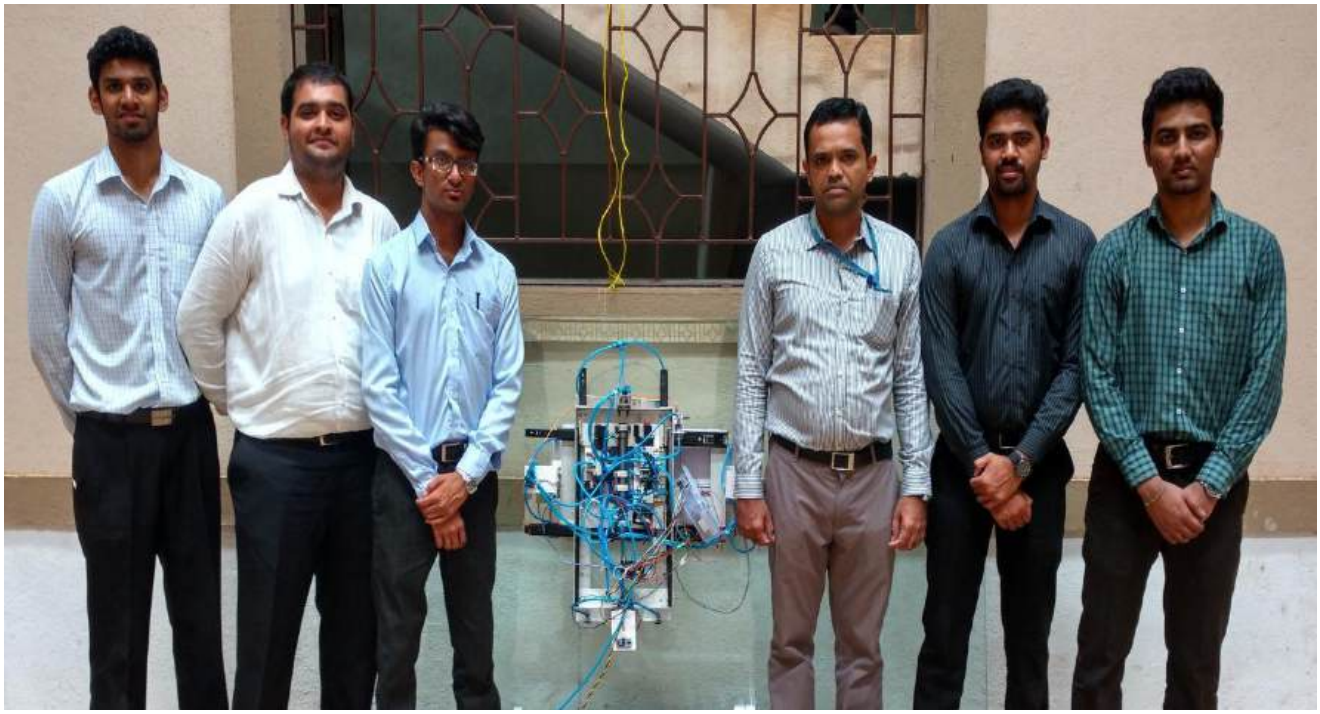
***Applications*:** The device will enable engineers to take quick decisions to control the parametersof Lubricating oil and store data over a long period of time thereby saving time of quality analysis.

Awards and Participation:

- Published in International Journal of Engineering & Technical research.
- Featured in The Navhind Times.

Working Model:

GLASS CLEANING ROBOT FOR HIGH RISE BUILDINGS



Domain/Area of Interest: Automation / Robotics

Project Members:

Johan Vernekar
Vibert Trindade
Francis Fernandes
Siddhant Dessai
Cecil Falcao

Project Guide:

Prof Ajit Salunke

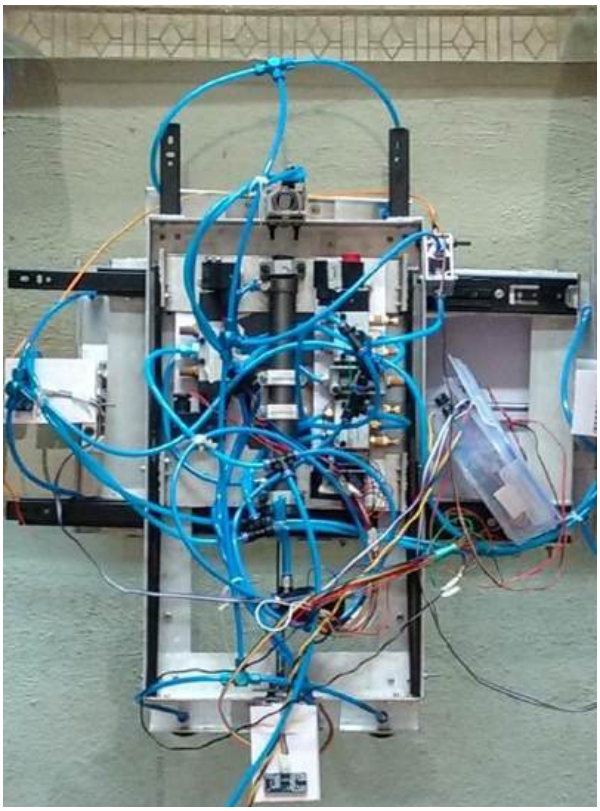
Brief Idea of project: The cleaning is achieved by horizontal movement of a sponge attached to thelower end of the horizontal aluminum frame of the robot. The vertical and horizontal frames consist of vacuum cups which hold the robot against the glass surface. Ultrasonic sensors detect the distance between the glass and the sensor. If the distance is within the limits, the relay circuit is signaled to actuate the solenoid valves which extend/retract the pneumatic cylinders that facilitate the motion of the robot. All the actions of the robot are controlled by ATMEGA328P microcontroller.

***Applications*:** In the present scenario, one of the most important requirements of maintenance ofhigh rise buildings, malls, corporate offices, hospitals, etc. with glass facades is the cleanliness. This project aims to eliminate risk of exposing human beings to laborious and dangerous work and thereby reducing time and cost of cleaning.

Awards and Participation:

- Featured in Clean India Journal in July 2016 issue and Times of India, Goa Edition & Gomantak Times.
- Research paper published in IEEE Xplore / International conference on Innovative SustainableComputational Technologies (CISCT 2019) at Graphic Era University Dehradun.

Working Model:



SOLAR POWERED PLOUGHING ROBOT

Domain/Area of Interest: Automation / Robotics

Project Members:

Dhirendra Singh

Akash Yadav

Sawant Krishnanath Sundar

Abhinav Parulekar

Santosh Mishra

Project Guides:

Prof Ajit Salunke

Brief Idea of project: The autonomous mobile robot effectively utilizes the available solar energy for ploughing small fields, gardens etc. Farmers who own these small fields/lands constitute 70% of the agriculture sector. A 14 W capacity solar panel converts the solar radiations into electricity which is stored in a 12 V battery. A cast iron plough is mounted on an aluminum body. The motion of the robot is controlled by Arduino Microcontroller using 3 ultrasonic sensors for obstacle detection. The battery drives 4 DC motors for vehicle movement and one motor for ploughing. The robot can also be controlled remotely by bluetooth, wireless or through SMS.

***Applications*:** With successful implementation of the prototype, it is possible to minimize theuse of bullocks and manual labor for ploughing and reduce the dependency of farmers on diesel powered vehicles. The device can save energy and avoid air pollution due to emissions of toxic gases into the atmosphere.

Awards and Participation:

- Featured in The Navhind Times & Gomantak Times.
- Research paper published in Second International conference on recent advances in engineeringsciences at M.S. Ramaiah Institute of Technology Banglore / International research in Engineering & technology.

Working Model:

DESIGN AND FABRICATION OF RETRACTABLE BRIDGE

Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Froylan Gracias
Mikhail Estibeiro
Alvan Fernendes
Samson Reberio
Kevin Thomas

Project Guides:

Prof Chetan Gaonkar

Brief Idea of project: The Project showcases a 4 meter long pedestrian bridge that rolls into an octagon. This is an innovative design wherein trusses retract to form an octagon with the help of pneumatic cylinders. These 14 pneumatic cylinders are operated with the help of compressed air. For long and heavy structure hydraulic cylinders can be used. The unique design mechanism makes it possible to support and maintain the balance and position of retractable part of the bridge. It also has a fail-safe mechanism that locks the bridge in case of pneumatic failure and prevents it from free falling. This bridge is an interesting attraction for anyone who likes architecture, engineering and design or who might appreciate the gentle artistry.

***Applications*:** The light weight design makes it possible to carry this bridge on vehicle to use it in emergency situations.

Awards and Participation:

- Received funding of Rs. 110000/- from DST Goa
- Second place at Kshitij 2016
- Featured in The Times of India, Goa edition & The Navhind Times.

