KAMARAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

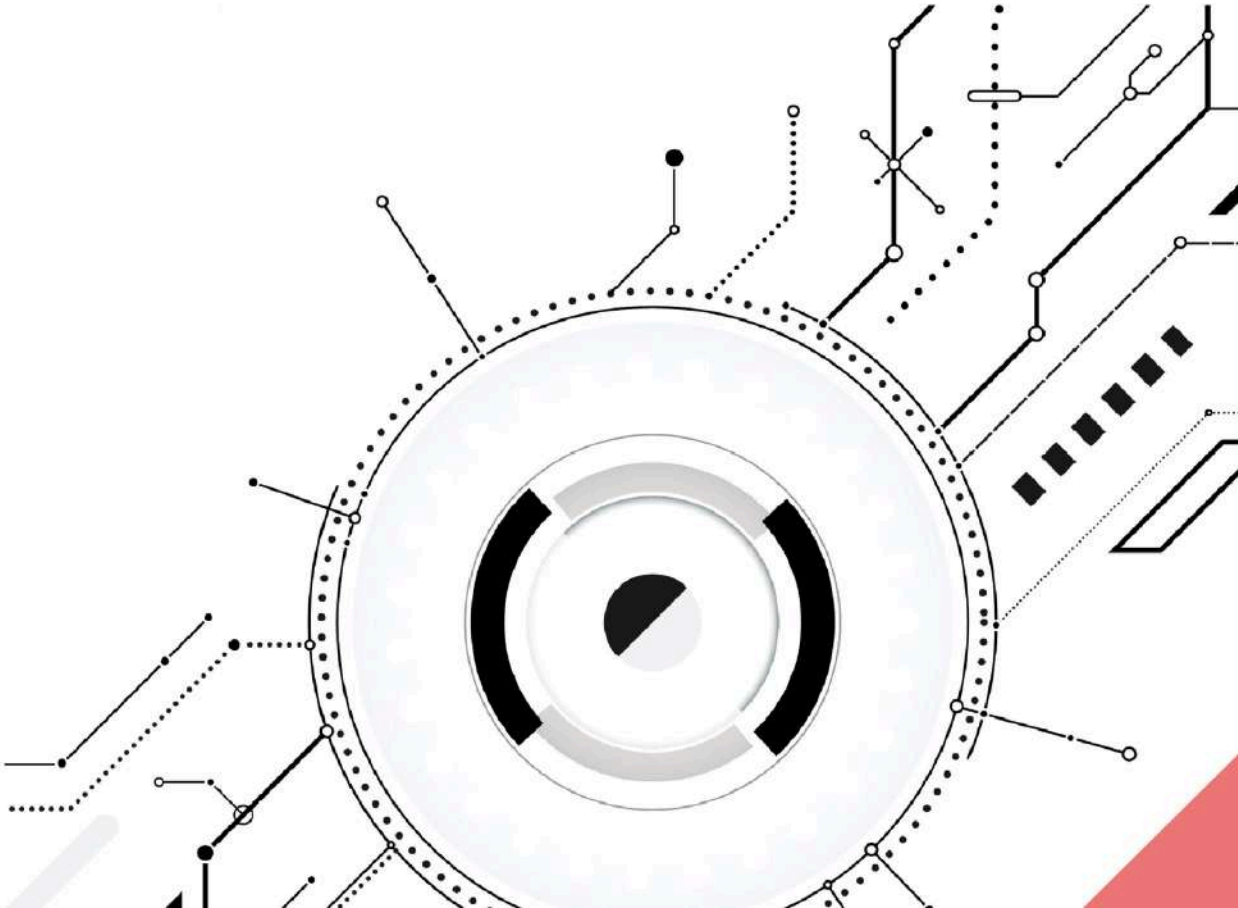
(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)
S.P.G.Chidambara Nadar - C.Nagammal Campus
S.P.G.C. Nagar, K.Vellakulam – 625 701 (Near VIRUDHUNAGAR).

DEPARTMENT OF MECHATRONICS ENGINEERING
Accrediated by NBA, New Delhi

VOL 5, ISSUE 2

MECHATRONZ

2024-2025



DEPARTMENT OF
MECHATRONICS ENGINEERING

VISION

To make the department of Mechatronics Engineering unique in the field of research and development towards industrial automation & robotics.

MISSION

To impart highly innovative and technical knowledge in Mechatronics Engineering to the urban and unreachable rural students through "Total Quality Education".

PROGRAMME EDUCATIONAL OBJECTIVES

- Graduates will be able to apply their multi-disciplinary knowledge to formulate, design, develop and analyse Mechatronics System.
- Graduates will be able to come up with solution for any real time problems in the field of Mechatronics Engineering and allied areas demanded by the Industry and Society.
- Graduates will be able to get familiarized with economical issues in Mechatronics Engineering and work in multi-disciplinary teams with ethical code of conduct.

PROGRAM SPECIFIC OUTCOMES

- Graduates will be able to apply their knowledge in sensors, drives, actuators, controls, mechanical design and modern software & hardware tools to design and develop cost effective Mechatronics systems.
- Graduates will be able to become Technocrats and Entrepreneurs, build the attitude of developing new concepts on emerging fields and pursuing higher studies.

PROGRAM OUTCOMES

Engineering Graduates will be able to

Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

ABOUT THE DEPARTMENT OF

MECHATRONICS ENGINEERING

Our college, with a vision to promote quality technical education to rural communities, was established in the year 1998 with four engineering branches. Recognizing the importance of core engineering disciplines, our long-standing aspiration to introduce a Mechatronics Engineering program was realized in the academic year 2014–2015. Mechatronics Engineering is a well-recognized interdisciplinary course that is gaining significant importance in the industrial world. What sets this program apart from other B.E. programs are its unique features and practical approach. Students of this program are:

This program also provides exposure to Bio-Mechatronics, which integrates mechanical systems with human physiology. Students will undertake their final year projects in leading industries, enabling them to apply theoretical knowledge to real-life problems. This industrial exposure prepares them to tackle more challenging and innovative application-oriented projects based on real-world situations.

