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**ZEAL POLYTECHNIC**

**NARHE, PUNE**

***NAVNIRMITI***

**STUDENT PROJECT BOOKLET**

**VOLUME  
NO. 8**

**EDITION -  
MAY-2024**

**MECAHNICAL ENGINEERING  
DEPARTMENT**





## ABOUT INSTITUTE ZEAL POLYTECHNIC, NARHE, PUNE

Zeal Education Society was established in 1996 with the vision to offer education with a difference, the expert guidance of Hon. Shri. S.M. Katkar, a distinguished industrialist. ZES hosts eight institutes that provide quality education to students from pre- primary to Ph.D. courses. Zeal Polytechnic started in 2008 and offers Diploma Courses in Mechanical Engineering, Civil Engineering, Computer Engineering, Electronics and Telecommunication Engineering & Electrical Engineering.

The institute aims at providing the students with excellent Infrastructure, state of the art facilities, well-equipped laboratories and a strong force of faculty members. This has resulted in incredible performance of the students continually throughout the years. Recently, our Founder director has been conferred with the 'Icon of Education 'award by Lokmat media group in the presence of Hon. Smt. Smriti Irani, Former HRD Minister, Government of India from Hon. Shri. Vinod Tawde, former Technical Education Minister, Maharashtra State.

## Principal's Message

***Prof. Ayub A. Tamboli***

I am very happy to note that the department of Mechanical Engineering of Zeal Polytechnic is releasing its NAVNIRMITI, a student project booklet enumerating the various emerging projects of the students. I take immense pride in acknowledging the outstanding academic achievements of our diploma mechanical engineering students. Your commitment to excellence and the pursuit of knowledge has been commendable. Your academic journey is a testament to the dedication and hard work you have invested in your education. Polytechnic education provides the knowledge and skills required to help revolutionize the world in which we live. The students and faculty of department are proactive in taking initiatives in technical, cultural and social events. I hope this NAVNIRMITI a student project booklet will serve the purpose of reflecting all research activities of this department and it will inspire others to do their best. I express my gratitude to each one of you for your contributions to the success of our diploma mechanical engineering program. Together, let us continue to strive for excellence and innovation I congratulate all the students who have put their efforts in bringing this great issue of NAVNIRMITI, a student project booklet and also appreciate HOD and all faculty members for motivating the students towards this fulfillment. I wish each one of them in the department success in all their endeavors.



**Prof. Ayub A. Tamboli**

**Ph. D Pursuing, ME (HPE), BE(ME)**

**Principal,**

**Zeal Polytechnic, Narhe, Pune.**

# HOD Message

**Prof. Nilesh Kokare**

The Department was established as Dnyanganga Polytechnic in 2008. It offers a diploma in mechanical engineering and can accommodate 150 students we function with the vision that the Department should get recognized as an innovative and leading Mechanical department in Pune region and afar. The department aims at offering students with the high-quality education clubbed with practical exposure that empowers them with the ability to aid the society by their services in the future. The Department aims at making superior diploma engineering professionals through academic brilliance and excellent education. The syllabus in Mechanical Engineering is steered with an extraordinary approach that helps students to meet the modern requirements of industries. To cater to the current advancement in technology, new subjects such as CAD / CAM and Automation, alternative Energy Resources, Material Handling System are also conducted using modernized laboratories and the required infrastructure. A team of well qualified and experienced faculty members forms the backbone of the Department. This team is determined to empower students with sound academic knowledge and practical experience which in turn makes the students ready to face the industry challenges.



Prof. Nilesh Kokare

*HOD,*

*M.E. (Design)*

# NAVNIRMITI COMMITTEE

## CHIEF EDITORIAL

**PRPF. SACHIN SURYWANSHI**  
**PROF. MANOJ CHARATE**

## EDITORIAL TEAM

**MISS.PRADNYA PAWAR,**  
**MR. SUMIT HAWALDAR,**  
**MR. SOHAM PACHAORE,**  
**MR. AYAN BEG.**

*Dear Readers,*

*In the vibrant tapestry of our academic journey during the 2022-23, the NAVNIRMITY project booklet has been a transformative odyssey. As students passionately engaged in ground breaking research, we found ourselves at the crossroads of curiosity and innovation. This project booklet serves as a testament to our collective pursuit of knowledge and the unyielding dedication that fuelled our academic endeavours. Each student's contribution represents a unique thread in the intricate fabric of NAVNIRMITY, weaving together diverse perspectives and disciplines. Through late-night brainstorming sessions, countless hours in the lab, and the shared excitement of discovery, we forged bonds that extended beyond the realm of academia. The challenges we faced became stepping stones, and the solutions we unearthed stand as markers of our resilience and creativity. This booklet encapsulates not just our academic achievements, but the spirit of collaboration, curiosity, and determination that defines our collective journey through the NAVNIRMITY project. May these pages inspire future students to embrace the joy of exploration and the limitless possibilities that lie within the realm of research.*

*Warm Regards,*

*The Editorial Team*

*Mechanical Engineering Students*

## DEPARTMENTAL VISION AND MISSION

### VISION

To impart technical knowledge and professional skills through academic excellence and industry interaction for developing socially and industrially responsible mechanical engineers.

### MISSION

- ❖ M1:- To cultivate technical expertise and professional ethics through high-quality education and industry engagement.
- ❖ M2:- To offer practical training, enriching courses, and lifelong learning skills for success in diverse, interdisciplinary social and industrial environment.
- ❖ M3:- To promote problem-solving, communication and entrepreneurial skills while working as individual or member of team.