Working Model: **https://www.youtube.com/watch?v=OjKaJnE--Ts**

DESIGN AND DEVELOPMENT OF THE WASHING SYSTEM FOR THE UNDERBODY OF THE CAR

Domain/Area of Interest: Product Development/ Multidisciplinary

Project Members:

Abhijit Dessai
Dheeraj Naik
Mukesh Naik
Pratish Naik
Volney Travasso

Project Guides:

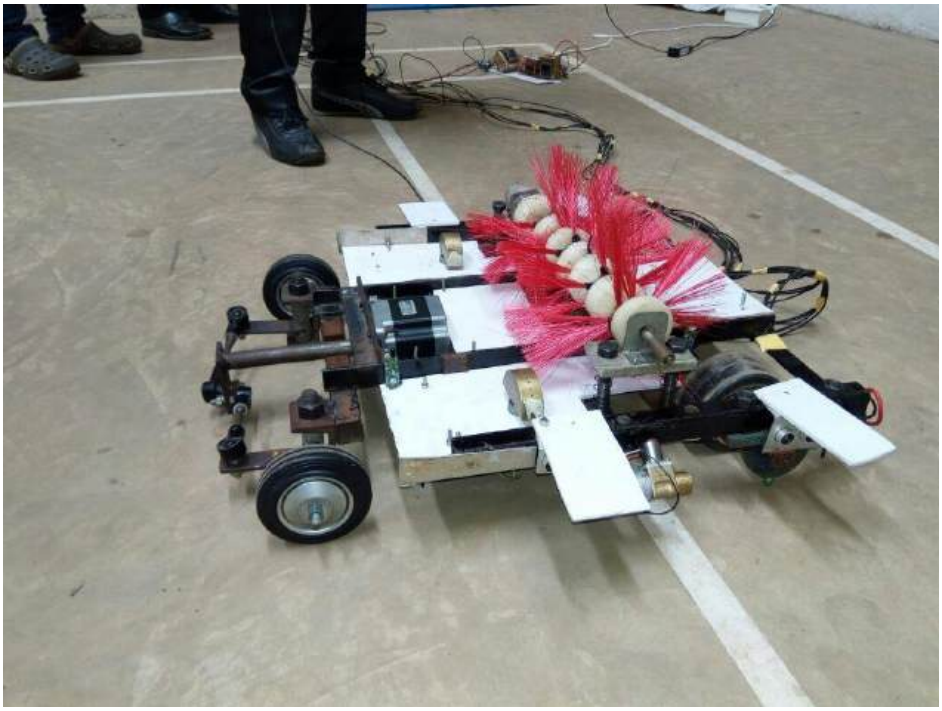
Mr Sachin Turi

Brief Idea of project: The Product has been designed and fabricated to clean the underbody of Hatchback cars within the ground clearance of the vehicle. The system is programmed to get aligned withthe width of the car, as per the signals received from IR Proximity Sensors fitted to the system. The actionis achieved with the help of a Steering system actuated by a Stepper Motor. The system is self-driven based on a Programmed Arduino Uno, and powered by a DC motor. The cleaning is achieved by rotary motion of a brush powered by a separate set of DC Motors and mounted on a spring base for a varying Ground Clearance. Before activation of brushes, jet of water is sprayed underneath the vehicle with the help of two nozzles fitted in front of the brush system. The full system is mounted on a steel frame and allthe actions of the system are controlled by ATMEGA328P microcontroller.

***Applications*:** The product is developed only for Hatchback cars. The Ground Clearance data ofHatchback cars in India is referred to define the maximum and minimum reach of the brush system forcleaning.

Awards and Participation:

- The work was showcased on Clean India Journal & featured in Gomantak Times.



Automated Tile Polishing Robot

Domain/Area of Interest: Automation / Robotics

Project Members:

Eldon Noronha
Isaiah Ferrao
Eufran Rodrigues
Rodvin Rodrigues
Maison Fernandes

Project Guide:

Prof Ajit Salunke

Brief Idea of project: The autonomous robot has been designed and fabricated for polishing of tiles, granite, marble and other floorings. In this device, electricity stored in a battery is used to drive two motors for vehicle movement and one motor for the polishing disk. The polishing disk holds the abrasive material used to grind and polishthe tiles. The disk also has provision for holding and easily replacing the abrasives depending on the type of flooring. The motion of the robot is controlled by an Arduino microcontroller which is aided by using 2 Ultrasonic proximity sensors for obstacle avoidance. A universal joint connected to the shaft driving the polishing disk keeps the wheel in constant contact with the surface. The vibration sensor attached to the device determines the duration of polishing. The robot consumes 0.5 HP power and can polish an area of 100 Sq. m in approximately 2 hours for a normal coarse finish.

***Applications*:** Under present scenario tile polishing is a tedious and time consuming process with a high dependency on efficiency of human workers. This device not only helps reduce the dependency on human workers but also reduces the time taken for the entire polishing process. This prototype is also smaller in size and overall makes the entire polishing process more economically viable and if implemented as a product on a larger scale can be a boon to the construction industry and also for domestic use for floor polishing inhouseholds.

Awards and Participation:

- Presented at 3rd Biennial International Conference on Nascent Technology in Engineering(ICNTE 2019)
- Featured in the Navhind Times & Clean India Journal.

Working Model:

DESIGN AND FABRICATION OF PNEUMATIC PAPER STAMPING MACHINE

Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Aditya D'souza
Chrislee Dias
Jolton D'costa
Linford Dias
Nashlon D'souza

Project Guide:

Prof Pravin Verekar

Brief Idea of project:

The paper stamping is based on principle of metal stamping which is used in the industries. In this case, arubber stamp is attached to a pneumatic actuator (cylinder) which is driven by stepper motors on an XY table. The envelopes along with the postal stamp are fed to the conveyor belt by friction rollers one after the other. Then the image is captured by a camera and sent to a computer where it is processed in LabVIEW software. In LabVIEW, a previously taken template image of the postal stamp is matched with the stamp on the envelop due to which the stepper motors are activated through a Microcontroller which moves the pneumatic cylinder above the stamp. Once the required position is attained, a solenoid valve gets activated which forces the piston out of the cylinder resulting in stamping action. A rubber stamp is attached to the pneumatic cylinder by a stamp holder. The machine is capable of stamping numerous amount of paper stamps in short amount of time.

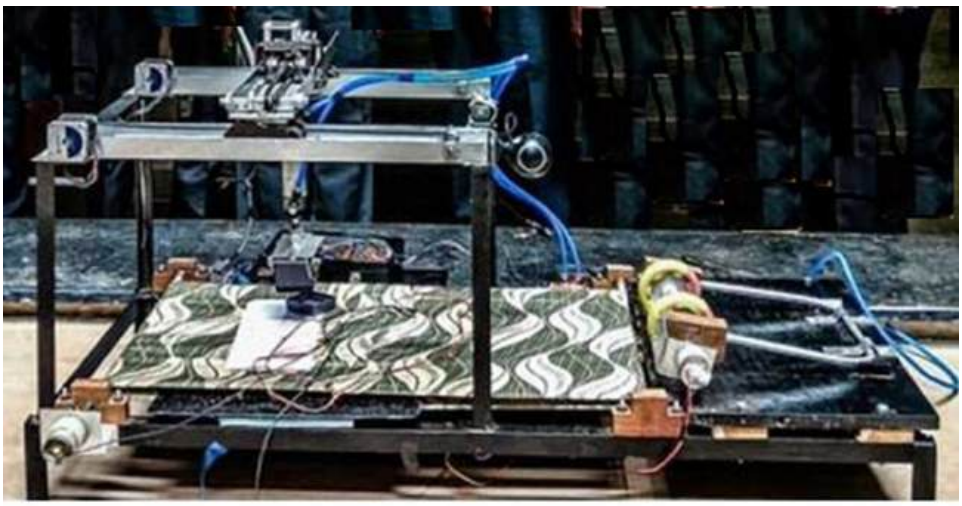
Applications:

Paper stamping in all the offices, institution, banks, and post offices are done manually which is time consuming and laborious . The intensity of the stamp is not uniform. A prototype of an automated pneumatic paper stamping machine has been developed in which stamping is done by a small capacity pneumatic press. This machine can replace the traditional manual stamping.

Awards and Participation:

- Featured in the Navhind Times.

Working Model:



LATERITE STONE DRESSING MACHINE

Domain/Area of Interest: Automation

Project Members:

Olencio Zuzarte
Sunny D'mello
Ralston Fernandes
Anish Kharangate
Jonathan Baptista

Project Guide:

Prof Ajit Salunke

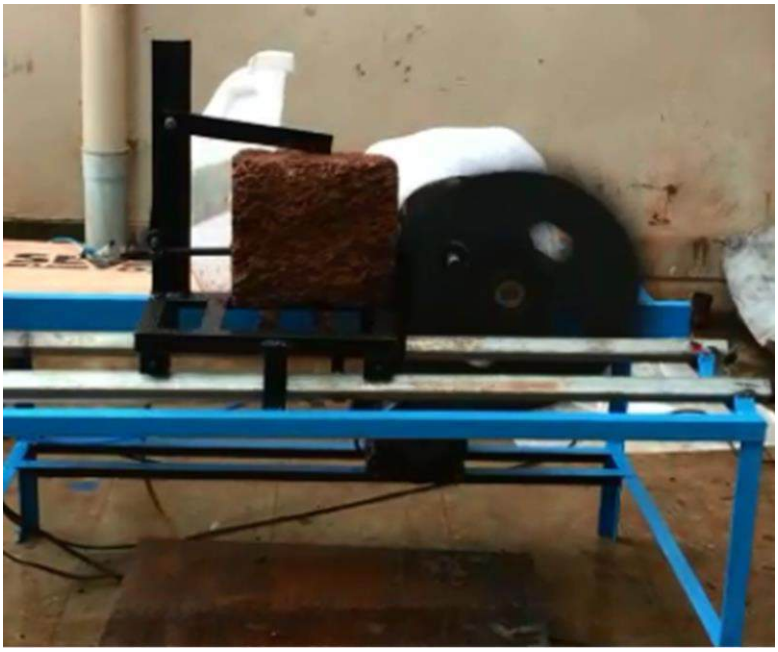
Brief Idea of project: The machine provides provisions for various sizes of stone dimensions, eliminates manual labour and minimizes time required for dressing laterite stone. A uniform size of stone per lot can be obtained without sacrificing the surface finish of the laterite stone which can be used for construction applications such as provide vertical and horizontal joints in masonry, exposed masonry, landscaping etc. The prototype if implemented on a commercial scale would be a boon for the Construction Industry.

