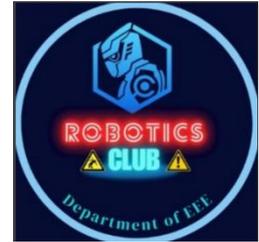




Department of Electrical and Electronics Engineering Robotics club



The Department of EEE has a robotics club with 2 faculty members and 35 student members. The **Robotics Club** is a dynamic platform that nurtures innovation, creativity, and technical excellence among students. The club focuses on exploring the interdisciplinary aspects of robotics, combining **electronics, electrical systems, control engineering, embedded systems, and artificial intelligence** to design and develop intelligent machines. Regular workshops, competitions, and project-building activities help students apply classroom knowledge to real-world applications. The club also motivates students to participate in national-level competitions, fostering teamwork, creativity, and problem-solving skills.

Objectives of the Club:

- To provide hands-on experience in designing, building, and programming robots.
- To encourage students to apply theoretical knowledge of EEE in practical, real-world robotics applications.
- To foster teamwork, problem-solving skills, and innovation in automation and robotics.
- To participate in inter-collegiate and national-level robotics competitions.
- To promote research and project-based learning in areas such as autonomous robots, industrial automation, IoT, and AI-enabled robotics.

Faculty Coordinators:

Dr. Naveenkumar Tadikonda, (Asst. Prof, EEE)

Mr. Ravindranadh Chowdary Vankina. (Asst. Prof, EEE)

Student Coordinators:

Mr. G V T Gopi (228W1A0269), B. Tech IV year

Mr. M Chakradhar (228W1A0291), B. Tech IV year,

Mr. V Tarun (238W1A02B6), B. Tech III year,

Products developed by the robotics club

Product no:1

Product Name: **Uchchaihshrava Agro Pilot**

Industry Name (MoU): **Peepul Agri Ventures LLP**

Name of the faculty involved in this project: **Prof. P V R L Narasimham (HOD, EEE)**

Dr. Naveenkumar Tadikonda, (Asst. Prof)

Mr. Ravindranadh Chowdary Vankina.(Asst.

Prof)

The department has an MoU with Peepul Agri Ventures LLP for 5 years. This MoU mainly focuses on knowledge sharing between these two organizations. As part of MoU, Peepul Agri Ventures LLP will be ready to spend 5 Lacks every year for R&D projects, where both organizations jointly work on projects.

In view of MoU, Peepul Agri Ventures LLP and the Department of EEE are jointly working on a project named **Uchchaihshrava Agro Pilot**, which will be helpful to chilli farmers. The main aim of this project is to develop an agricultural boat for seven applications in chilli farming, such as monitoring the chilli growth, spraying pesticides in the field, identifying ripped chillies, cutting and collecting ripped chillies, and more.

In this project, the total work is divided into 4 objectives:

1. Implement both the differential and crab movement with precise speed control in the Boat.
2. To identify the crop pattern in the chilli field with the help of a GPS module and Google Earth Pro.
3. Implement the image processing techniques to identify the growth of the chilli plant and distinguish the ripe and unripe chilli.
4. Prepare the plucking and collection mechanism on the boat after the chillies are ripped.

Objective 1:

Implementation procedure :

Differential movement

In a four-wheel robot using differential drive control, each side's wheels are paired and driven by a single motor per side. A two-channel motor driver allows independent control of these motor pairs. Forward movement is achieved when both motors rotate in the same direction at equal speed, while backward movement occurs when both rotate in reverse. To turn, one motor slows down or reverses while the other continues moving forward. For left turns, the right motor drives forward while the left motor slows or reverses, and for right turns, the opposite occurs. In-place rotation is possible by rotating the motors in opposite directions, allowing the robot to pivot without moving forward or backwards.

Crab movement (Four wheel four steer base movement)

The proposed system integrates multiple components to enable precise control and efficient crab-like movement on a robotic platform. Testing results focus on performance, reliability, and practical applications. The system demonstrated excellent mobility, utilizing 180-degree servo motors for precise wheel angle adjustments.