## PROGRAM EDUCATIONAL OBJECTIVES

**PEO 1:** Provide socially responsible, environment friendly solutions to Mechanical engineering related broad-based problems adapting professional ethics.

**PEO 2:** Adapt state-of-the-art Mechanical engineering broad-based technologies to work in multidisciplinary work environments

**PEO3:** Solve broad-based problems individually and as a team member communicating effectively in the world of work.





## SUMMARY OF PROJECT

**Academic Year: 2023-24**

**Semester: VI**

**Program Name: Mechanical Engineering**

**Class & Division: TYME (A) & (B)**

Group No.	Guide Name	Roll No.	Enrollment No.	Name of the Students	Title of Project	Type of Project
1	Mr. Shaikh S. R.	1	2009880195	GARAD MOHAN HANUMANT	MANUALLY OPERATED DRAINAGE CLEANING MACHINE	SOCIAL APPLICATION
		52	2109880778	GANDHAL SARVESH GOVIND		
		53	2109880779	GANDHAL SARWARTH GOVIND		
		60	2209880841	SHINDE SAPNA GIRIDHAR		
2	Mr. Deshmukh V. B.	2	2009880252	SHINDE GAURAV SITARAM	DESIGN AND FABRICATION OF OBSTACLE AVOIDING CAR	APPLICATION
		3	2009880257	KHARAT SAMARTH HANUMANT		
		4	2009880279	REDE RONIT NITIN		
		5	2009880281	SATPUTE ADESH AMOL		
3	Mr. Mohammad A. S.	6	2109880535	ADIL JAVED DABIR	PORTABLE RIVETING MACHINE	APPLICATION
		43	2109880671	SAMARTH ANAND BARAKE		
		57	2209880831	KARALE ROHAN SURESH		
		58	2209880832	KUMBHAR SAHIL SANJAY		
4	Mr. Chandane A. M.	7	2109880544	BAIG AAYAN RAFIQUE	DESIGN AND FABRICATION OF AUTOMATIC BOGGIE	APPLICATION
		31	2109880617	KONNUR OM SHRIKANT		
		37	2109880638	NASKE ASHITOSH RAMESH		
		50	2109880690	TIWARI ANURAG SANJAY		
5	Mr. Yenkar R. G.	8	2109880548	BHADARGE ADITYA DEEPAK	WASTE HEAT RECOVERY USING DOMESTIC REFRIGERATOR	APPLICATION
		27	2109880603	KALE ANISH NANDKISHOR		
		38	2109880642	PANGARE SOHAM SANDEEP		
		47	2109880680	SHIRKE ADARSH UMESH		
6	Mr. Shaikh S. R.	9	2109880556	CHAUDHARI RUTIK DATTATRAY	DESIGN AND FABRICATION OF PNEUMATIC HACKSAW MACHINE	SPONSORED INDUSTRIAL
		10	2109880563	DARWATKAR VAIBHAV VISHWNATH		
		11	2109880564	DESHMUKH ANISH NILESH		
		20	2109880588	JADHAV ATHARV RAMDAS		
7	Mr. Charate M. M.	12	2109880566	DHAGE SANDHYA ANIL	MANUALLY OPERATED ECO-FRIENDLY ROAD CLEANING MACHINE	SOCIAL APPLICATION
		18	2109880586	INAMDAR SANIYA AHMEDHUSEN		
		29	2109880611	KANGANE PRANAV PRAKASH		
		33	2109880624	MAHADIK SAIRAJ PRAVIN		
8	Mr. Aghor S. G.	13	2109880568	DHEBE SUNIL DHONDIBA	CONVEX SURFACE MILLING MACHINE	APPLICATION
		22	2109880592	JAGDALE ROHAN SANTOSH		
		40	2109880650	PAWAR LOKESH BALASO		
		42	2109880666	SAKPAL NITIN RAMCHANDRA		