***Applications*:** The prototype if implemented on a commercial scale would be a boon for theConstruction Industry for dressing laterite stone which is presently done manually.

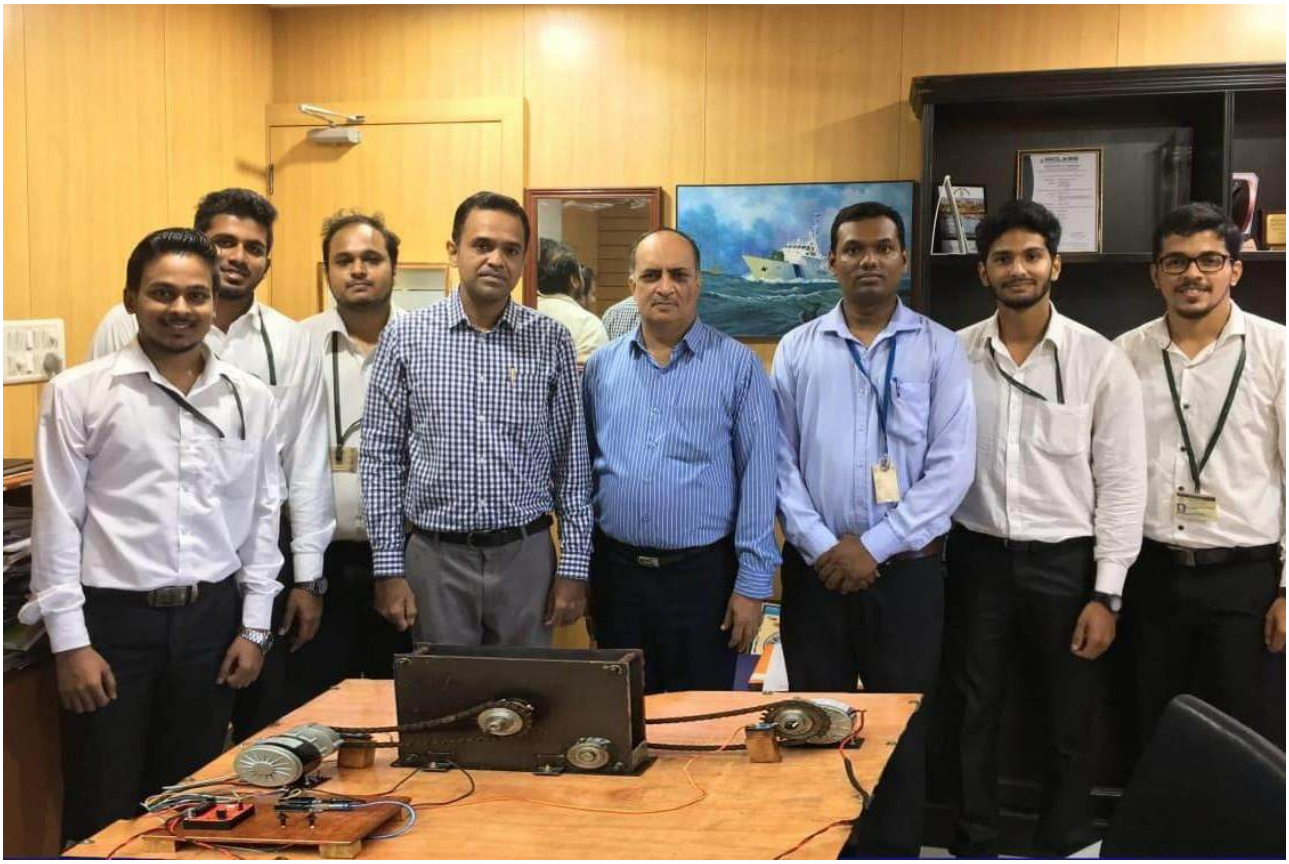
Awards and Participation:

- Featured in The Navhind Times.

Working Model:



LINEARLY VARIABLE - CONTINUOUS TRANSMISSION SYSTEM(LV-CTS)



Domain/Area of Interest: Product Development / Transmission

Project Members:

Divyajeet Naik
Vivek Kumar
Raj Nagzarkar
Pranav Savant
Sunny D'mello

Project Guides:

Prof. Sachin Turi
Co-Guide: Prof. Avil D'sa

Brief Idea of project: Automobile Industry, over a long period, made use of only manual gearbox solely due to cost and lack of automation. Advancement of technology and automation has seen various companies come up with more fuel efficient and power effective transmission. Nowadays the semi-automatic and automatic has overtaken the manual transmission system. A LINEARLY VARIABLE - CONTINUOUS TRANSMISSION SYSTEM (LV-CTS) is our attempt to potentially eliminate this problem by making use of gears. As the companies attempt to attain higher and higher speeds, LVCTS will help transmit these high speedsat stable rates. LV-CTS is an attempt for designing a system using Epicyclical gear train to attain improved functionality than CONTINUOUSLY VARIABLE TRANSMISSIONS (CVT), Where the planet gears are controlled by an electric motor to attain the different gear ratios. As epicyclical gear box has two inputs i.e. one from the engine to the ring gear and the other from electric motor to the planetary gear set, therefore it has two degrees of freedom. This system also provides with an over-drive system when a reverse feed is given to the planetary system via electric motor.

***Applications*:** Automobile Industry**.** A LINEARLY VARIABLE - CONTINUOUS TRANSMISSION SYSTEM (LV-CTS) is an attempt to potentially eliminate the manual Transmission problem by making use ofgears.

Awards and Participation:

- The Project got Funding of 75000 from Goa Shipyard Ltd. The concept has been registered under GoaInnovation Council and is in the process of further Patent development procedure.

REFINING OF USED ENGINE OIL

Domain/Area of Interest: Automobile

Project Members:

Mr. Joshua Sapeco
Mr. Senroid Fernandes
Mr. Uddhav Pai
Mr. Satyam Prabhudesai
Mr. Sree Hari Nair

Project Guides:

Asst. Prof. Sharad Shanbhag

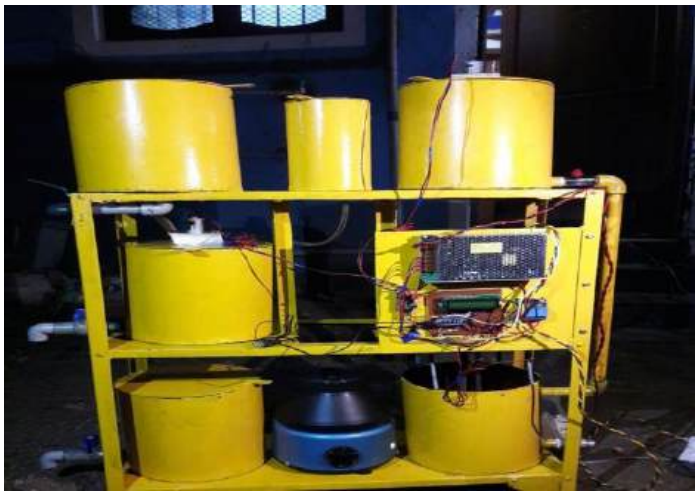
Brief Idea of project: This project addresses recycling of waste engine oils treated using acetic acid. This gives the recycled oil the potential to be reused in car engines after adding the required additives. It is a device that receives used engine oil and refines devalued properties of that oil close to its original valued properties. The processes would include various methods like Pre-treatment, dehydration,supplementation of acetic acid, mixing of kaolinite and blending.

***Applications*:** This research has shown that used engine oil can be recycled by using glacial acetic acid. This method produces base oil comparable to that produced using conventional methods.

Awards and Participation:

- Paper was presented during the International Virtual Conference on "Future Trends in Automotive Technologies, organized by VIT, Chennai on 3rd July 2020.
- Paper was published in International Journal of Engineering Research and Technology. (IJERT) Volume 9, Issue 5, May – 2020

Working Model:



DESIGN AND FABRICATION OF AUTOMATED HEIGHT AND ANGLE MEASURING FIXTURE FOR BLADE MOUNTING BRACKETS OF FANS

(From L to R) Amey Tari , Sairaj Gauns , Prof. Ajit Gaonker, Nithin Rajmohan, Prof. Suraj Marathe , Rajesh Kumar , Suyash Khandeparkar seen with their automation set up.

