Shri Madhwa Vadiraja Institute of Technology and Management, Bantakal – 574115
Hackothsava 2023 – Synopsis

Team Name:	Team URBAN			
College Name and Address:	Jyothy Institute of Technology, Bengaluru			
Course:	BE in CSE			
Theme of submission: (check mark the relevant box)	**Transformative Education** ☐		**Sustainable Industrialization** ✓	
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Project Title:	UNMANNED ROVER-BASED AGRICULTURAL NAVIGATION FOR WEED DETECTION			

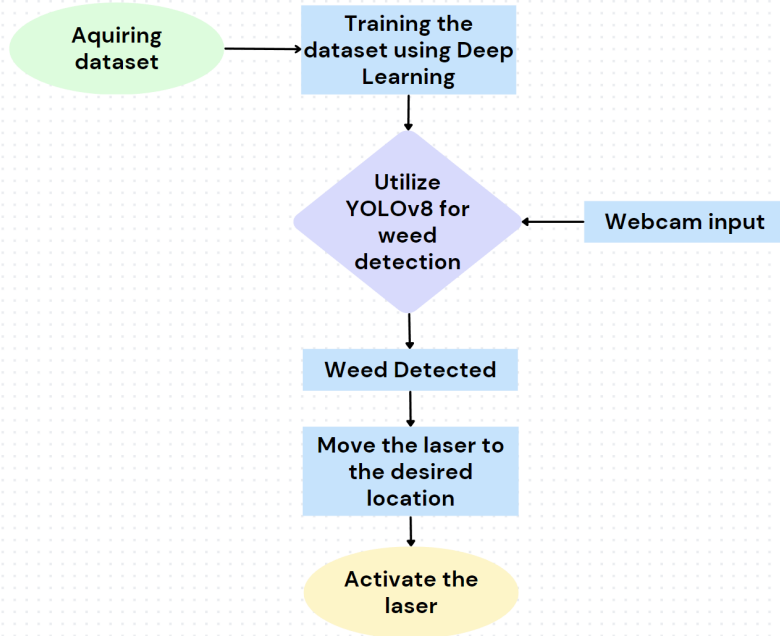|	
Abstract of the proposed project: (word limit 300)	Pest and Weed infestations can significantly impact crop yields and quality. We use pesticides and insecticides that not only affect the yield and land, it also affects the human beings around, during the process. Control can be hazardous and costly to farmers. Recently, robotic systems have emerged as a likely approach for identifying and managing farm pests and weeds. In this paper, we present a rover-based system for object detection of pests and weeds on farms. Our system is a rover equipped with a high-resolution camera and a machine-learning algorithm for object detection as it navigates through the farmland area. The rover is programmed to navigate through farm fields and capture images of crops autonomously. The images are then analyzed using a deep-learning algorithm that identifies pests and weeds with high accuracy. Once the images from the database of pests and weeds match the object detected, we shoot the pest with a laser. Specifically, we measure the accuracy, precision and eliminate the threat. This facilitates targeting the harmful pests and weeds only so that the plant is unharmed. The dependencies and showstoppers of our system are camera resolution, lighting conditions, and training data quality. Our system has the potential to reduce the time and cost of pest and weed detection on farms and can help farmers to take immediate targeted action to manage this. Overall, our research justifies the effectiveness of a rover-based system for object detection of pests and weeds on farms and highlights the potential of robotics and machine learning for precision agriculture & pest control.

Detailed Methodology with proper diagrammatic representation:	 **Aquiring dataset** → **Training the dataset using Deep Learning** **Training the dataset using Deep Learning** ↓ **Utilize YOLOv8 for weed detection** ← **Webcam input** ↓ **Weed Detected** ↓ **Move the laser to the desired location** ↓ **Activate the laser** Using the acquired dataset, a model is trained to identify weeds amongst crops. The rover will have a high-resolution camera and be designed to move independently around farm fields while taking pictures of the crops. Machine learning algorithm using YOLOv8 will be used to analyse the shots the rover has taken in order to identify weeds with high precision. This will enable us to acquire coordinates of the weeds seen. The Laser targeting system will then point to the desired target and activate the laser beam. This will then result in elimination of the weed.
Software/ hardware required for the implementation:	**Computer Vision using YOLOv8 for detection and an all terrain rover with Rocker-bogie Suspension**
Benefit to the society from the project	**Healthier yield and cost reduction for farmers without the use of harmful chemicals.**