9	Mr. Chougule S. S.	14	2109880572	GADRE VARAD UDAY	AUTOMATIC OPENING AND CLOSING OF DOOR USING IR SENSOR AND ARDUINO R3	APPLICATION
		15	2109880573	GAIKWAD ADITYA BAPU		
		23	2109880597	JOGLEKAR RUSHIKESH VINAY		
		24	2109880598	JOSHI JAY VIJAY		
10	Mr. Mahale P. R.	16	2109880578	GHUTE MANGESH CHANDRAKANT	MANUALL OPERATED CUTTING AND GRINDING MACHINE	APPLICATION
		25	2109880599	JOYASHI SARTHAK SANDIP		
		34	2109880628	MATE PRASAD NITIN		
		48	2109880687	TANISHK TUSHAR SURYAWANSHI		
11	Mr. Kokare N. N.	17	2109880583	HARSH ARUN KHUTEKAR	DESIGN, FABRICATION AND PERFORMANCE TESTING OF AUTOMATIC WATER PUMP	APPLICATION
		36	2109880632	MULGUND PRASHANT SOMNATH		
		39	2109880647	PATIL PRANAV RAVINDRA		
		49	2109880688	TAWARE VAIBHAV SANTOSH		
12	MR. Pathak D. M.	19	2109880587	JADHAV ADITYA DILIP	PAPER RECYCLING MACHINE INNOVATION: AN EXPERIMENTAL APPROACH	SOCIAL APPLICATION
		21	2109880591	JADHAV YASH UTTAM		
		44	2109880672	SANAS OMKAR SANDEEP		
		45	2109880677	SHAIKH MOSIN SHAKIL		
13	Mr. Shinde B. P.	26	2109880602	KADAM YASH VINOD	DESIGN AND FABRICATION OF VORTEX TUBE FOR INDUSTRIAL APPLICATION	SPONSORED INDUSTRIAL
		35	2109880631	MISHRA SONU SURESH		
		46	2109880679	SHINDEPATIL SANHITA KESHAVRAO		
		51	2109880698	SAHYADRI ANIL GAIKWAD		
14	Mr. Suryawanshi S. S.	28	2109880604	KALE ONKAR NANDKISHOR	MANUAL OPERATED LOAD LIFTING AND CARRYING PORTABLE CLEANING MACHINE	APPLICATION
		30	2109880614	KHARE NAKUL PRADEEP		
		32	2109880619	KHADE PRANAV RAMDAS		
		41	2109880652	PAWAR PRADNYA RAVINDRA		
15	Mrs. Yadav P. R.	54	2209880825	GOTHAL SWARUP ANKUSH	HYDRAULIC WORK PIECE HOLDING DEVICE	APPLICATION
		55	2209880827	HONE SHUBHAM UMESH		
		56	2209880830	KAMBLE RUTIK RAJENDRA		
		59	2209880837	ROKADE SIDDHESH RAJESH		
16	Mr. Yenkar R. G.	61	2109880539	ASHLESHA MANISH MANDHARE	SPRINGLESS SUSPENSION USING ROCKER BOGIE MECHANISM	APPLICATION
		64	2109880549	BHALERAO SIDHANT SATISH		
17	Mr. Shinde B. P.	63	2109880547	BHADALE ATHARVA GANESH	PEDAL OPERATED HACKSAW	APPLICATION
		62	2109880546	BET RAHUL RAJESH		
		85	2109880689	THORAT ATHARV MAHESH		
		66	2109880554	CHARHATE SNEHA PRAKASH		
18	Mr. Chandane A. M.	68	2109880594	JAGTAP OM PRAVIN	DESIGN AND FABRICATION OF SOLAR GRASS CUTTER	APPLICATION
		77	2109880637	NAIK SWAPNIL LAXMAN		
		65	2109880552	CHANDANE SANKET APPA		
		71	2109880612	KHAIRE PRANAV ROHIDAS		
19	Mr. Suryawanshi S. S.	70	2109880601	KADAM PREM PANDIT	MANUALLY OPERATED SHEET METAL BENDING, CUTTING & GRINDING MACHINE	SPONSORED INDUSTRIAL
		74	2109880620	LAD PRANAV MAHESH		
		75	2109880625	MAITHILI MAHENDRA PASALKAR		
		67	2109880569	DOLTODE OMKAR HANUMANT		



20	Mr. Kokare N. N.	80	2109880648	PATIL UTKARSH TIRTHRAJ	DESIGN AND FABRICATION OF LINEAR ACTUATOR USING LEAD SCREW	SPONSORED INDUSTRIAL
		72	2109880615	KHENGARE NISHANT SUNIL		
		81	2109880663	ROKADE OM DEVDAS		
		84	2109880682	SIDDHANT BALKRUSHANA POMAN		
21	Mr. Shaikh S. R.	73	2109880616	KHIRID LALIT PANDURANG	DESIGN AND FABRICATION OF AUTOMATIC SAND SEPARATOR	SPONSORED INDUSTRIAL
		79	2109880646	PATIL AKHILESH LAXMAN		
		83	2109880678	SHINDE OMKAR HARISH		
		69	2109880596	JHA ADITYA DILIP		
22	Mrs. Yadav P. R.	82	2109880676	SAWAT SHREYASH GANPAT	HYDRAULIC PIPE BENDING MACHINE	APPLICATION
		76	2109880633	MULIK RUSHIKESH RAJENDRA		
		78	2109880640	PADWAL OM DINKAR		



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**PROJECT TITLE: - MANUALLY OPERATED DRAINAGE CLEANING MACHINE**

**Abstract: -** Water is one of the essential needs for the existence of life on earth. In spite of 70% water on earth, majority of water is not suitable for drinking purpose. There is a huge demand of clean water as it is used for a variety of purpose such as drinking, bathing, cleaning, cooking etc. Impurities present in water can cause serious health issues that can damage the life of human beings. The chief function of the automatic drainage system is to collect, transport, as well as dispose the solid waste in the waste bucket by the help of claws. Solid waste in drainage water includes empty plastic bottles, polythene bags, papers etc. Impurities in drainage water can lead to blockage of the drainage system. In order to avoid such situation these impurities are needed to be dispose time to time for the continuous flow of drainage water. Drain can be cleaned continuously with the help of model using the drive system to remove the solid waste and threw it into waste bucket collector. The main objective of this paper is to initiate the efficient working of system. This system automatically cleans the water in the drainage system. Any impurity appears and claws which are driven by chain sprocket grasp the solid waste and threw it into the waste bucket to avoid blockage. It reduces the effort of manual labor as well as the threat to human life from diseases caused by sewage water.