Domain/Area of Interest: Automation & Process Improvement

Project Members:

Amey Tari
Nithin Rajmohan
Rajesh Kumar
Sairaj Gauns
Suyash Khandeparkar

Project Guide:

Prof Suraj Marathe (Guide)

Brief Idea of project: Blade mounting brackets play a vital role in successful operation of fans. Light weight metal blades if mounted directly onto the rotor, it will not be possible to obtain desired angle or the lift for the blade which invariably determines the output from the fan. Also, the chances for vibrations and blade breaking increases. This in turn leads to an increase in noise during operation. So, to get a rigid joint between the rotor and the blades, the blade holding brackets are used. The lift and the inclination of the blade mounting bracket are the major parameters to be monitored while designing blade brackets. Presently the inspection of blade mounting brackets is done manually by incorporating a vernier height gauge, V-block, and bevel angle protractor. This requires a skilled person to carry out the inspection. It also requires very accurate measurement of the dimensions. Carrying out the inspection manually is time consuming. An extensive research and study have been carried out to overcome these limitations of manual inspection. The device is designed to overcome all the above-mentioned issues associated with the manual mode of inspection. The project explores the field of electromechanical engineering by integrating the concepts of industrial engineering with the aim of reducing the overall measurement and inspection time.

Applications:

The automated height & angle measuring fixture was specifically designed to overcome the challengesthat was faced by Sri Om Engineering Works to increase their testing capacity and save labor costs.

Awards and Recognitions:

1. 93% reduction in the cycle time which resulted in a 100% testing of all the componentsproduced.
2. Research paper published at the **International Journal of Engineering Research inMechanical and Civil Engineering.**
3. First place at “Kshitij 2016”
4. Featured in The Navhind Times.

Working Model:

DESIGN AND FABRICATION OFBEACH SAND CLEANER

Domain/Area of Interest: Product/Cleaning (Swatch Bharat)

Project Members:

Kaygun Pereira
Vallon Dsilva
Mark Ferrao
Selvin Pereira
Akshay Phadte

Project Guides:

Prof Suraj Marathe (Guide)
Prof Tanay Rege (Co-Guide)

Brief Idea of project: In this project the main aim of this machine is to lift the waste debris from the sand and dispose them into the hopper. Due to motor the rake rotates; as the rake rotates it collects the waste debris from the sand. As the machine is placed on the sand, the waste debris on the sand will get lifted by the rake and move it to a conveyor and lift it at upward direction. As the waste reaches upper extreme position it will get dropped in the hopper. The machine will be pulled by a 4 wheel drive vehicle. Hence this will result in the cleaning of beach surface and safe collection of waste debris from the sand.

***Applications*:** This project aims to eliminate and keep the beach sand clean under Swatch Bharat and thereby reducing time and cost of cleaning.

Awards and Participation:

- Featured in a local newspaper NAVIND TIMES, Gomantak Times and Clean India Journal.
- first place at Kshitij 2019

Working Model:

DESIGN AND FABRICATION OF DISABLED FRIENDLY WHEELCHAIR

Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Deepak Kolur
Saideep Naik
Vinay Naik
Anay Kalghatgi
Prashant Gaonkar

Project Guides:

Prof Swapnil Ramani (Guide)
Prof Ajit Salunke (Co-Guide)

Brief Idea of project: The project deals with Design and Fabrication of disabled friendly wheelchair which helps the disabled and physically challenged people. The currently available wheelchair in the market does not have the facility such as converting wheelchair into seating to sleeping position, automatic bracing system. The available cost of wheelchair is high. We have addressed this issue through our project by designing a new mechanical system to help physically challenged people in standing and sleeping, simple structure which is less power consuming and economical compared to existing product. The disabled person will be able to stand by means of a specially de-signed mechanism and a pneumatic piston, which will provide stability and support. The mobility of the wheelchair will be controlled by high torque dc motor. Motion of the wheelchair is controlled by arduino microcontroller which is operated through joystick.

***Applications*:** The Wheelchair finds application in care of immovable people (people with persistent vegetative state, paraplegia, stroke and spinal cord injuries), where the care requires a lot of time and manpower.

Awards and Participation:

- Featured in top-100 at India international Science Festival and in top-165 in DRDO student project competition (DRUSE)
- Represented Goa University at Inter UGC Anveshan 2019 at Udaipur and Kalpak 2020 at Panaji
- 2nd place at FSIE expo Mumbai 2019
- First place at Kshitij 2019.
- Featured in Gomantak Times, The Navhind Times & Times of India, Goa edition.

Working Model:

SOLAR POWERED PLANT TRIMMING MACHINE

Domain/Area of Interest: Automation

Project Members:

Mukesh Naik
Bindesh Khandeparkar
Kshtij Naik
Savio Pereira
Swapnil Karapurkar

Project Guides:

Prof. Ajit Salunke (Guide)
Prof. Swapnil Ramani (Co-Guide)

Brief Idea of project: The project deals with design and fabrication of a prototype of plant trimming machine operated by solar power. It uses a 1.5 HP motor and a 12 V battery which is charged by a solar panel to run the prototype. Power from the battery is used to drive the cutting blades. The cutting frame is assembled with the help of mechanical links .Different shapes can be achieved with the help of the cutting blades by using various attachments. The cutting action is carried out using horizontal blades mounted on high speed motors fast enough to cut the plants and shrubs. The cutting frame rotates at 15 RPM and the cutting blades rotate at a very high rpm to trim and give the required shape to the plants. Automation of the project is achieved with the help of the Arduino microcontroller and can also beoperated manually with the help of switches. The prototype is easy and simple to use, reduces manual labor and constant supervision is not required. It is relatively faster than the existing hand held equipment technique and can be easily assembled and disassembled on site.

***Applications*:** If implemented as a product on a larger scale can be beneficial to maintenance of gardens in public space, college campuses, hospitals, resorts etc. It is also much more economically viable option compared to the other plant trimming machine and also environment friendly since it makes use of Solar energy.

Awards and Participation:

- Featured in Gomantak Times.

Working Model:

DESIGN AND FABRICATION OF HOPPER SYSTEM FOR CRAYON LABELING MACHINE

Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Sandeep Kolambkar
Sangharsh Naik
Saurav Naik
Vyas Naik
Vikas Velip

Project Guides:

Prof Chetan Gaonkar

Brief Idea of project: The project deals with Design and Fabrication of hopper system for crayon labeling machine which is used in industry to automate the process of labeling the crayons. This pneumatically operated hopper system is an advanced design of conventional hoppers with pneumatic cylinders controlled by direction control valves the Pneumatic cylinders operate at a pressure between (1-10bars) the fast action of the cylinders helps in improving process speed.
The system consist of pneumatic cylinders which are controlled by 5/2 direction control valves with solenoid actuation the automation the system is done using Arduino which is programmed as per the required sequence of operation the Arduino send the signal to the relay switch to open or close the valves all together they help in releasing one object at a time in addition the guide rail is adjustable to adopt different sizes.

***Applications*:** This kind of hopper system is that it can adopt to different kind of cylindrical objects such as crayons, cylindrical bottles, test tubes etc the guide rail provided can be adjusted as per diameter of the object and if necessary small changes in design and program can be made.

Awards and Participation:

1. The project was supported by industry, Faber-Castell Pvt Ltd., Corlim, Goa

Working Model:

DESIGN AND DEVELOPMENT OF A PLATFORM WITH STABILIZATIONAND CONTROL MECHANISM

Domain/Area of Interest: Product/Multidisciplinary/Automation

Project Members:

Yatish Danageri
Manjunath Alve
Harshad Kawlekar
Nolan Pires
Siddhanth Kalagutkar

Project Guides:

Prof Ramnath Prabhu Bam

Brief Idea of project: Due to the bad road conditions it is often difficult for passengers to have comfortable drive on the Indian roads. Many of the times the bad road conditions affect the health of the passengers in the long run. The same difficulty and the problem get aggravated when it comes to medical ambulance. The patient being carried on the ambulance experiences the road excitations which can have adverse effect on the condition of the patient. This problem can be solved by developing a device which can cancel and dampen out these vibrations and stabilize itself at the same time. This study mainly aimed at developing such a platform which will cancel and dampen out these excitations with the help of linear actuators. It will be controlled by a microcontroller which will get its inputs from set of sensors. This data from the sensors in conjunction with the feedback from the actuators is processed. Then the output signals are sent to the actuators which will result in stabilization of the platform. The model is tested for different excitations including random excitations and the stability of the platform is observed.

***Applications*:** The project was carried out mainly targeting the Ambulance application.

Awards and Participation:

- Second Place at Kshitij 2019.
- Presented the paper on the work at **National E-Conference on Progresses and Research in Mechanical Engineering (*PRIME-2020)* 31st July, 2020** held at SDM College of Engineering and Technology, Dharwad.

Working Model:

AUTOMATED WELD SLAG CLEANINGMACHINE

Domain/Area of Interest: Product/Manufacturing

Project Members:

Josan Da Costa

Denis Palmeira

Vibhav Pai

Aadesh Verenkar

Joel Fernandes

Sairaj Sinari

Project Guides:

Prof Sanjeel Naik (Guide)

Brief Idea of project: Welding is a fabrication or sculptural process that joins materials, usually metals, by causing fusion which is distinct from lower temperature metal joining techniques such as soldering and brazing, which do not melt the base metal. The slag produced during welding protects the puddle from atmospheric contamination. The slag from the weld is removed while sending the job for the next operation, but it is a tedious process to clean the flux manually and a huge amount of skilled labour is also needed. An automated weld slag cleaning machine would reduce the time required for slagremoval for lengthy plates, at a low cost and without much skilled labour. The main disadvantage of traditional slag removal processes are that they are time consuming, inefficient and destructive at times.