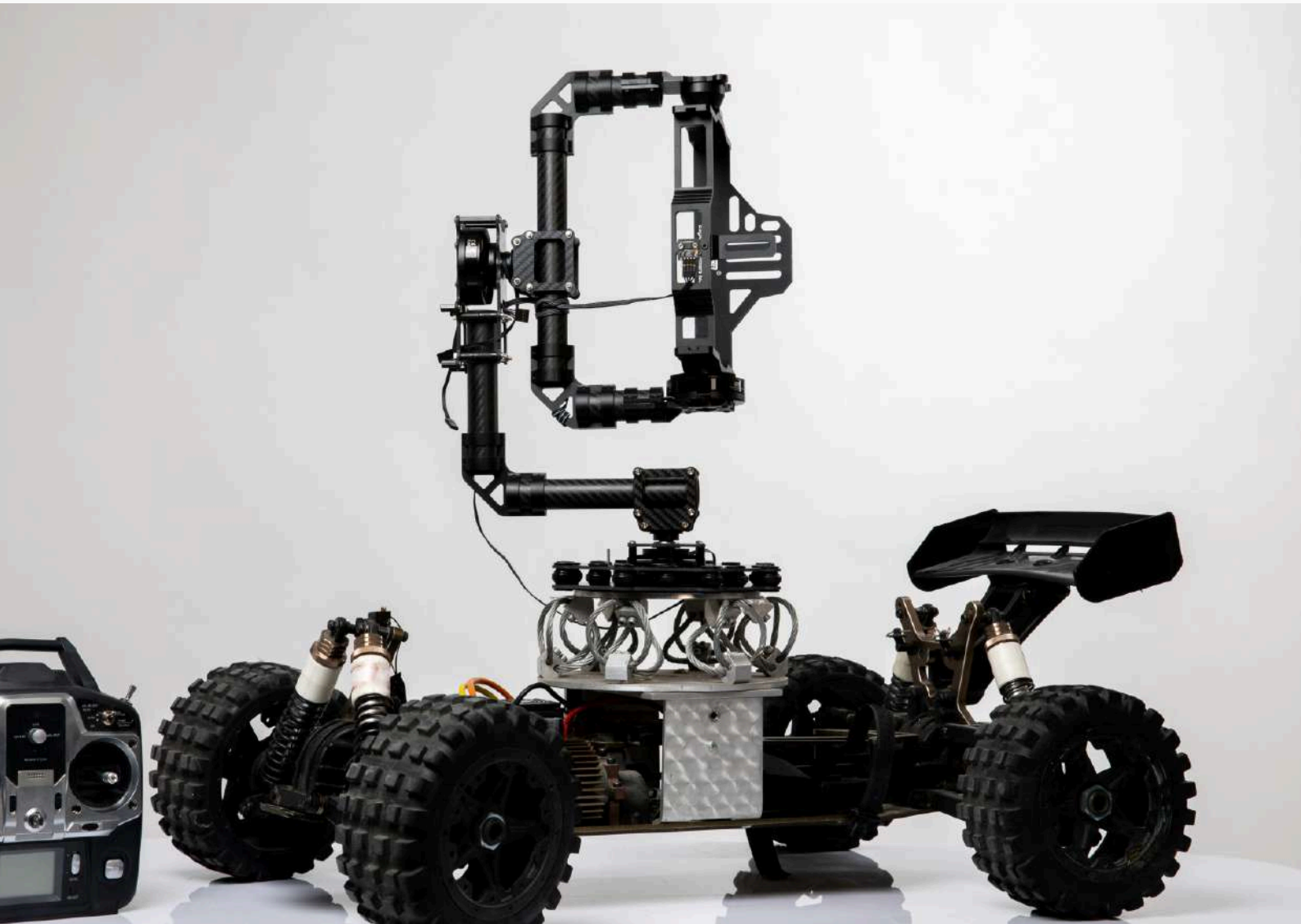
Through this project work, students develop decision-making skills, adaptability, and the ability to work in diverse team environments.

Well-equipped with computer skills.Trained in operating microcontrollers and programmable logic controllers (PLCs). Experienced in handling industrial sensors, as well as hydraulic, pneumatic, and electric drives.Skilled in mechanical structure design and learning various mechanisms involved in manufacturing processes.

about the MECHATRONZ

This vol 5, Issue 2 presents a comprehensive overview of the Department of Mechatronics Engineering and its activities for **January to June 2025**.

The structure of mechanics, The pulse of electronics, The brain of intelligence.



DEPARTMENT OF
MECHATRONICS ENGINEERING

Faculty profile

S.No	Name of the Faculty with Designation	Qualification	Specializatin
1	Dr. K. Kannan, Professor & Head	M.E., Ph.D.,	Digital Image Processing, Machine Vision, Embedded System and Robotics
2	Dr.M.Sudalaimani, Associate Professor	M.E., Ph.D.,	Automation and Control Systems
3	Dr. S. Rajesh Babu Assistant Professor	M.E., Ph.D.,	Power Quality, Renewable Energy Systems, Machine Learning
4	Dr. P. Balasundar, Assistant Professor	M.E., Ph.D.,	Manufacturing, Composite Material, Tribology and Powder Metallurgy
5	Mr. A. Arul Kumar, Assistant Professor	M.E., (Ph.D).,	Renewable Energy Source, Power Electronics Drives and Power Quality
6	Mr. S. Wesley Moses Samdoss, Assistant Professor	M.E., (Ph.D).,	Robotics, Embedded Systems, IoT, and Machine Learning
7	Mr. A. Ganesan, Assistant Professor	M.E.,	Thermodynamics, Heat Transfer, Fluid Mechanics Refrigeration and Air Conditioning

PUBLICATIONS

Journal Name: Ceramics International
Authors: David Blessley Sekar, Narayanasamy Pandiarajan, Femiana Gapsari, Putu Hadi Setyarini, ***Balasundar Pandiarajan***, Ramkumar Thulasiram
Tittle of Paper: Development of Nano-SiO2 blended Polyetherimide Coating through Electrospinning for Improved Corrosion Resistance of AZ91D Magnesium alloy.