**Project Photo :-**





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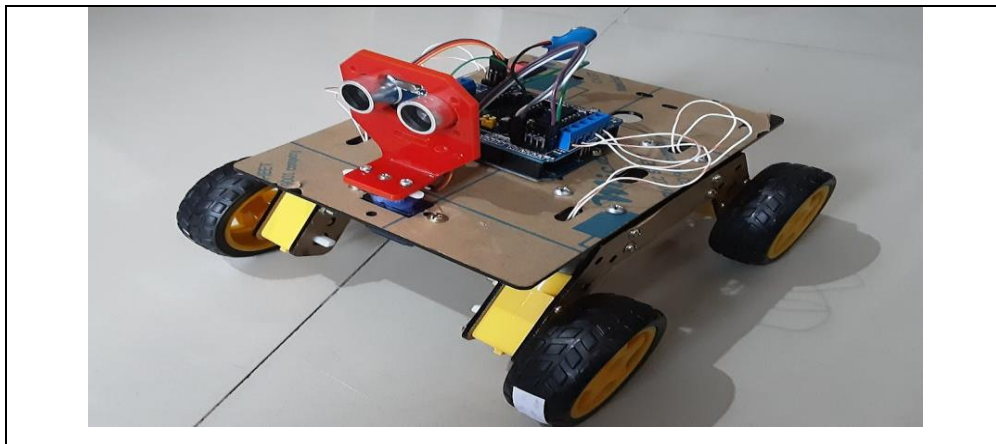
- Name of Students :-**
- 1) GARAD MOHAN HANUMANT
  - 2) GANDHAL SARVESH GOVIND
  - 3) GANDHAL SARWARTH GOVIND
  - 4) SHINDE SAPNA GIRIDHAR

**Guide Name :-** Prof. S. R. Shaikh

**PROJECT TITLE :- DESIGN AND FABRICATION OF OBSTACLE AVOIDING CAR**

**Abstract :-** This project depicts an obstacle-evasion robot vehicle restricted by an ultrasonic sensor. The Arduino microcontroller drives the robot prototype car, which employs an ultrasonic sensor for obstacle detection. This sensor is mounted on the vehicle's front and two sides. The sensor receives data from the robot's attached sensors once the encircling zone begins. The sensor detects the impediment and proceeds to choose an impediment-free path. The sensor will convey the command to the controller and is distinguished from the controller by selecting the appropriate motion for the robot wheel. The vehicle wheel's advancement and direction will now be determined by the identification of the ultrasonic sensor and the use of a wheel encoder. This vehicle is used to detect obstructions and avoid their effects.

**Project Photo :-**





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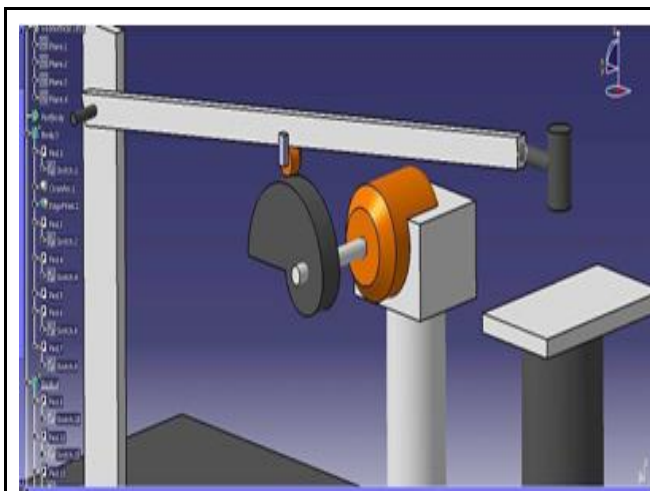
- Name of Students :-**
- 1) SHINDE GAURAV SITARAM
  - 2) KHARAT SAMARTH HANUMANT
  - 3) REDE RONIT NITIN
  - 4) SATPUTE ADESH AMOL

**Guide Name :-** Prof. D. B. Deshmukh

**PROJECT TITLE :- PORTABLE RIVETING MACHINE**

**Abstract :-** Portable Riveting Machine can change many industries Increase productivity, ensure fairness and improve worker safety. This provides the basis for the design and development of these machines, which focus on Purpose, components, and design and safety procedures. The demand for an automated hammering machine in various industries has increased significantly, Replaces repetitive and painful tasks like shaving or tool making Increase productivity, improve consistency and improve employee safety. This foundation is the basis for the design and development of such machines. Produces building materials. Should include the design and development of impact drills Collaboration between engineers, designers and industry professionals to ensure they meet.

**Project Photo :-**





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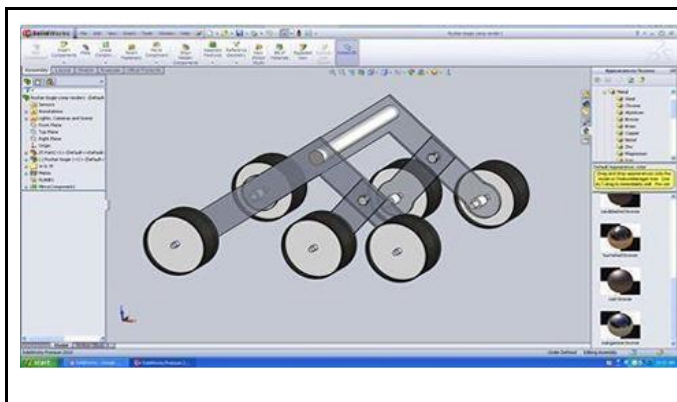
- Name of Students :-**
- 1) ADIL JAVED DABIR
  - 2) SAMARTH ANAND BARAKE
  - 3) KARALE ROHAN SURESH
  - 4) KUMBHAR SAHIL SANJAY

**Guide Name :-** Prof. A. S. Mohammad

**PROJECT TITLE :- DESIGN AND FABRICATION OF AUTOMATIC BOGGIE**

**Abstract :-** Rocker bogie are important for conducting in-situ scientific analysis of objectives that are separated by many meters to tens of kilometers. Current mobility designs are complex, using many wheels or legs. They are open to mechanical failure caused by the harsh environment on Mars. A four wheeled rover capable of traversing rough terrain using an efficient high degree of mobility suspension system. The primary mechanical feature of the rocker bogie design is its drive train simplicity, which is accomplished by using only two motors for mobility. Both motors are located inside the body where thermal variation is kept to a minimum, increasing reliability and efficiency. Four wheels are used because there are few obstacles on natural terrain that require both front wheels of the rover to climb simultaneously. A series of mobility experiments in the agriculture land, rough roads, inclined, stairs and obstacles surfaces concluded that rocker bogie can achieve some distance traverses on field.