The main objectives of the creating the machine was

a. To design a low-cost weld slag cleaning machine.

b. To eliminate manual work required during slag removal.

c. To make the machine portable and compact.

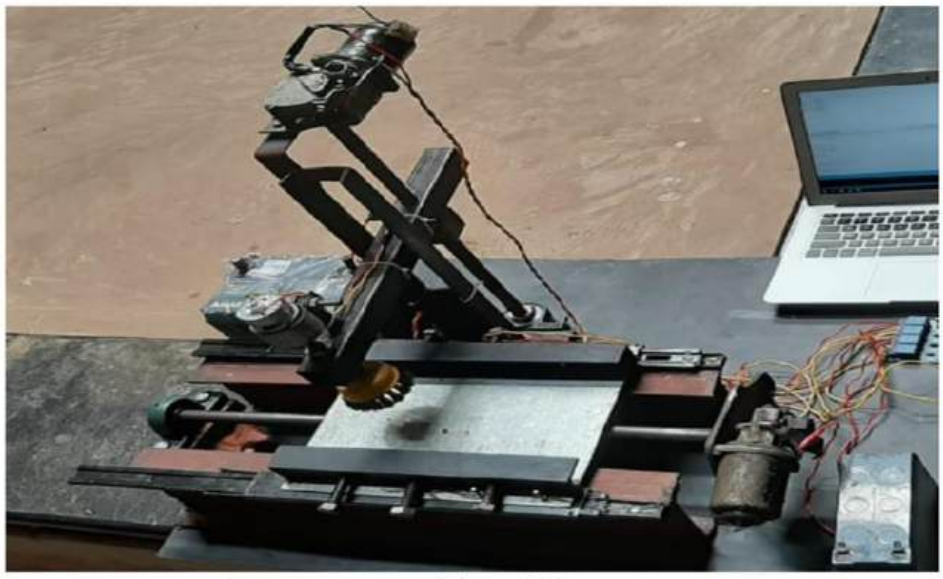
d. To reduce the time required for slag removal for lengthy plates.

***Applications*:** The machine finds applications in cleaning slags of long welded plates in construction sites, or in manufacturing industries.
Since it involves very less human interaction it can also find applications in slag removal during automated welding of components especially plates.

Awards and Participation:

1. Participated in Kshitij 2019.
2. Presented Technical paper in National E-Conference PRIME 2020 at SDMCET, Dharwad.

Working Model:



PRODUCTION AND CHARACTERIZATION OF FUEL DERIVED FROM PLASTIC

Domain/Area of Interest: Thermal

Project Members:

Mr.Brijesh Prakash Gajinkar
Mr.Shubham Nandan Hande
Mr.Sushmay Shivanand Madkaikar
Mr.Nagesh Vishwanath Kochkar
Mr.Sidhant Rajaram Naik

Project Guides:

Asst. Prof. Sharad Shanbhag

Brief Idea of project: Plastics have become the way in our lives and now pose tremendous threat to environment. We have found innovative way to reduce this plastic pollution by converting plastic into value added products. Waste plastics were used for the pyrolysis process to get fuel oil that has physical properties like petrol and diesel.

Applications:

Conversion of plastics into fuel solves two issues, one of the large plastic seas, and the other of the fuel shortage. Only as long as these waste plastics last these dual benefits, will exist, but will surely provide a strong platform for building a sustainable, clean and green future.

Awards and Participation:

- This Project secured 1st place during the Kshitij- 2019 project exhibition.

Working Model:

DESIGN AND FABRICATION OF GLASS POWDERING AND GRADING MACHINE FOR VARIOUS INDUSTRIAL APPLICATIONS

Domain/Area of Interest: Product/Waste Management

Project Members:

Shivdas Gaad
Rajat Halarnekar
Ranjeet Naik
Rajat Naik
Sahil Naik

Project Guide:

Prof Suraj Marathe

Brief Idea of project: The project involves Design and Fabrication of glass powdering machine, such that it can crush any waste glass including tubelight and successfully segregate the crushed glass according to its size. The currently available machine in the market do not have the feature of controlling the crushed glass size while the prototype built by us can be adjusted to do so, also our machine is affordable and portable as compared to the ones available in the market.

The built prototype is able to crush waste bottles, tubelight, and other waste glass into fine powder. The machine setting can be changed to give out a specific size of crushed glass thereby catering to various requirements as per applications. In addition, the machine is able to crush and separate out the paper labels from the glass bottles.

***Applications*:** The Machine finds application in the field of waste treatment plants i.e. to turn thewaste glass into powder and to use this for various applications. The crushed glass can be used to partially substitute the sand/ aggregate used in construction.

Awards and Participation:

- Third place at Kshitij 2019 organized by DBCE
- Third place at Aarush 2019 organized by PCCE
- Represented DBCE at KALPAK project exhibition organized by Goa University 2020
- Second place at waste management hackathon 2020 organized at DBCE.
- Featured in Times of India, Goa edition.

DESIGN AND DEVELOPMENT OF SYSTEM FOR THE EXTRACTION OFWATER FROM AIR BY USING VAPOR COMPRESSION CYCLE

Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Noah Gomes
Gerhard Lourenco
Johan Godinho
Hubert De Barros
Anand Raikar

Project Guides:

Prof Gaurish M Samant

Brief Idea of project: There is a water crisis today, and it is directly or indirectly affecting us. Today, one in every 10 human beings has no access to clean water. This is due to various reasons such as droughts, lack of natural supply of water, inadequate infrastructure, and contaminated water, etc. With theincreasing population and rising global warming, the water crises are becoming a huge danger to our ecosystem. Atmospheric Water Generator (AWG) is a device that collects humidity available in our atmosphere utilizing condensation and is like condensation happening around a glass filled with cold water. The collected condensed water is purified using purification cartridges and then mineralized before dispensing it for drinking. The present prototype model generates **24 liters** a day and the cost of this prototype is approximately **Rs. 65000/-.**

***Applications*:** The project was carried out mainly targeting the potable water

Awards and Participation:

- Participated in Project Competition organized by Goa Chamber of commerce and Industry 2020
- Selected as a potential Project by IIIC

Working Model:

DESIGN AND DEVELOPMENT OF DRONE FOR SPRAYING OF PESTICIDES ON COCONUT TREE

Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Mr. Pankaj Kumar
Mr. Rohil Naik
Mr. Sarvesh Kumthekar
Mr. Deepak Sharma
Mr. Neehal Bind

Project Guides:

Prof Gaurish M Samant

Brief Idea of project:

One of the main sources of income in India is Agriculture. The production rate of cropsin agriculture is based on various parameters like temperature, humidity, rain, etc. which are natural factors and not in farmer's control. The field of agriculture also depends on some factors like pests, disease, fertilizers, etc. which can be controlled by giving proper treatment to crops. Coconut trees are affected by various types of pests and diseases, the most prominent one among them is rhinoceros beetle. Pesticides may increase the productivity of crops but it also effects on human health. For spraying pesticides on a coconut tree, the farmer first has to climb the tree carrying pesticide on his back, after reaching the top of the tree farmer spray's the pesticide and then return to the ground.

The main drawback of this system is the safety of the farmer and also the load which farmer carry at his back is heavy due to which they face difficulty in climbing. To overcome these difficulties the proposed system would employ an unmanned aerial vehicle (UAV) equipped with a spraying mechanism that would ascend to the tree. The operator could then command the UAV to spray pesticides on the infected areas with the help of a spraying mechanism. So the main aim of our project is to design an agriculture drone for spraying pesticides. The use of pesticides in agriculture is very important and it will be efficient if we use intelligent machines such as drones to overcome the harmful effects of pesticides on farmers.

This report describes the development of quad copter UAV and the spraying mechanism. In this report we also discuss the integration of the sprayermodule to quad copter system. The discussed system involves designing a prototype which uses simple cost effective equipment like BLDC motor, ESC, Propeller, Battery etc. From the future perspective, agriculture drones can assist farmers to reduce excessive use of pesticides and will contribute to reducing the chemical load on the environment byspraying on the plant that requires attention. Therefore, in the future, this can be called thegreen-tech tool.

Applications:

The project design and development of drone for spraying of pesticides on coconut tree was successfully developed at Don Bosco College Of Engineering by incorporating design and analytical knowledge.

The following are the results that are listed during the testing phase of the project.

- The analytical calculation for the estimation of the payload was computed as 888.9 grams and was compared with the actual payload of the drone which was 950 grams.

- As per the calculation the minimum thrust produced by the motors was 2400gms but practically thrust generated by the motors was more than the minimum thrust required, as a result of which drone was able to take off.

- The drone was able to carry 250 ml of pesticides and the precision spraying was done successfully.

- The estimated flight time at 50% throttle was calculated as 12 min but practically at 50%throttle the flight time was 10 min.
- The proposed design was estimated to spray pesticide on coconut tree in a range of 40- 45 feet but due to intense monsoon wind it was flying up to 10-12 feet abovethe ground level.