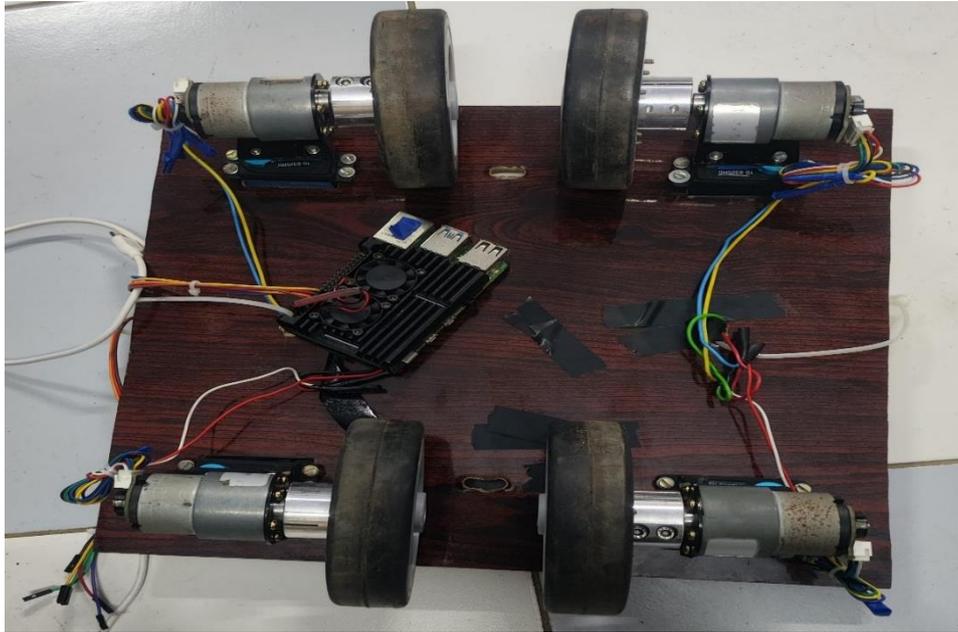


Fig. 1. Implementation of crab movement on prototype boat

Status of the objective: The work that was assigned under this objective was completed, and industry people also verified

Objective 2:

Implementation procedure:

The Farmer himself selects the Robot field through Google Earth Pro (Software). Creates a random polygon field on the map and saves it with a extension of .kml or .kmz format. This .kml file has a separate GPS Co-ordinates (Latitude and Longitude) at every point in the field. The Robot's path is generated by a separate Python code that uses the field. KML file. The path is generated by the desired Length and Width (spacing) between the Channels in the field. The generated path will be saved again in the Robot_path.csv file format, which helps to visualise the path in the Google Earth Pro software. The start and end points are marked. Our college playground will be considered as a chilli field for simulation purposes, and identified by Google Earth Pro for simulation purposes, as shown in Fig.2. Fig.3 is the field pattern estimation of the boat.