**Project Photo :-**





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- 1) BAIG AAYAN RAFIQUE
  - 2) KONNUR OM SHRIKANT
  - 3) NASKE ASHITOSH RAMESH
  - 4) TIWARI ANURAG SANJAY

**Guide Name :-** Prof. A. M. Chandane

**PROJECT TITLE :- WASTE HEAT RECOVERY USING DOMESTIC REFRIGERATOR**

**Abstract :-** This study explores the potential of waste heat recovery systems in domestic refrigerators to enhance energy efficiency and reduce environmental impact. The abstract reviews existing literature on waste heat recovery technologies, including thermoelectric generators, heat exchangers, and absorption refrigeration systems. It discusses the challenges and opportunities associated with implementing waste heat recovery in domestic refrigerators, such as space constraints, cost-effectiveness, and system complexity. The abstract highlights the importance of developing innovative and practical solutions to harness waste heat from refrigeration systems to improve overall energy efficiency and sustainability in household appliances.

**Project Photo :-**





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- Name of Students :-**
- 1) BHADARGE ADITYA DEEPAK
  - 2) KALE ANISH NANDKISHOR
  - 3) PANGARE SOHAM SANDEEP
  - 4) SHIRKE ADARSH UMESH

**Guide Name :-** Prof. R. G. Yenkar

**PROJECT TITLE :- DESIGN AND FABRICATION OF PNEUMATIC HACKSAW MACHINE**

**Abstract :-** In mass production industries and workshops, there is frequent need of cutting objects in a very quick manner so as to meet fast processing tasks. This study aims to create a proto-type pneumatic powered hacksaw that utilizes pneumatics components to provide motion to blade, solenoid valves, an air compressor as a source of power and a programmable logic controller (PLC). This helps in reducing the overall cost of the hacksaw right from designing to manufacturing since expensive electronic circuits are not used. When compared to motorized hacksaw this pneumatic hacksaw with simultaneous and sequential pneumatic circuits is capable of performing the same task automatically with assistance of even an unskilled labor which in turn reduces the running cost of the machine.

**Project Photo :-**





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- Name of Students :-**
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  - 2) DARWATKAR VAIBHAV VISHWNATH
  - 3) DESHMUKH ANISH NILESH
  - 4) JADHAV ATHARV RAMDAS

**Guide Name :-** Prof. S. R. Shaikh

**PROJECT TITLE :- MANUALLY OPERATED ECO-FRIENDLY ROAD CLEANING MACHINE**

**Abstract :-** A manually operated eco-friendly road cleaning machine designed to address the challenge of urban road cleanliness while minimizing environmental impact. The machine incorporates innovative features such as a human-powered propulsion system and sustainable materials, making it an environmentally conscious alternative to traditional road cleaning equipment. Through a combination of mechanical and manual processes, the machine efficiently collects debris and waste from road surfaces, contributing to cleaner and safer urban environments. This abstract highlights the key design principles, operational features, and environmental benefits of the proposed road cleaning machine, showcasing its potential for enhancing sustainability in urban maintenance practices.

**Project Photo :-**







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- Name of Students: -**
- 1) DHAGE SANDHYA ANIL
  - 2) INAMDAR SANIYA AHMEDHUSEN
  - 3) KANGANE PRANAV PRAKASH
  - 4) MAHADIK SAIRAJ PRAVIN

**Guide Name :-** Prof. M. M. Charate

**PROJECT TITLE :- CONVEX SURFACE MILLING MACHINE**

**Abstract :-** Milling is one of the most important machining processes in manufacturing. This process is used to shape solid materials especially metals. It is mostly used in shaping flat and irregular surfaces. It can be used for drilling, cutting gears, boring and producing slots. Milling a curved surface falls under the umbrella of profile/ contour CNC milling. It involves machining irregularly shaped profiles or continuous curves with various degrees (slanted, concave, or convex). This is a crucial process in getting most of the uniquely shaped bespoke parts done, which requires the CNC machining services providers to have advanced knowledge of the fundamental machining principles and programs.

The Curved Surface milling machine, a project which demonstrates the set up for milling a flat surface to curved surface without CNC. The Drilling machine is stationary. A flat platform is provided upon which the material can be placed. The platform is set upon two inclined rods which is mounted on slider that allows the platform to move back & forth but in a curved way according to its arrangement. The reciprocating motion of the platform is done manually with the help of a lead screw mechanism.