Working Model:

EXPERIMENTAL STUDY OF COUPLED MODE FLUTTER OF AIRFOIL

Domain/Area of Interest: Research/Fluid Mechanics

Project Members:

Joel Pacheco
Nathan Miranda
Joel Colaco
Bensan Fernandes
Joel Pereira

Project Guide:

Prof. Pravin Verekar

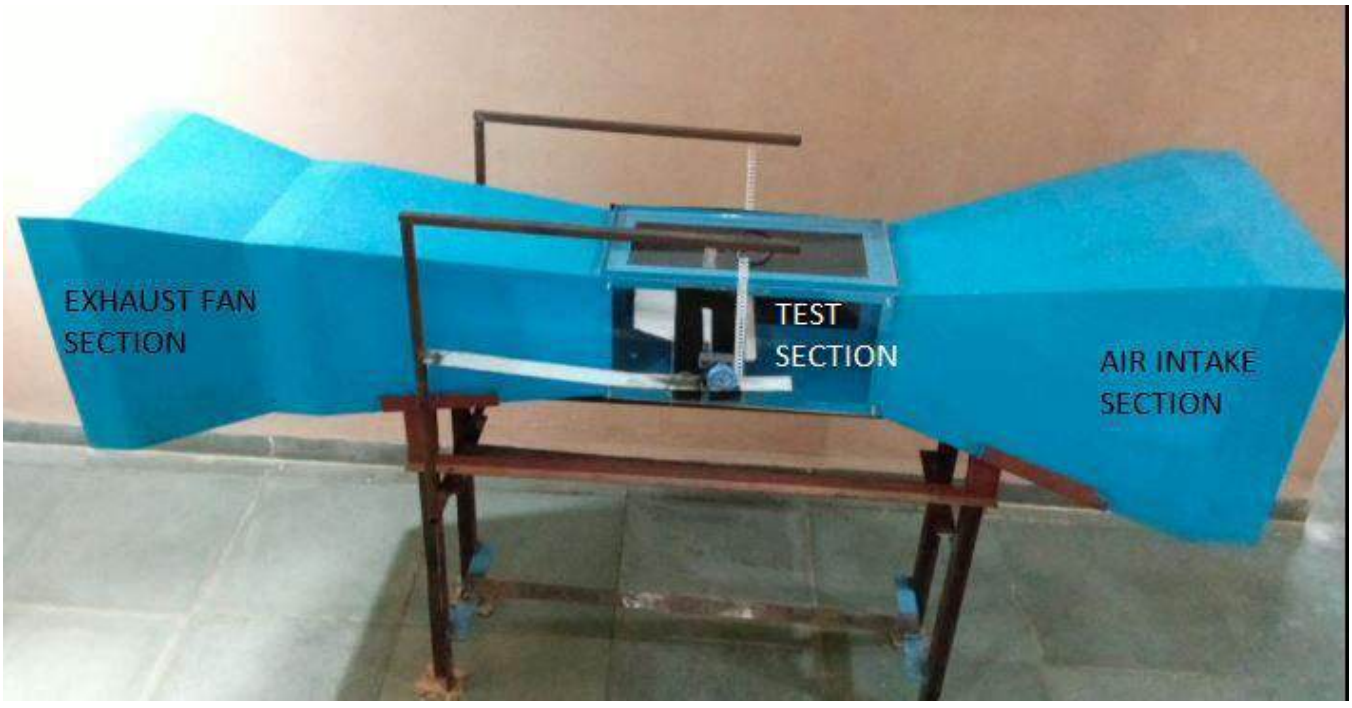
Brief Idea of project:

It has been observed that there is continuous desire to improve the aerodynamic performance of aircraft so as to achieve expanded increased flight envelope and long flight endurance. So, in this experimental research, the flutter behavior of an airfoil is experimentally studied with the goal of identifying the critical speed at which the flutter occurs. Flutter is a dynamic uncertainty of a structure (airfoil) in an air flow or fluid flow with the interaction of aerodynamic, elastic and inertial forces. Anemometer is used as ameasuring instrument to measure the critical speed. The aim of our project is to carry an experimental studyon the couple mode flutter that is pitch and plunge on an airfoil placed inside the wind tunnel. The couple mode flutter of fixed and partially rotating airfoils of different cord lengths are studied and effect of various aerodynamic parameters is shown and validated through conducting experiments in the wind tunnel. Since this research is based on fields like design, vibration, aerodynamics, fluid dynamics it would enhance one's knowledge in understanding these subjects and apply the theoretical concepts studied and observe real life phenomenon of air flow over different bodies.

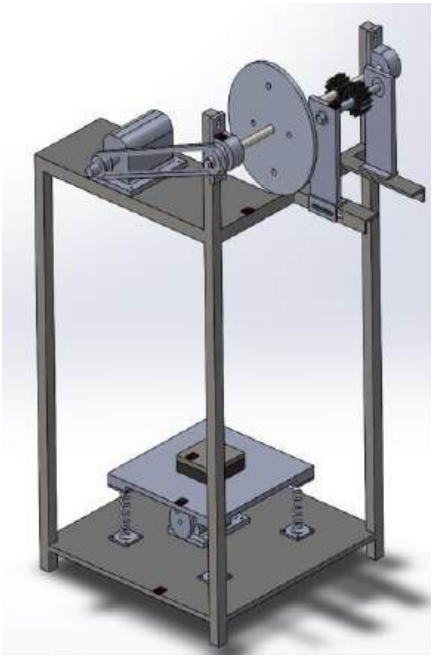
Applications:

Experimental study of coupled mode flutter of airfoil can be used to provide a theoretical model to estimate the onset of instability for wind turbine blades, to identify the major structural parameters governing the onset the flutter, to identify fluid structure interaction at different wind speeds by changing the wind speed progressively, and to determine the coupled mode flutter characteristics in the airfoil experimentally and draw empirical relations and conclusions.

Working Model:



DESIGN AND DEVELOPMENT OF A MULTIPURPOSE VIBRATION TEST RIG



Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Vivian Viegas
Sharvil Prabhu
Gaurav G.S. Nevrekar
Lincoln Veigas
Suhail Mustafa

Project Guides:

Mr. Ramnath Prabhu Bam

Brief Idea of project:

Any machine during their operation generates vibration due to the dynamic forces acting on the machines due to operating conditions, structure and ageing of the machine. This vibration may create noise, abrasion in the machine parts, mechanical fatigue, degrade performance, transfer to other machines via floor orwalls and may cause complete shutdown of the machine. For students, in order to better understand the implications of vibration, applications and importance of vibration testing and analysis, this modular multi-purpose test rig is an important tool. The test rig facilitates the means to conduct the study of concept of Resonance in a system, Force Transmissibility, finding Natural Frequency of a Spring Mass system and Fault Detection in rotating systems in a modular setup also capable of studying the effects of mass and spring rate. Open source code will be used to integratethe serial bus communication circuit and acquire data from the accelerometer sensors. Using Fast Fourier Transform, the data collected and processed will be used for vibration analysis to understand the characteristic amplitudes of vibration and it's components at the most prominent machine elements. It is important to assess the Magnitude of vibration generated and transmitted during their operating conditions.

Applications:

- The intent of this approach to design a multipurpose vibration test rig is to enhance the knowledge about Vibration and it's characteristics to provide practical experience to engineering students.
- Basic training on condition monitoring using vibration analysis.

Awards and Participation:

- Third Place in College Level Project Exhibition NIRMANA 2021
- Displayed for Media Interaction held at Don Bosco College of Engineering

Working Model:

Design and Fabrication of Wheelchair cum Stretcher

Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Mr. Kalpesh Gaude
Mr. Jeston DeSouza
Mr. Senroy DaCosta
Mr. Kline DeSouza
Mr. Jesusferns Cardozo

Project Guides:

Mr. Sanjeel Naik

Brief Idea of project:

The main aim of our project is to improve patient comfort and enhance the efficiency of entire system. Most of the patient attendant in hospital face problem while shifting patient from wheelchair to bed. If the patient leg or any part of body is broken, it needs to be handled in extra care while moving from wheelchair to stretcher. The model makes it easy for moving the patient as the stretcher and bed is of same height, patient can be slided, vice versa it also becomes easy if the patient need be sit as the stretcher converts into wheelchair. The wheelchair is designed in such a way in which it can be fitted on normal wheelchair present in markets, which can be converted from wheelchair to stretcher and vice versa.

Applications:

- This product will eliminate the shifting of person from wheelchair to stretcher, so this project has awide scope in medical and health care areas.
- People at old age homes can use this model as per their requirement.