Journal Name: Waste and Biomass Valorization
Authors: Kaliraj Medadurai, Narayanasamy Pandiarajan, Femiana Gapsari, Putu Hadi Setyarini, Balavairavan Balasubramaniam, ***Balasundar Pandiarajan***, Sanjay Mavinkere Rangappa, Suchart Siengchin
Tittle of Paper: Valorization of Ceiba pentandra Shell Waste as a Filler in PLA Biofilms: Effects on Functional Properties and Biodegradation.

Journal Name: Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science
Authors: Aswin Immanuel Solomon Jebarajan Manickam, Selvakumar Gurusamy, Senthil Kumar Shanmugakani, Narayanasamy Pandiarajan, ***Balasundar Pandiarajan***, Muthu Natarajan Shunmugam
Tittle of Paper: Characterization of cast rare earth WE43 magnesium alloy and parameter optimization for wire electrical discharge machining using TOPSIS & COPRAS.

Journal Name: Journal of Polymer Research
Authors: G Venkatesan, A Perumal, R Prithivirajan, S Muthu Natarajan, ***P Balasundar***
Tittle of Paper: Investigation of mechanical properties of environmentally friendly human hair fiber-reinforced polymer composite.

Journal Name: Electrical Engineering
Authors: ***Arulkumar Annamalaichamy***, Prince Winston David, Praveen Kumar Balachandran, Ilhami Colak
Tittle of Paper: Performance evaluation of PI and FLC controller for shunt active power filters.

PATENTS

Title: Polygon Shaped Loban Burning Stand
Author(s): M. Prithiviraj, K.Kannan, S.Senthil, M.Sangeethalakshmi
Patent Number: 426068-001
Status: Granted

Title: Tyre
Author(s): M.Prithiviraj, K.Kannan S.Senthi, M.Sangeethalakshmi, K.Dinesh, V.Muthupandi, J.Saroj Kanna, .K.Arun Pratop Sangeethalakshmi
Patent Number: 432140-001
Status: Granted

ACTIVITIES FOR THE ACADEMIC YEAR 2024-2025

Alumni Guest Lecture on
The Impact of Mechatronics Engineering on the Automotive Industry - 31st January 2025

On 31st January 2025, the Department of Mechatronics Engineering organized an engaging Alumni Guest Lecture on the topic “The Impact of Mechatronics Engineering on the Automotive Industry”. The resource person for the session was Mr. Krishna M., a proud alumnus from the 2016–2020 batch, who is currently working as a Senior Design Engineer and Trainer at Spaark Technologies, Coimbatore. Mr. Krishna shared his rich professional experiences and he provided valuable insights into the evolving role of the mechatronics in the automotive sector. He highlighted how modern vehicles integrate mechanical systems, electronics, embedded systems, and intelligent control to enhance safety, comfort, efficiency, and performance. Students had the opportunity to interact with Mr. Krishna during a lively Q&A session, where he encouraged them to build strong fundamentals while also gaining hands-on exposure to software tools, simulation platforms, and industry practices. He also shared tips on how to bridge the gap between academic learning and industrial expectations. The session concluded with a note of gratitude by the department faculty, acknowledging Mr. Krishna for his continued association and contribution to the growth of the Mechatronics Engineering community. The lecture not only enriched the students’ technical knowledge but also served as an inspiration by showcasing how alumni can make a significant impact in cutting-edge industries.

PLACEMENT DETAILS (2021-2025 BATCH)

S.No	Roll Number	Student Name	Company Details
1	21UMT002	ARAVINDH AARYA.G	Selva Engineering and Automation, Virudhunagar.
2	21UMT003	SRI RAMACHANDRAN.K	SANMINA IMS Company, Chennai.
3	21UMT004	PARVATHARAJAN.B	Tarcin Robotic LLP, Madurai.
4	21UMT006	GIRI.P	NCR Corporation India Private Limited, Chennai.
5	21UMT012	SURYAVIGNESH.R	Motherson Automotive Technologies & Engineering, Chennai.
6	21UMT013	SAROJ KANNA	TFT Engineering and Manufacturing Services Pvt Ltd, Chennai.
7	21UMT014	MOHAMMED AMMAR.S	Alfa TKG Integrated Solutions India Pvt. Ltd., Chennai.
8	21UMT015	HARIHARAN.B	The Silicon Harvest, Madurai.
9	21UMT016	SUBASH CHANDRU.P	Motherson Automotive Technologies & Engineering, Chennai.
10	21UMT017	ARAVINTHA KUMAR.S	Mitsuba India Private Limited, Chennai.
11	21UMT018	SIVANESAKARTHIC.RA.K	Tech7 Automation, Coimbatore.
12	21UMT020	LAKSHMAN HARI.C	6F Tech Consultant India Pvt Ltd, Chennai.
13	21UMT022	NILESH.A	FACEPREP, Coimbatore.
14	21UMT023	POISOLLAN.G.A	HCL (Embedded Intern), Madurai.

PLACEMENT DETAILS (2021-2025 BATCH)

S.No	Roll Number	Student Name	Company Details
15	21UMT024	KARUNA SAGAR.T	Tarcin Robotic LLP, Madurai.
16	21UMT025	ARAVINTH.V	Robomiracle Technologies Private Limited, Coimbatore.
17	21UMT026	ARIVISHNU.R	NCR Corporation India Private Limited, Chennai.
18	21UMT027	ESAKKI BALA KARTHIK.K	NCR Corporation India Private Limited, Chennai.
19	21UMT028	MITHUN KUMAR.G.S	Robomiracle Technologies Private Limited, Coimbatore.
20	21UMT029	ARSHAD PARWESH	Yuvashakti Skill India Pvt Ltd. (YSF), Chennai.
21	21UMT030	KISHOURE KUMAR.D	Grasim Industries Limited (Birla Paints Division), Chennai.
22	21UMT031	SATHISH KUMAR.K	NCR Corporation India Private Limited, Chennai.
23	21UMT032	GOKILAN.K.G	AQUASUB Engineering, Coimbatore.
24	21UMT033	ARUN PRATOP.K	NCR Corporation India Private Limited, Chennai.
25	21UMT034	DINESH .K	AQUASUB Engineering, Coimbatore.

PRIZES WON LIST IN INTER-INSTITUTE EVENTS

S.No	Name of the student	Type of the Programme	Date	Organizing Institution	Prizes own
1	Mathiya Vedha Niranjan R	Idea-thon	27/03/2025	Coimbatore Institute of Engineering and Technology, Coimbatore.	Third
2	Yogacharan R	Idea-thon	27/03/2025	Coimbatore Institute of Engineering and Technology, Coimbatore.	Third
3	Gokul S	Idea-thon	27/03/2025	Coimbatore Institute of Engineering and Technology, Coimbatore.	Third
4	Sangareshwaran B	Idea-thon	27/03/2025	Coimbatore Institute of Engineering and Technology, Coimbatore.	Third
5	Vijai R	Connexion	26/03/2025	Francis Xavier Engineering College, Tirunelveli.	First
6	Mohammed Omar Ahsaan T A	Mr. Talent	14/03/2025 & 15/03/2025	National Engineering College, Kovilpatti.	Third

STUDENT INTER-INSTITUTE EVENTS PARTICIPATION DETAILS

S.No	Name of the student	Type of the Programme	Date	Organizing Institution
1	Mathiya Vedha Niranjan R	Symposium	22/02/2025	Knowledge Institute of Technology, Salem.
2	Mathiya Vedha Niranjan R	Code Quest	27/03/2025	Coimbatore Institute of Engineering and Technology, Coimbatore.
3	Sashwanth S	Paper Presentation	28/03/2025 & 29/03/2025	Hindustan Institute of Technology, Chennai.
4	Sashwanth S	Symposium	21/02/2025	KLN College of Engineering, Madurai.
5	Bibaks Nobal A P	Paper Presentation	26/03/2025	Francis Xavier Engineering College, Tirunelveli.
6	Isac Stephen V	Paper Presentation	14/03/2025	KPR Institute of Engineering and Technology, Coimbatore.
7	Trishna K	Paper Presentation	14/03/2025	KPR Institute of Engineering and Technology, Coimbatore.
8	Trishna K	Logo Quest	14/03/2025	KPR Institute of Engineering and Technology, Coimbatore.
9	Jotheeswaran A	Paper Presentation	27/03/2025	Coimbatore Institute of Engineering and Technology, Coimbatore.
10	Sriram A	Paper Presentation	21/02/2025	KLN College of Engineering, Madurai.
11	Hari Rajan K	Paper Presentation	14/03/2025	KPR Institute of Engineering and Technology, Coimbatore.
12	Hari Rajan K	Logo Quest	14/03/2025	KPR Institute of Engineering and Technology, Coimbatore.

STUDENT INTER-INSTITUTE EVENTS PARTICIPATION DETAILS

S.No	Name of the student	Type of the Programme	Date	Organizing Institution
13	Guhaneshwar S	Paper Presentation	14/03/2025	KPR Institute of Engineering and Technology, Coimbatore.
14	Guhaneshwar S	Logo Quest	14/03/2025	KPR Institute of Engineering and Technology, Coimbatore.
15	Muthu Jeya Sundar	Symposium	21/02/2025	KLN College of Engineering, Madurai.
16	Sahaya Santhosh Raj S	Paper Presentation	14/03/2025	KPR Institute of Engineering and Technology, Coimbatore.
17	Ragavarshini S	Paper Presentation	14/03/2025 to 16/03/2025	PSG, College of Technology, Combatore.
18	Loga Anjana P	Symposium	21/02/2025	KLN College of Engineering, Madurai.
19	Priyadharsan S	Symposium	19/02/2025	Mepco Schlenk Engineering College, Sivakasi.
20	Priyadharsan S	Paper Presentation	19/02/2025	Mepco Schlenk Engineering College, Sivakasi.
21	Madhan Kumar R	Symposium	10/03/2025	Kongu Engineering College, Erode.
22	Madhan Kumar R	Paper Presentation	10/03/2025	Kongu Engineering College, Erode.
23	Shiva R	Symposium	10/03/2025	Kongu Engineering College, Erode.

STUDENT INTER-INSTITUTE EVENTS PARTICIPATION DETAILS

S.No	Name of the student	Type of the Programme	Date	Organizing Institution
24	Shiva R	Symposium	22/02/2025	Knowledge Institute of Technology, Salem.
25	Vijai R	Symposium	26/03/2025	Francis Xavier Engineering College, Tirunelveli.
26	Hari Krishnan B	Symposium	21/02/2025	KLN College of Engineering, Madurai.
27	Sriram Narayanan K	Paper Presentation	14/03/2025 to 16/03/2025	PSG, College of Technology, Combatore.
28	Rathikashree B	Symposium	21/02/2025	KLN College of Engineering, Madurai.
29	Parthiban M	Symposium	21/02/2025	KLN College of Engineering, Madurai.
30	Sanjay Kumar M	Symposium	10/03/2025	Kongu Engineering College, Erode.
31	Yogacharan B	CodeQuest	27/03/2025	Coimbatore Institute of Engineering and Technology, Coimbatore.
32	Muthu Manickam K	Symposium	21/02/2025	KLN College of Engineering, Madurai.
33	Sangareeswaran B	Symposium	22/02/2025	Knowledge Institute of Technology, Salem.
34	Mohammed Omar Ahsaan	Paper Presentation	14/03/2025 & 15/03/2025	National Engineering College, Kovilpatti.
35	Agilesh Kumar L	Paper Presentation	06/03/2025	Thiagarajar College of Engineering, Madurai.

STUDENT INTER-INSTITUTE EVENTS PARTICIPATION DETAILS

S.No	Name of the student	Type of the Programme	Date	Organizing Institution
36	Madhav Eshwar R	Paper Presentation	14/03/2025 & 15/03/2025	National Engineering College, Kovilpatti.
37	Selva Murugan R	Paper Presentation	14/03/2025 & 15/03/2025	National Engineering College, Kovilpatti.
38	Selva Murugan R	Mr. Talent	14/03/2025 & 15/03/2025	National Engineering College, Kovilpatti.
39	Prasanna Kumar M	Paper Presentation	14/03/2025 & 15/03/2025	National Engineering College, Kovilpatti.
40	Prasanna Kumar M	Technochill	14/03/2025 & 15/03/2025	National Engineering College, Kovilpatti.
41	Pothimenon L	Paper Presentation	14/03/2025 & 15/03/2025	National Engineering College, Kovilpatti.
42	Pothimenon L	Mr. Talent	14/03/2025 & 15/03/2025	National Engineering College, Kovilpatti.
43	Aathithya R	Paper Presentation	06/03/2025	Thiagarajar College of Engineering, Madurai.
44	Aathithya R	Technical Event	06/03/2025	Thiagarajar College of Engineering, Madurai.
45	Jothika P S	Paper Presentation	14/03/2025 to 16/03/2025	PSG, College of Technology, Combatore.
46	Suba Sri G S	Paper Presentation	11/03/2025	Anna University Regional Campus, Tirunelveli.
47	Suba Sri G S	Idea Contest	11/03/2025	Anna University Regional Campus, Tirunelveli.
48	Sasti Ramanathan A	Paper Presentation	06/03/2025	Thiagarajar College of Engineering, Madurai.

STUDENT INTER-INSTITUTE EVENTS PARTICIPATION DETAILS

S.No	Name of the student	Type of the Programme	Date	Organizing Institution
49	Jay Subhan R	Symposium	19/02/2025	Mepco Schlenk Engineering College, Sivakasi.
50	Mohammed shakeel Umar	Paper Presentation	14/03/2025 to 16/03/2025	PSG, College of Technology, Combatore.
51	Karthick Pandi	Paper Presentation	14/03/2025 to 16/03/2025	PSG, College of Technology, Combatore.
52	Devi Priya M	Paper Presentation	11/03/2025	Anna University Regional Campus, Tirunelveli.
53	Devi Priya M	Idea Contest	11/03/2025	Anna University Regional Campus, Tirunelveli.
54	Deepika M	Paper Presentation	14/03/2025 to 16/03/2025	PSG, College of Technology, Combatore.
55	Usman Fayaz A	Paper Presentation	06/03/2025	Thiagarajar College of Engineering, Madurai.
56	Yogesh Kumar D	Symposium	19/02/2025	Mepco Schlenk Engineering College, Sivakasi.
57	Muthu Rahini M	Paper Presentation	11/03/2025	Anna University Regional Campus, Tirunelveli.
58	Pevin Kumar S	Paper Presentation	06/03/2025	Thiagarajar College of Engineering, Madurai.

ROS BASED MOBILE ROBOT FOR WAREHOUSE OBJECT DETECTION

S. RAGAVARSHINI
P. LOGA ANJANA
B. RATHIKASHREE
2022 - 2026

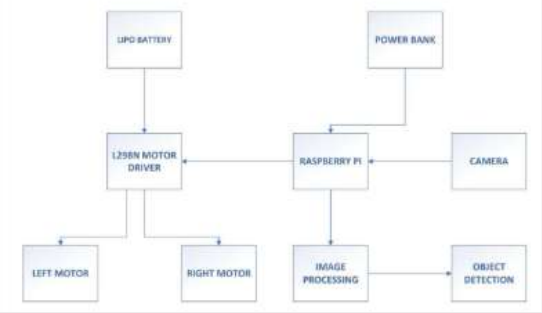
INTRODUCTION

This project focuses on building a mobile robot that can detect objects and navigate autonomously in a warehouse environment. The robot uses ROS 2 (Robot Operating System), a camera, and machine learning to identify items and move safely. The goal is to support warehouse tasks like inventory tracking .

METHODOLOGY

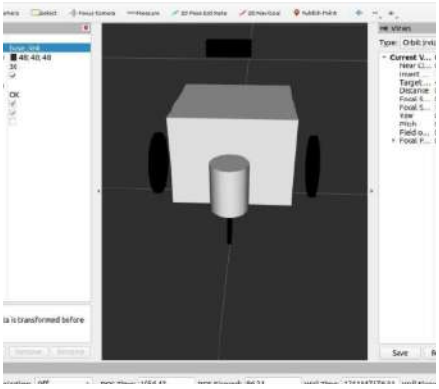
This project focuses on developing a ROS 2-based mobile robot capable of detecting objects and navigating autonomously within a warehouse environment. The robot integrates hardware components such as Raspberry Pi, motors, sensors, and a camera, along with software tools like ROS 2, TensorFlow Lite, and OpenCV. A modular design was adopted to support future upgrades and ease of maintenance. The robot's body was constructed using 3D-printed parts, featuring a two-wheel differential drive and a caster wheel for balance, with key components like motor drivers, batteries, Raspberry Pi 4, and a camera installed and properly shielded to ensure smooth operation. ROS 2 (Foxy/Humble) was configured on Raspberry Pi 5, with packages for motor control, sensor data, camera streaming, object detection, and navigation, supported by custom ROS nodes for real-time communication. Object detection was achieved using a lightweight SSD MobileNet model converted to TensorFlow Lite, and integrated with the Pi camera via OpenCV for real-time image processing. iNavigation was handled through differential drive motors and encoder feedback for odometry, with basic path planning and optional ultrasonic sensors for obstacle avoidance.

All modules were integrated using ROS 2's publish-subscribe architecture, with ROS topics and TF transforms managing spatial relationships. The robot was tested in a simulated warehouse environment, evaluating object detection accuracy, navigation smoothness, and real-time performance, leading to iterative improvements. Visualization tools like RViz and rqt were used to monitor sensor data, trajectories, and detection feedback. The robot operates by capturing images, processing them on Raspberry Pi, and sending motor commands for movement, powered by a 12V LiPo battery and a power bank. Mechanical components were designed in SolidWorks, including the base chassis, protective cover, camera mount, and camera ball, ensuring stability, protection, and proper sensor placement, optimized for 3D printing and assembly. Overall, the system demonstrates effective integration of vision, control, and navigation, offering a promising solution for warehouse automation with potential for future enhancements in path planning and multi-robot coordination.



RESULTS AND DISCUSSION

The mobile robot was successfully developed and tested in a simulated warehouse environment. The integration of ROS 2 with TensorFlow Lite and OpenCV enabled real-time object detection and autonomous navigation. During testing, the robot demonstrated reliable performance in identifying common warehouse items using the SSD MobileNet model. Detection accuracy was consistent across varied lighting conditions and object placements, with minimal latency in image processing. Navigation tests showed smooth movement between waypoints, supported by encoder-based odometry and differential drive control. The robot was able to avoid obstacles using ultrasonic sensors, maintaining safe paths without manual intervention. The ROS 2 publish-subscribe architecture allowed seamless communication between modules, ensuring synchronized behavior across motor control, vision, and sensor systems. allowed seamless communication between modules, ensuring synchronized behavior across motor control, vision, and sensor systems. Visualization tools like RViz and rqt provided valuable insights during debugging and performance tuning. These tools helped monitor sensor data, robot trajectories, and object recognition feedback in real time. The modular design also proved effective, allowing easy adjustments to hardware and software components during iterative improvements. Overall, the results confirm that the system meets its objectives for warehouse object detection and autonomous navigation. Future work may focus on enhancing path planning algorithms, expanding object categories, and integrating with warehouse management systems for real-world deployment.



CONCLUSION

The development of the ROS 2-based mobile robot for warehouse object detection successfully demonstrated the integration of hardware and software to achieve autonomous navigation and real-time object recognition. By combining technologies such as Raspberry Pi, TensorFlow Lite, OpenCV, and ROS 2, the robot was able to detect objects, plan paths, and avoid obstacles effectively. The modular design allowed for easy assembly, maintenance, and future upgrades. Testing in a simulated warehouse environment confirmed the system's reliability and performance. Overall, this project provides a strong foundation for further advancements in warehouse automation, including multi-robot coordination and integration with inventory management systems.

DRONE BASED BUILDING INSPECTION SYSTEM

This Project aims to develop a drone based inspection system.

The project introduces a drone-based crack inspection system designed to enhance the effectiveness and safety of structural health monitoring processes. Traditional methods of infrastructure inspection often involve manual labor, are time-consuming, and expose personnel to hazardous environments.

The drone inspection routes while capturing detailed images of structural surfaces. These images are transmitted wirelessly via Wi-Fi to a Monitor, enabling real-time or deferred analysis. By utilizing OpenCV, an open-source computer vision library, the system processes the images to detect, classify, and measure cracks with high precision. Advanced image processing algorithms such as edge detection, thresholding, and contour analysis are employed to identify crack patterns, their lengths, widths, and orientations. These data are crucial in assessing the severity of the structural damage and predicting potential failure risks.

PROBLEM STATEMENT

As cities grow, inspecting buildings for cracks is harder, slower, and risky with old methods. These need scaffolding and skilled workers, which costs time and money.

The implementation of drone-based building inspection systems marks a significant advancement in the field of structural health monitoring. By utilizing autonomous drones equipped with high-resolution imaging and intelligent data processing, this technology effectively overcomes the limitations of traditional manual inspection methods.

C Balaji
R Madhan Kumar
S Sahaya Santhosh Raj

2022 - 2026

Child Rescue System From Borewell Using Artificial Intelligence

PROJECT OBJECTIVES

The aim of this project is to make a safe system to rescue children from borewells. It uses a camera to detect the child, gives oxygen when needed and lifts the child safely with a robotic gripper.

DELIVERABLES

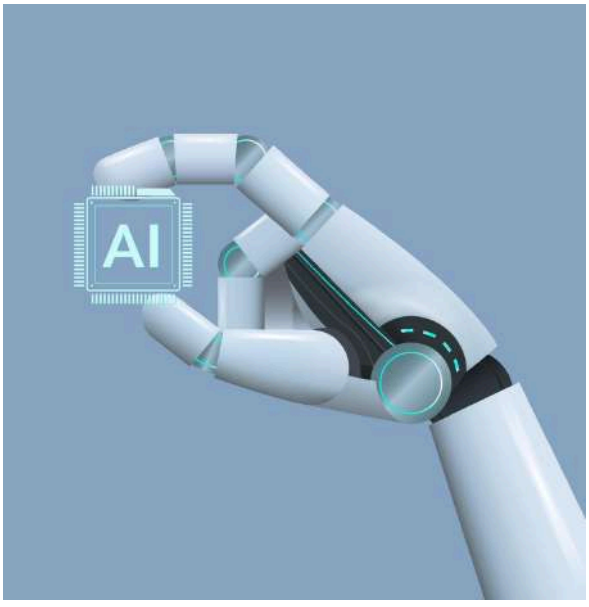
Prototype of robotic rescue system with AICamera and image processing module
Borewell monitoringby sensors
Vacuum gripper with servo motor

SOCIAL IMPACT

This project saves lives by giving children faster support during borewell accidents. It reduces risks for rescue teams and shows how technology can bring hope in emergencies.

SYSTEM DESIGN

Our system combines AI, sensor, and robotics to provide a faster and safer rescue process.
Key functions include: Camera detection, environmental sensing, robotic gripping, oxygen regulation, and wireless communication for real-time monitoring.



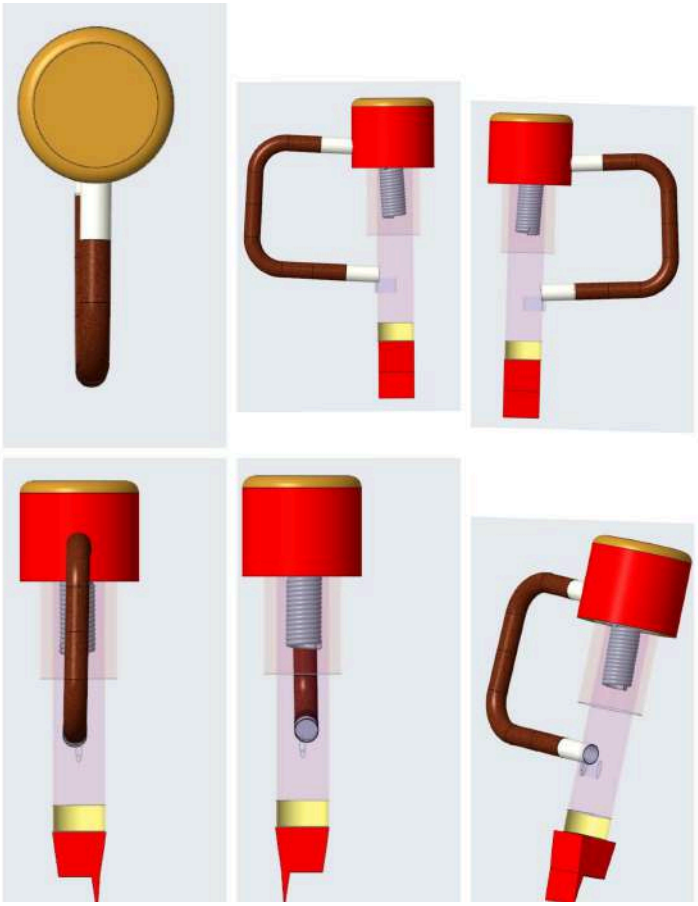
S. Muthu jeya sundar
B. Hari Krishnan
K. Muthumanickam

2022 - 2026

DESIGN AND FABRICATION SEED SOWING SYSTEM INTEGRATED IN DRONE

OBJECTIVES

Main Objective: To design and fabricate an autonomous seed sowing mechanism integrated with a drone. The system will release seeds when triggered by the drone's movement and automatically close the seed hopper after dispensing, ensuring efficient and precise seed placement.



PROBLEM STATEMENT

Traditional seed sowing methods are:
Labor-intensive, Time-consuming. Prone to inaccuracies, Difficult to monitor and control seed placement precisely. Lead to increased seed wastage and higher input costs. Require skilled labor, which may not always be available in rural areas. This leads to uneven seed distribution and wastage, thus affecting agricultural productivity.

MOTIVATION

More efficient farming seed sowing process, Reducing manual labor, and, Improving the accuracy of seed placement. Ultimately increasing crop yield and productivity.

METHODOLOGY

Seed Sowing Mechanism Mounted on Drone. Seed Tank (Stores seeds at top of mechanism). Transmitter Tube (Guides seed downward). Closed Seed Outlet (Initial State). Triggering mechanism aligns two holes. Drone pushes mechanism into soil surface. Seed dispensed into the ground.

RESULTS AND DISCUSSION

Increased Sowing Efficiency, Helps Farmers Increase Crop Yields and Income While Reducing Labor Costs. Contributing to Better Livelihoods in Rural Communities and reducing resource waste (e.g., seeds, water)

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A. P. Bibaks Nobal

2022 - 2026

PNEUMATIC HAND GRIPPER

INTRODUCTION:

Pneumatic pick-and-place systems use air pressure to move and position objects quickly and accurately. This system uses air to move the arm and a magnet to grip metal parts. Combining both makes it fast, easy to control, and good for repeated tasks.

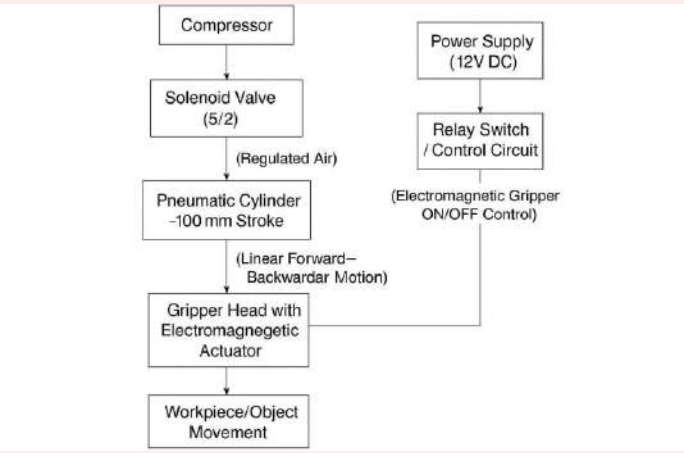
PROBLEM STATEMENT:

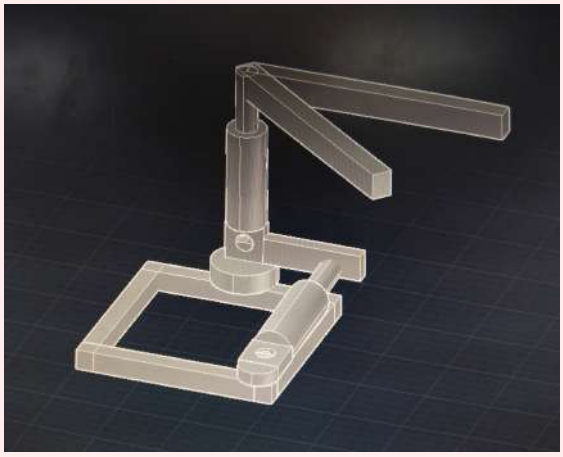
Manual handling is slow and tiring. Pneumatic grippers are fast and cheap. They can damage delicate objects. They need better precision and care. A safer, more reliable pneumatic gripper is needed.

OBJECTIVE:

The objective is to design a pneumatic gripper that can handle materials quickly and efficiently. It should grip objects gently to avoid causing any damage, especially to delicate items. The gripper must provide better precision and control during operation. Overall, the goal is to develop a reliable and costeffective solution suitable for industrial applications.

METHODLOGY:





MODEL DESCRIPTION:

This model shows a mechanical system used for handling materials with a pneumatic gripper. It includes the following main parts.

Vertical Pneumatic Cylinder: This is the upright cylinder that moves the gripper arm up and down.

Gripper Arms: These are two rectangular bars at the top that open and close to hold or release an object. They are moved by an actuator or mechanical linkage.

Base Frame: The bottom part of the model is a square or rectangular frame that supports and stabilizes the whole system.

Rotating/Pivot Joint: This part allows the gripper arm to rotate or adjust its angle to better reach or align with objects.

Horizontal Pneumatic Cylinder: This cylinder controls the opening and closing of the gripper or adds another movement direction.

COMPONENTS:

Compressor, Solenoid Valve, Pneumatic Cylinder, Electromagnetic actuator, Electrical Control Circuit

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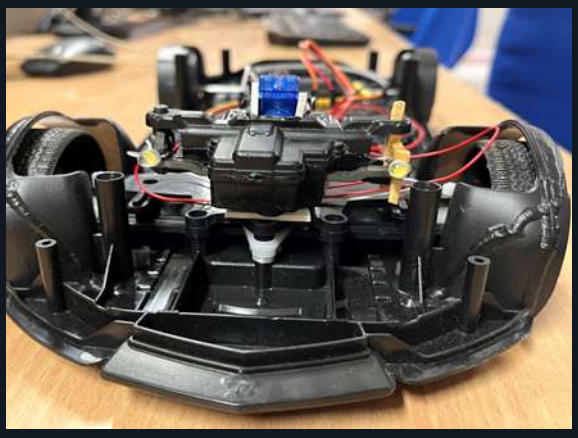
STEERING CONTROLLED HEADLAMP



INTRODUCTION

Driving at night or on poorly lit roads has always been a challenge for motorists. Traditional headlamps only point straight ahead, leaving curves and corners less visible. To overcome this limitation, automobile engineers have developed the Steering-Controlled Headlamp (SCH) system, which adjusts the light beam according to the steering direction

What is a Steering-Controlled Headlamp?

A steering-controlled headlamp is an intelligent lighting system that moves in sync with the steering wheel. Instead of remaining fixed, the headlamp beam turns in the same direction as the steering input, ensuring better visibility while negotiating bends and curves.

Working Principle

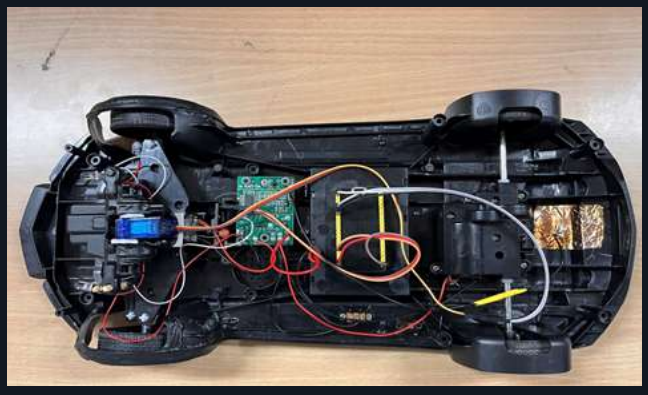
Sensors detect the steering angle and vehicle speed. Based on these inputs, the headlamp motor adjusts the beam direction. The stronger the steering turn, the greater the adjustment of the light beam. This mechanism ensures that the illuminated area matches the actual driving path.

Enhance Nighttime Visibility :Improve clarity and range of headlights.

Increase Road Safety : Reduce accident risk in low light.·Facilitate Automatic **Adjustments** : Dynamically adjust lighting based on conditions.

Minimize Blind Spots : Illuminate areas in curves effectively.

Boost Driver Comfort : Decrease eye strain during night driving



A steering-controlled headlamp is a special type of headlight that moves in the same direction as the steering wheel. When the driver turns the wheel, the light also turns, making the road ahead clearer. This is very useful at night, especially on sharp curves, hilly roads, or dark streets. It improves safety by helping drivers notice obstacles earlier and gives a more comfortable driving experience. Cars and SUVs for safer highway and hill driving. Premium motorcycles for improved curve navigation. Advanced vehicles as part of Adaptive Front Lighting Systems (AFS)

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