**Project Photo :-**



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**Name of Students :-**

- 1) DHEBE SUNIL DHONDIBA
- 2) JAGDALE ROHAN SANTOSH
- 3) PAWAR LOKESH BALASO
- 4) SAKPAL NITIN RAMCHANDRA

**Guide Name :-** Prof. S. G. Aghor

**PROJECT TITLE :-** AUTOMATIC OPENING AND CLOSING OF DOOR USING IR SENSOR AND ARDUINO R3

**Abstract :-** This project introduces an automated door control system utilizing Arduino UNO R3, infrared (IR) sensors, and a servo motor. Engineered for enhanced convenience and accessibility, the system employs IR sensors to detect user presence, with the Arduino UNO R3 processing real-time sensor inputs. The servo motor is then controlled to actuate the door mechanism, allowing automatic door open and close functionalities. Adjustable sensitivity settings for IR sensors and a user-friendly interface contribute to the system's adaptability. This cost-effective solution is designed to improve energy efficiency, facilitate accessibility for individuals with mobility challenges, and enhance overall security in diverse environments such as homes, offices, and public spaces.

**Project Photo :-**



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- Name of Students :-**
- 1) GADRE VARAD UDAY
  - 2) GAIKWAD ADITYA BAPU
  - 3) JOGLEKAR RUSHIKESH VINAY
  - 4) JOSHI JAY VIJAY

**Guide Name :-** Prof. S. S. Chougule

**PROJECT TITLE :- MANUALLY OPERATED CUTTING AND GRINDING MACHINE**

**Abstract :-** This project details the design and fabrication of a PVC cutter machine aimed at enhancing the precision and efficiency of cutting Polyvinyl Chloride (PVC) pipes, commonly used in plumbing, irrigation, and construction. Traditional methods of cutting PVC pipes often result in imprecise cuts and time-consuming processes. The proposed machine addresses these challenges by offering a precise and automated cutting solution, featuring a sturdy frame, a motor powered cutting mechanism, and adjustable settings for different pipe diameters, while ensuring operator safety. Fabrication involved selecting durable materials and employing precision machining techniques to manufacture various components. Extensive testing demonstrated significant improvements in cutting



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accuracy and efficiency compared to conventional methods, making the machine a valuable addition to industries reliant on accurate PVC pipe cutting.

**Project Photo :-**



- Name of Students :-**
- 1) GHUTE MANGESH CHANDRAKANT
  - 2) JOYASHI SARTHAK SANDIP
  - 3) MATE PRASAD NITIN
  - 4) TANISHK TUSHAR SURYAWANSHI

**Guide Name :-** Prof. P. R. Mahale

**PROJECT TITLE :- DESIGN, FABRICATION AND PERFORMANCE TESTING OF AUTOMATIC WATER PUMP**

**Abstract :-** Water hammer, a phenomenon arising from sudden changes in fluid flow velocity within a pipeline system, has long been recognized as a potential hazard in plumbing and hydraulic engineering. However, recent studies have explored its potential as a means of enhancing the efficiency of water transfer in high-altitude regions characterized by rugged terrain and significant elevation differentials. This paper presents a comprehensive review of the application of water



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hammer effect for efficient water transfer at high altitudes. The review begins with an overview of the principles underlying water hammer, including its causes, effects, and mathematical models. Subsequently, the relevance of water hammer to high-altitude water transfer is explored, considering the unique challenges posed by mountainous landscapes and elevated terrains. Various techniques used to harness and optimize the water hammer effect for enhanced water transfer efficiency are discussed, ranging from pipeline design considerations to control strategies and system configurations. Additionally, the paper examines case studies and practical implementations of water hammer-based water transfer systems in mountainous regions, analyzing their effectiveness, challenges, and potential for widespread adoption. Furthermore, insights into future research directions and opportunities for further advancements in utilizing water hammer for efficient water transfer at high altitudes are provided. An overview of the principles underlying water hammer, including its causes, effects, and mathematical models. The relevance of water hammer to the challenges of water transfer in mountainous regions, considering factors such as elevation differentials, rugged terrain, and natural barriers. Techniques for harnessing and optimizing the water hammer effect to enhance water transfer efficiency, including pipeline design considerations, control strategies, and system configurations. Analysis of case studies and practical implementations of water hammer-based water transfer systems in mountainous regions, evaluating their effectiveness, challenges, and potential for widespread adoption. Insights into future research directions and opportunities for further advancements in utilizing water hammer for efficient water transfer at high altitudes, including considerations of sustainability, environmental impact, and integration with emerging technologies. are provided, including considerations of sustainability, environmental impact, and integration with emerging technologies. This review serves as a valuable resource for researchers, engineers, and policymakers interested in the optimization of water transfer systems in high-altitude environments.



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**Guide Name :-** Prof. N. N. Kokare

**PROJECT TITLE: - PAPER RECYCLING MACHINE INNOVATION: AN EXPERIMENTAL APPROACH**

**Abstract :-** With the increasing demand for sustainable practices, paper recycling stands as a pivotal aspect of environmental conservation. This review paper outlines a novel experimental approach in the realm of paper recycling machinery. The proposed system commences with the shredding of paper, followed by the transformation of shredded material into pulp through a hydro pulper. Departing from conventional methods, our experimentation focuses on the application of an innovative spray mechanism, utilizing a pump and nozzles to distribute the pulp onto a conveyor. The objective is to investigate the viability of this unconventional method in paper formation. Subsequently, the processed material undergoes drying before being collected as recycled paper. Through a detailed exploration of this experimental approach, the paper contributes insights into the potential enhancements in efficiency and sustainability within the paper recycling industry.