Awards and Participation:

- Participated in College Level Project Exhibition NIRVANA 2021
- Displayed for Media Interaction held at Don Bosco College of Engineering

Working Model:

Human Hoist Ergonomic Chair

Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Mr. Vinamra Vinod Keni
Mr. Adarsh Ajeet Naik
Mr. Lanan Jehovah Dias
Mr. Prathmesh Govind Naik
Mr. Pravesh Bomo Jangli

Project Guides:

Mr. Ajit Salunke
Mr. Saurabh Raikar (Co-guide)

Brief Idea of project:

The principal objective of the project is to design and fabricate a “Human hoist Ergonomic Chair” for automotive repair which includes underbody work and maintenance and isuniquely designed for lifting, lowering and reclining. The chair is also automated for motion with hand- operated steering control. This chair is mechanically adjustable and based on the principle of a power screw (lead screw) mechanism. The Current situation of automotive workers includes a lot of physical stress, back pain, neck pain, knee pain and other joint pains. The employability of a disabled person (locomotors disability) in this area is another major concern. To solve this problem, we have designed a chair whose motion will be controlled by a high torque DC motor, which will create new opportunities for the disabled. It will also eliminate all of the health issues faced in the workplace and create a safe and comfortable working environment for the workers improving productivity and efficiency by boosting their morale hence decreasing health expenses.

Applications:

- In small-scale workshops where it is not affordable to opt for the latest technology like a hydraulicsystem which is expensive and has high energy consumption.
- In large-scale industries, where it is inefficient to use the hydraulic lift in all service conditions andfor minimal repairs.

Awards and Participation:

- Won Third Place in College Level Project Exhibition NIRMANA 2021
- Displayed for Media Interaction held at Don Bosco College of Engineering

Design and Fabrication of Semi-Automated Mechanism for Cleaning and Maintenance of Fuel Tanks on Ships

Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Ms. Benecia Colaco
Mr. Allson Jesus Joseph Dias
Mr. Allan Moses Chris Luis
Mr. Balesh Babaji Mayekar
Mr. Aloysius Do Amaral Coelho

Project Guides:

Mr. Saurabh Raikar

Brief Idea of project:

The project titled "Design and Fabrication of Semi-Automated Mechanismfor Cleaning and Maintenance of the fuel tank of ships" deals with the semi-automation of the current cleaning method associated with the fuel-oil-ready-to-use (F.O.R.U.) tanks. The currently implemented method in cleaning the fuel tanks uses manual labor. It poses a threat to the health and safety of the crew members. The environment inside the tanks is explosive and can cause asphyxiation. Apart from being hazardous to human life, the remnants of the sludge, sulphur, catalyst cat fines and asphaltic residue in improperly cleaned tanks can damage other pieces of equipment like boilers, heating coils, engines and clog pipelines. Moreover, there are financial losses associated with the current method employed in cleaning.The financial losses are due to the loss of time incurred, of at least six to seven days. Therefore, considering all these factors, a semi-automatic robotic mechanism has been developed. The robotic mechanism will ensure safety and a reduction in the operational time. It will clean the inaccessible parts of the tanks, thus ensuring efficient cleaning. As a result, there will be no damage to other pieces of equipment. The mechanism consists of two linkages and one snake arm attached in series. Stepper motors actuate the motion of the linkages and the snake arm. High tension cables control the movement of the snake arm. The design is quite flexible and can be modified to suit different tank designs. This project aims at making the existing cleaning process safer, faster, and reliable.

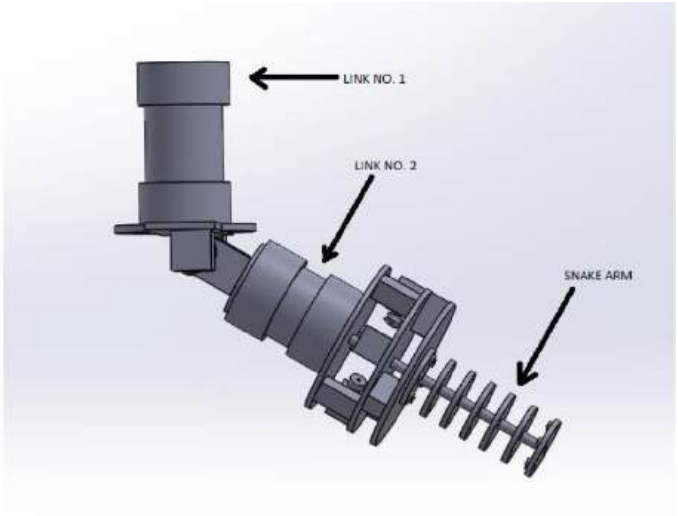
Applications:

- The project is a designed prototype for semi-automated cleaning application in fuel-oil-ready-to-use (F.O.R.U.) tanks which will help in saving cost, time and ensuring safety.
- The product can be used to clean any confined area where human access is limited or risky.

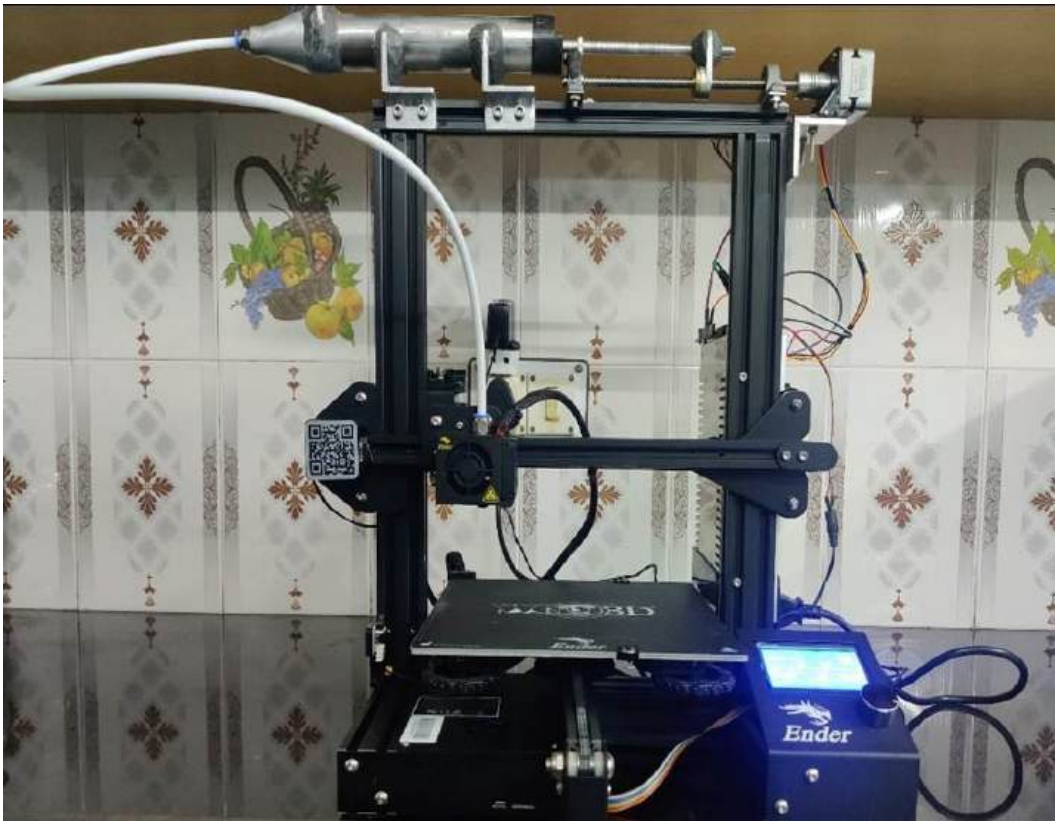
Awards and Participation:

- Won 1st place in College Level Project Competition NIRMANA 2021
- Won 3rd place in 'Technix 2021' National Level Project Competition organized by Final YearProject Quality Assurance Committee in association with IEEE DBCE Student branch
- Displayed for Media Interaction held at Don Bosco College of Engineering

Working Model:



Cake Making and Baking Using 3D Printing Technology



Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Mr. Myron Tony Barreto
Mr. Rolly Ignatius Dias
Mr. Everard Leitao
Mr. Johan Anibal Silveira
Mr. Ruturaj Suresh Fadte

Project Guides:

Dr Suraj Marathe

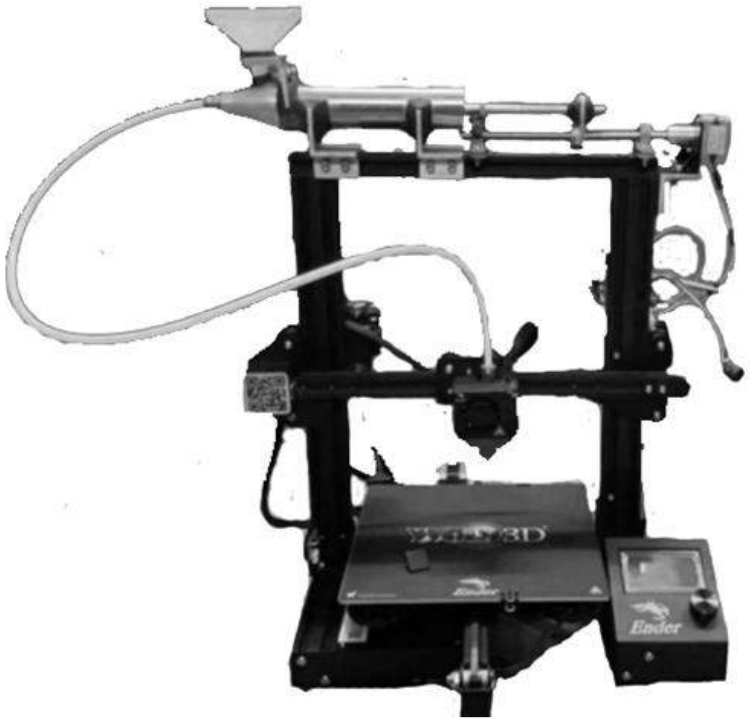
Brief Idea of project:

New lifestyles, higher incomes and consumer awareness are creating consumer demand for a year-round supply of high-quality, diverse, and innovative food products. Various important developments have been achieved in several areas related to foods and the food industry. For Example, sugar, chocolate, and cheese are used to create designed, shape-based food with the help of 3D printing technology (Additive Manufacturing Technology). Several industries utilize additive manufacturing technology to directly construct a physical model from the computer generated 3D model without a mould or a die in automobile, aerospace, and food industry. One of the advantages of 3D food printing is the ability to produce complex food models and to design a unique pattern. In our machine we use 3D printing technology to print an entire cake from a computer file. To carry out this 3D food printing technique, we use the Fused Deposition Modelling (FDM) technique. Making the cake of various intricate shapes and sizes, we try to reduce the baker's workload by automating the process. To achieve this, we use the Ender 3 pro 3D printer and a piston-cylinder extruder system controlled by a lead-screw assembly driven by a stepper motor. The extrusion is controlled by a stand along Arduino Uno. The baking is achieved with the help of the hot-end and the bed of the standard printer.