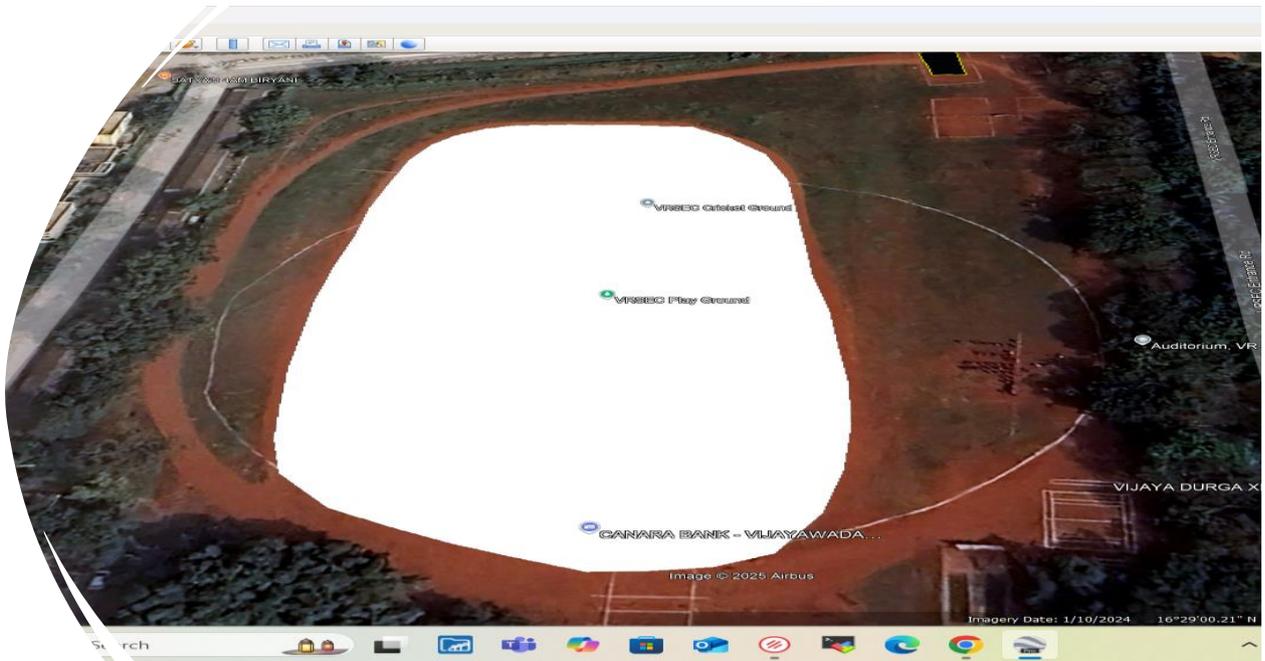


Fig.2. Filed selection by using google earth pro

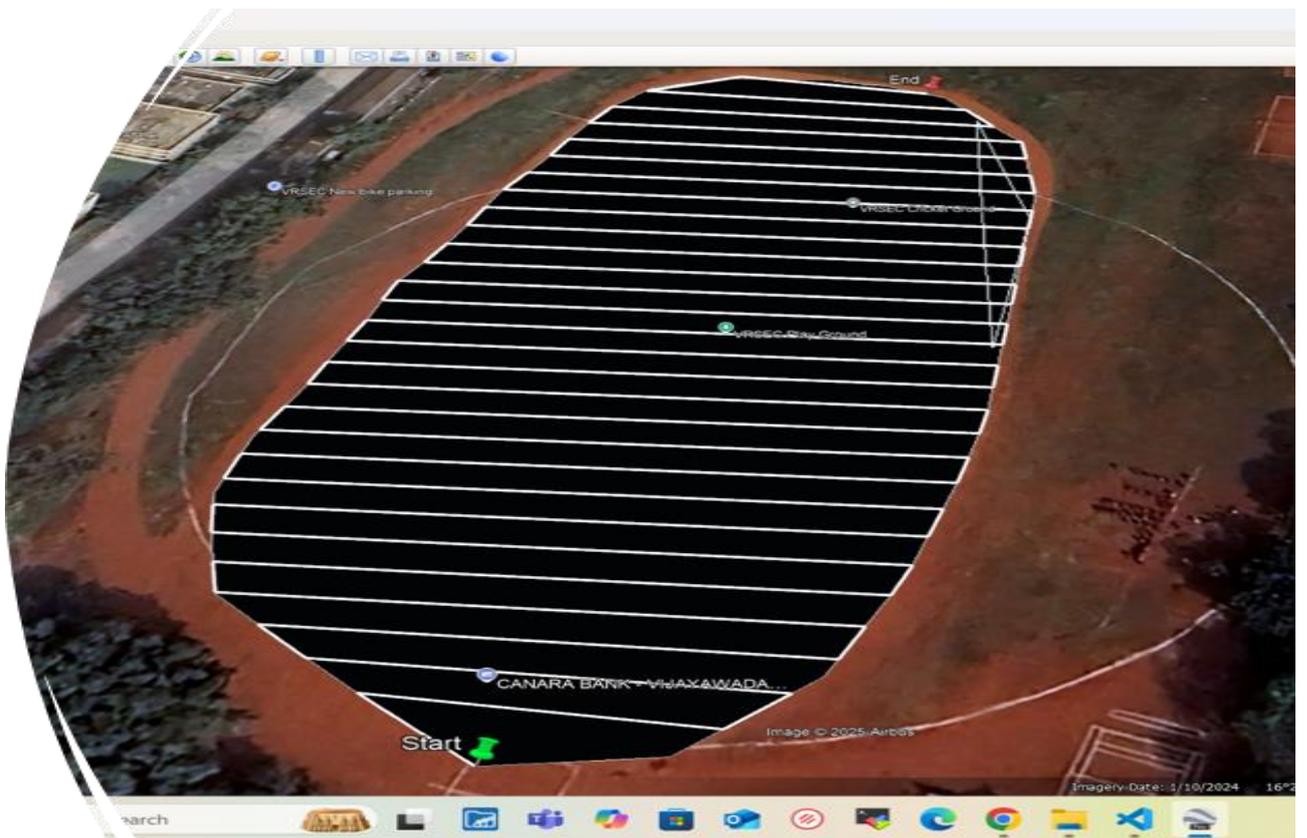


Fig.3. Crop pattern estimation of boat

Status of the objective: The work that was assigned under this objective was in the process, software part was completed, hardware part is pending.

Objective 3:

Implementation procedure :

The system utilizes computer vision and IoT sensors to enhance precision harvesting, environmental monitoring, and yield estimation. The Computer vision system equipped with YOLOv8 which detects fully grown red chilies in real time. Once detected, a ROS 2-based robotic arm is triggered to pluck the ripe chilies. This ensures efficient harvesting, reducing manual labor and crop damage. The model also tracks crop growth and monitors density using image analysis. The IoT sensors (temperature, humidity, and soil moisture) which are Embedded in Farm provides environmental data. Using this Data and AI algorithm we analyze plant health and estimate total yield based on growth patterns and historical data.

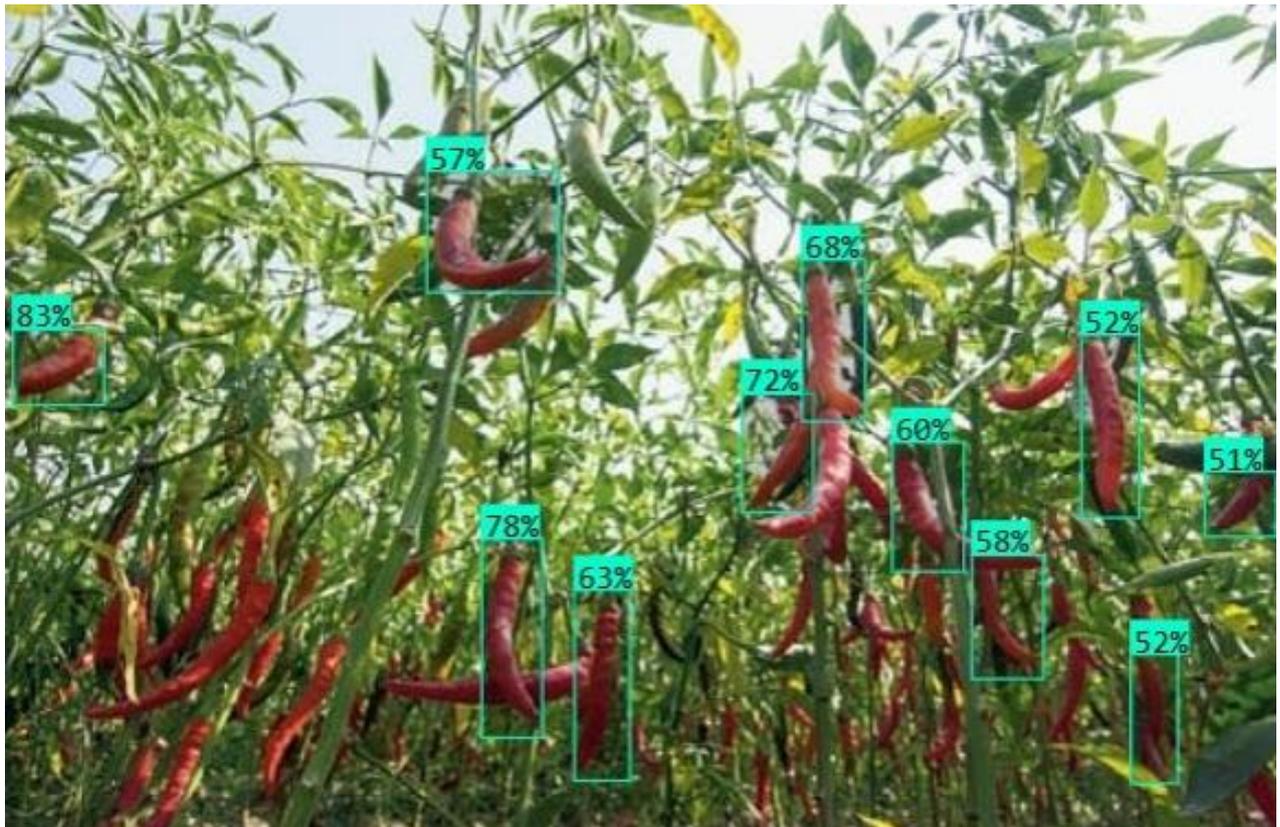


Fig.4 Identification of growth ripening in chilling by using AI techniques

The graph shown in Fig.5 illustrates the accuracy of a machine learning model during training and validation over multiple epochs. The x-axis represents the number of epochs, while the y-axis shows accuracy values. The training accuracy (blue line) increases steadily and reaches nearly 100% by the 8th epoch, indicating that the model has learned well from the training data. The validation accuracy (orange line) also follows a similar pattern but begins to plateau around the same epoch. However, a slight drop in validation accuracy in later epochs suggests potential overfitting.

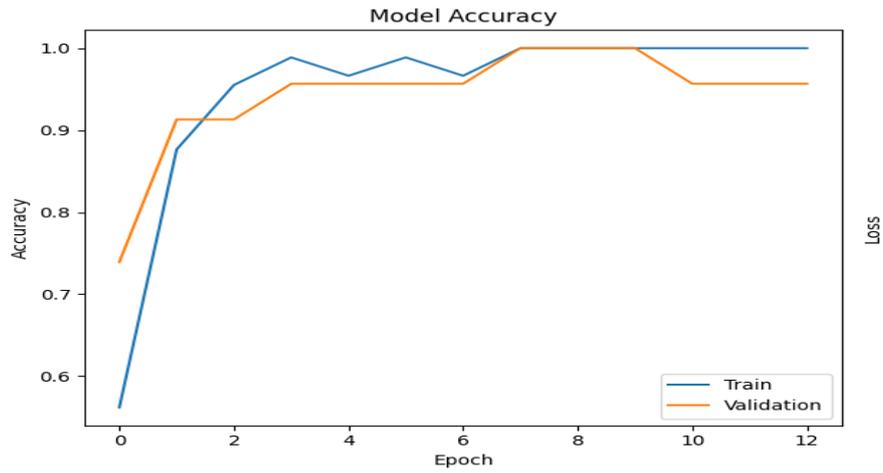


Fig. 5 Error estimation graph

Status of the objective: The work that was assigned under this objective was in the process, testing part was completed with few samples. After the company people verification, they instructed to test the algorithm in real time agricultural field. Real time validation is pending for this objective.

Objective 4:

This objective is not yet implemented completely, still in the working stage



Product No:2

Product Name: Weed removal tool,

Industry Name (MoU): Peepul Agri Ventures LLP

Name of the faculty involved in this project: **Prof. P V R L Narasimham (HOD, EEE)**

Dr. Naveenkumar Tadikonda, (Asst. Prof)

Mr. Ravindranadh Chowdary Vankina.(Asst.

Prof)

The main aim of this project is to develop a Weed removal tool. These mechanised tools are designed to grip, penetrate, and extract weeds by their roots—this helps eliminate them more completely than hand-pulling, reducing regrowth.

In this project, the total work is divided into 3 objectives:

1. Implement the image processing techniques to identify the weed on brown to green environment.
2. Implement the image processing techniques to identify the weed in a green-to-green environment.
3. Development of the practical model.

Presently, work is going on this project to fulfil the 1 objective. 2 and 3 objectives have not yet been started.

***** Simulation work is going no prototype was initiated*****

Outcomes of the robotics club:

Paid Internships:

- 2024-25 academic year, 5 students from the robotics club got paid internships.
- 2 students got an opportunity to do a paid internship at Peepuls Agri Ventures LLP, Hyderabad, with a pay of 15,000 per month.
- 3 students got an opportunity to do a paid internship at Flyway Innovation Private Limited, Bhopal, with a pay of 12,000 per month.

Job opportunity:

- 2 students got placed at Peepuls Agri Ventures LLP, Hyderabad, with a pay of 4 LPA.
- 1 student got placed at Flyway Innovation Private Limited, Bhopal, with a pay of 4 LPA.

The Robotics club collaborated with e Yantra IITB and started the Robotics lab in the department. The department has an MoU with Peepul Agri Ventures LLP for 5 years. This MoU mainly focuses on knowledge sharing between these two organisations. As part of the MoU, Peepul Agri Ventures LLP will be ready to spend 5 Lacks every year for R&D projects, where both organisations jointly work on projects. The robotics club has components worth of nearly 6 lakhs rupees.