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**PROJECT TITLE: - DESIGN AND FABRICATION OF VORTEX TUBE FOR INDUSTRIAL APPLICATION**

**Abstract: -** This paper explores the application of vortex tube systems for cooling purposes in the industrial forging sector. Cooling is a critical step in the forging process to ensure proper material properties and dimensional accuracy of forged components. Traditional cooling methods often involve significant energy consumption and may lead to uneven cooling rates, resulting in undesirable material properties. To address these challenges, this study investigates the utilization of vortex tube



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technology to achieve efficient and uniform cooling of forged job materials. We delve into the working principles of vortex tubes, which exploit the phenomenon of energy separation in compressed gas to produce both hot and cold streams without any moving parts. Through experimental analysis and computational simulations, we elucidate the parameters influencing the cooling performance of vortex tube systems, including inlet pressure, temperature, and geometrical configurations. Furthermore, we examine the integration of vortex tube systems into industrial forging processes to optimize cooling efficiency, reduce energy consumption, and enhance the overall quality of forged components. This research contributes to the advancement of sustainable cooling practices in the industrial sector, facilitating improved productivity and cost-effectiveness in forged job projects.

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**PROJECT TITLE: - MANUALLY OPERATED LOAD LIFTING AND CARRYING PORTABLE  
CLEANING MACHINE**

**Abstract** :- Cranes do play most vital role in the manufacturing industries. A crane is a mechanical lifting device equipped with a winder, wire ropes, and sheaves that can be used to lift and lower materials and to move them horizontally. In this project we aim to create a machine that reduces man power that is additional. This manual operated crane consists of an arrangement of rope, pulleys and hand winch along with an additional feature of cleaning the floor.

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**PROJECT TITLE :- HYDRAULIC WORK PIECE HOLDING DEVICE**

**Abstract** :- A bench /vice is a tool used to hold or clamp a workpiece to allow operations such as cutting, filing, milling, drilling, grinding, etc. It is usually made from cast iron with a fixed jaw and another parallel jaw which moves towards or away from the fixed jaw using the screw. Design and fabrication of a modified vice to improve the productivity, flexibility and comfort ability of the existing bench /vices have been achieved in this study. In this vice, we can also hold components of different shapes with the help of the adjustable jaws that can be provided if needed. A lever slides the movable jaw, using a lead screw for forward and reverse movement of the movable jaw. Hydraulic machine vice can be used for all types of machines.

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**PROJECT TITLE :- SPRINGLESS SUSPENSION USING ROCKER BOGIE MECHANISM**

**Abstract** :- The rocker bogie mechanism is a type of suspension system commonly used in robotic vehicles, particularly in space exploration rovers like NASA's Mars rovers. Unlike traditional spring-based suspensions, the rocker bogie mechanism relies on a system of pivoting joints and linkages to maintain stability and traction over uneven terrain. This mechanism allows the vehicle to traverse rough surfaces by distributing weight and adjusting wheel positions to accommodate obstacles. Its abstract nature lies in its ability to provide stability and mobility without relying on springs, making it well-suited for navigating challenging environments such as rocky terrain or steep slopes. Overall, the rocker bogie suspension system is well-suited for applications where stability, mobility, and reliability are paramount, making it a preferred choice for planetary exploration missions and other off-road vehicles operating in rugged terrain.

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**PROJECT TITLE :- PEDAL OPERATED HACKSAW**

**Abstract** :- Pedal Powered Hacksaw can be used for light duty cutting operations of plywood, soft-bamboo, and iron rod. This paper consists of a crank and slider mechanism. In the mechanism, pedal is directly connected to the hacksaw through crank and slider mechanism for the processing of cutting the plywood, bamboo, and iron rod. The aim is to develop a Pedal Powered hacksaw for the cutting of engineering materials for rural and urban areas when there is inadequate power supply. In order to ascertain the effectiveness of the machine, performance evaluation was carried out. The machine was tested for two different materials, which are soft bamboo and iron rod of 20mm diameter. The



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experimental result shows that cutting depth of about 10 mm can be obtained in 60 cutting strokes for around 60rpm; also a cutting depth of 31mm for bamboo is obtained with the same number of strokes. The results indicated that the Pedal Powered Hacksaw had given better, accurate and faster cuts when compared with hand hacksaw at different rpm. Pedal Powered Hacksaw helps to obtain less effort uniform cutting.

**Project Photo :-**



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**PROJECT TITLE :- DESIGN AND FABRICATION OF SOLAR GRASS CUTTER**

**Abstract :-** The solar grass cutter presented in this project harnesses solar energy to power a motorized grass cutting mechanism, providing an eco-friendly and sustainable solution for lawn maintenance. The system comprises photovoltaic panels to capture solar energy, which is then converted into electrical power to drive the cutting blades. The design incorporates efficient energy storage mechanisms to ensure continuous operation even during low sunlight conditions. Additionally, the cutter features safety measures to prevent accidents and ensure user protection. Overall, this solar-powered grass cutter offers a green alternative to traditional gas-powered or electric lawn mowers, contributing to environmental conservation efforts while maintaining efficient grass cutting capabilities.

**Project Photo :-**



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**PROJECT TITLE :- MANUALLY OPERATED SHEET METAL BENDING, CUTTING & GRINDING MACHINE**

**Abstract :-** This project introduces the design and fabrication of a manually operated sheet metal bending, cutting, and grinding machine, aimed at addressing the needs of small scale metalworking workshops and hobbyists. The machine offers versatility and efficiency in handling various sheet metal tasks, including bending, cutting, and grinding, through intuitive manual operation. The design incorporates key features such as adjustable bending angles, precise cutting mechanisms, and a robust grinding platform, ensuring accuracy and repeatability in metal fabrication processes. By providing a cost-effective and user-friendly solution, this machine contributes to enhancing productivity and promoting skill development in metalworking applications.

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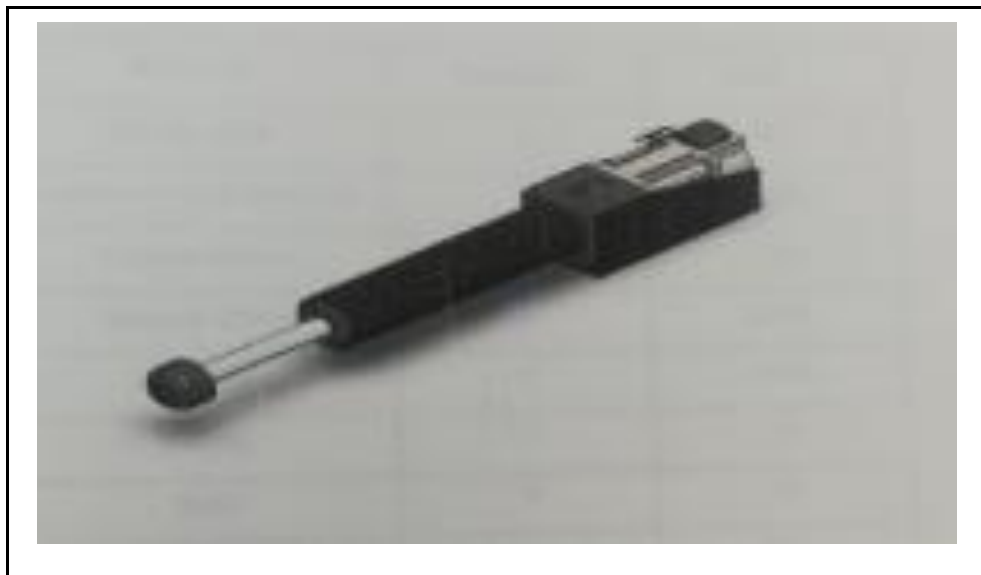
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**PROJECT TITLE :- DESIGN AND FABRICATION OF LINEAR ACTUATOR USING LEAD SCREW**

**Abstract** :- Linear motion systems play a crucial role in numerous engineering applications, ranging from robotics and automation to aerospace and manufacturing. Among the various mechanisms facilitating linear motion, lead screw actuators stand out for their simplicity, efficiency, and versatility. This review paper provides a comprehensive analysis of lead screw actuator configurations, focusing on optimization strategies to enhance their performance across different applications. We delve into the fundamental principles underlying lead screw actuators, discuss their key components, and explore various design parameters affecting their efficiency, precision, speed, and load capacity. Furthermore, we survey recent advancements in materials, coatings, and manufacturing techniques aimed at improving the overall performance and durability of lead screw actuators. By synthesizing existing research and providing insights into optimization approaches, this paper aims to serve as a valuable resource for engineers, researchers, and practitioners seeking to leverage lead screw actuators for optimal linear motion solutions.

**Project Photo :-**





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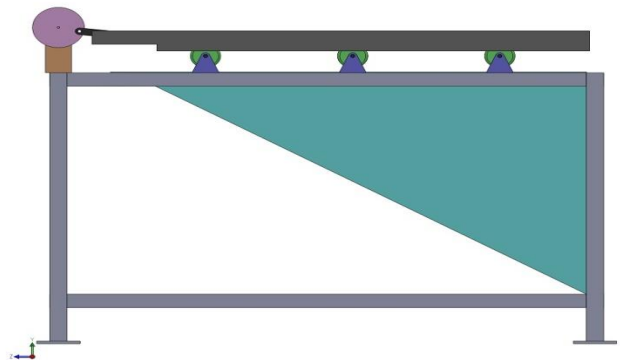


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**PROJECT TITLE :- DESIGN AND FABRICATION OF AUTOMATIC SAND SEPARATOR**

**Abstract :-** Sand is essential for any type of construction. Different types of sand are required for different constructions. For example, column, plaster, stairs. And this process takes a lot of labor and effort, so if you want to build on a large scale, the traditional methods of separating sand are not suitable for us. As per the survey, single filter machine is available in the market. In our experimental setup three different quality of sand filtered in a single process. The strength of this setup is simulated in ANSYS also and by using our experimental setup we reduce labour cost and time. And increase working efficiency or working purpose upto 35%. For this operation we used three types of filter frame and three different compartments. The slider crank mechanism is used in this model.

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**PROJECT TITLE: - HYDRAULIC PIPE BENDING MACHINE**

**Abstract :-** Traditional method of bearing removal from shaft is very difficult. It can remove by hammering or by applying more force. By hammering the bearing surface gets damaged. So, we can apply the hydraulics for this removal of bearing from shaft. Hydraulic system plays a very important role in almost all the applications in now a day. At present the above two are that is hydraulic bearing puller and hydraulic pipe bender are manufactured separately. The objective of this research is to combine the pulling operation and bending operation in a single machine. In this we can do both the operations that are bearing pulling and pipe bending by using hydraulics. The above research works on the principle of "Pascal's law of hydraulics" that states the pressure of a fluid in a closed vessel is uniform in all directions. At present the above two are that are hydraulic bearing puller and hydraulic pipe Bender are manufactured separately. The objective of this research is to combine the pulling operation and bending operation in a single machine. In this we can do both the operations that are bearing puling and pipe bending by using hydraulics. The above research works on the principle of "Pascal's law of hydraulics" that states the pressure of a fluid in a closed vessel is uniform in all directions.



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