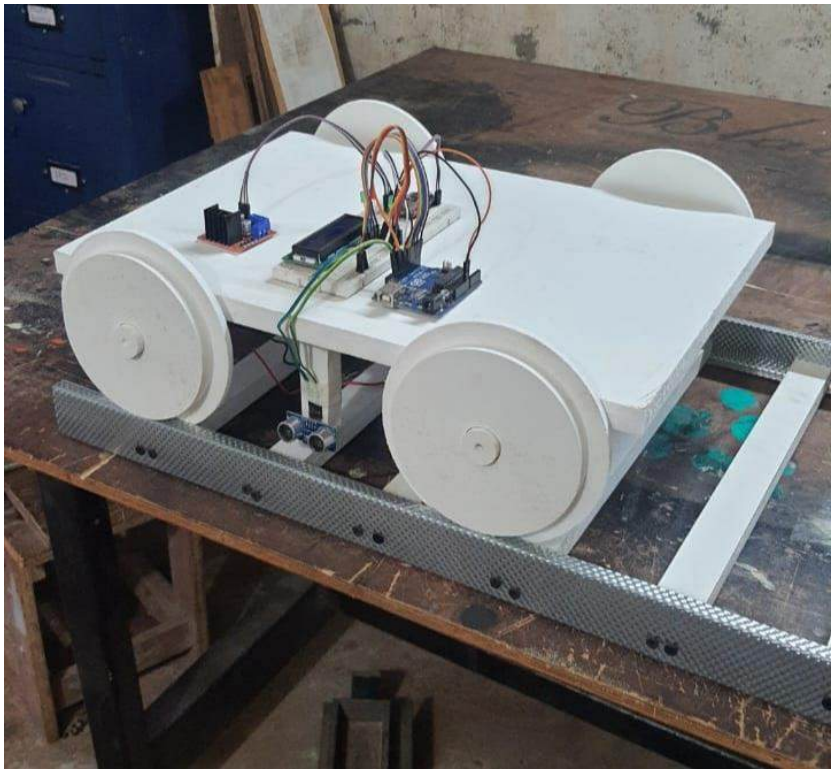
Awards and Participation:

- Participated in College Level Project Exhibition NIRVANA 2021
- Displayed for Media Interaction held at Don Bosco College of Engineering
- Received Prototyping funds Rs.20000 from GSinC.
- Patent filling in progress.

Working Model:



RAILWAY TRACK FAILURE DETECTION SYSTEM: IMPLEMENTATION, MAINTENANCE STRATEGIES



Domain/Area of Interest: Product/Multidisciplinary

Project Members:

Miss. Amonkar Prithvi Uday
Mr. Parab Saiprasad Rama
Mr. Khan Rehan Aktar
Mr. Sawant Raj Prasad
Mr. Naik Mahesh Santosh

Project Guides:

Dr. Suraj Marathe

Brief Idea of project:

Indian Railways is one of the largest networks in the country, with a track distance of more than 1,15,000 kilometres, with 67,312 stations and 7,112 stations route. Its motto is "the lifeline of the country", and the main transport is completed by the railways of the country. We believe that the railroad is one of the cheapest and safest means of transport, but there are also certain accidents on the railroad. 60% of accidents are caused by road failures or the formation of cracks in the road. Today's rail systems involve manual track inspection, which is cumbersome and not entirely effective. However, the detection and correction of track defects are a problem for all railway companies in the world. The objective of this project is to detect railroad track failures while studying the stresses caused on the tracks, the types of defects and the severity of the failures. Some of the failures include rail wear, welding problems, motor Burn out, internal defects, ripples, and Rolling Contact Fatigue (RCF) problems such as surface cracks, head inspection, sagging, peeling and chipping.

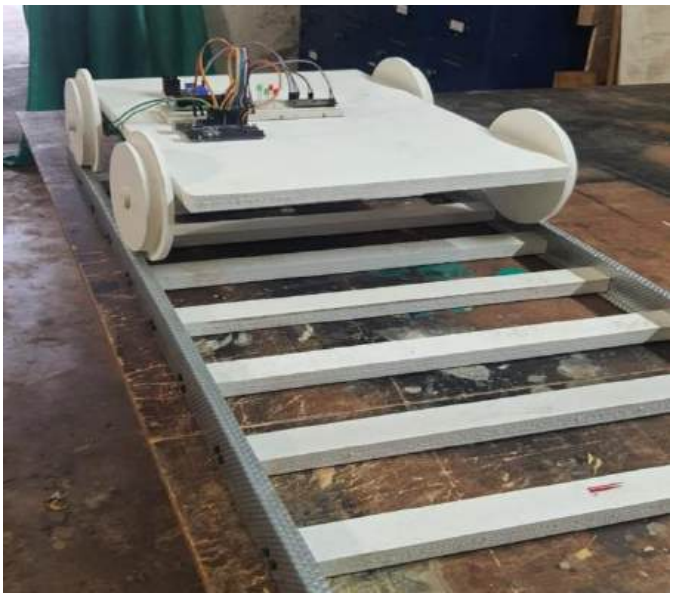
Applications:

- This product will detect the cracks on the rails.
- Depending upon the severity of the defects various maintenance strategies will be implemented.

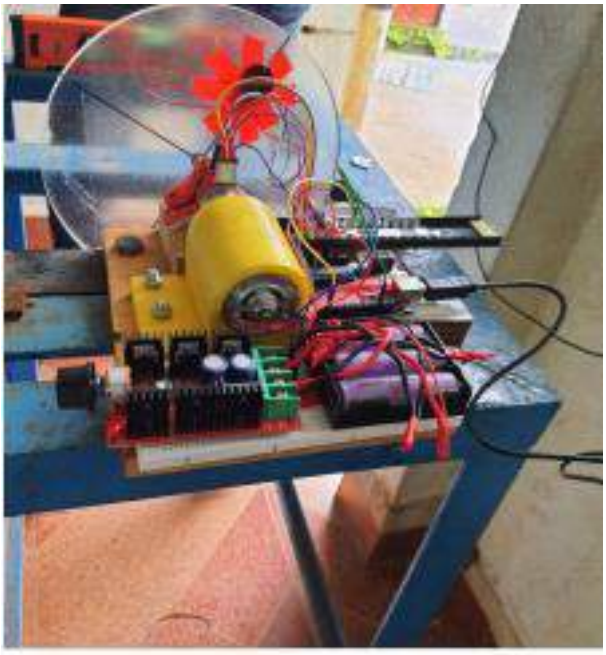
Awards and Participation:

- Participated in College Level Project Exhibition NIRVANA 2021
- Displayed for Media Interaction held at Don Bosco College of Engineering

Working Model:



DESIGN AND FABRICTION OF AUTOMATIC ROTOR BALANCING MACHINE



Domain/Area of Interest: Design Engineering

Project Members:

Mr. Sejel Martins
Mr. Sohal S. Shirodkar
Mr. Rohit Velip
Mr. Chinmay Kakodkar
Mr. Varadraj Naik

Project Guides:

Prof. Avil Allwyn Dsa

Brief Idea of project:

Rotor imbalance is the most common cause of machine vibration. In practice, rotors can never be perfectly balanced, owing to errors manufacturing such as, porosity in casting, non-uniform material density, manufacturing tolerances, and gain or loss of material during operations. Imbalance Mass leads to the generation of a centrifugal force, which must be counteracted by bearings and support structures. A full spectrum analysis is presented for vibration signal to reveal the fault specific whirl signatures. The results clearly indicate the potential and feasibility of the discussed approach for the rotor imbalance diagnosis in a rotor shaft system coupled with a three phase induction motor. This paper presents a smart experimental method for vibration measurement and imbalance fault detection in rotating machinery by automation.

Applications:

- This product can detect unbalance in rotors.
- Automation helps to rectify the unbalance onboard.

Awards and Participation:

- Participated in College Level Project Exhibition NIRVANA 2021
- Displayed for Media Interaction held at Don Bosco College of Engineering

Working Model: