DESIGN AND DEVELOPMENT OF AGRIBOT USING MACHINE LEARNING.

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Abstract

This project deals with the problem of the farmer getting labor. This system will help farmers to perform different tasks such as automatically Weed detection Using machine learning technology, Spraying herbicide on weeds, and continuous monitoring of farms. This system also detects the liquid level of herbicide in the tank. With the help of machine learning, we are processing this data to detect weeds and crop plants. This project is helpful for farmers as it will reduce cost, effort, time, etc.

Keywords—*Weed, labour, Herbicide, Machine learning*

I. INTRODUCTION

Nowadays it has become a challenge for farmers to get labor to perform farming activities. The world is moving towards automation hence This paper proposes a system to help farmers by automating some farming activities like weed detection, spraying herbicide on weeds, Liquid level detection of herbicide in tanks, and continuous monitoring of farms. We have used the YOLO algorithm to detect the crop and weed. This algorithm is an advanced real-time monitoring model. This system provides high productivity, reduces labor costs, is easy to use, and fully automated.

II. EASE OF USE

A. Increased productivity

This system increases the productivity. It needs less effort than manual spraying herbicide on a weed.

B. Reduced cost

It saves herbicide by detecting weeds and spraying on that particular weed. Also, it reduces the labor cost. This system is fully automatic hence it reduces the cost.

C. Efficient use of resources

It is continuously detecting the liquid level (herbicide) in the tank. Efficiencies use of resources is also one advantage of this system.

D. High-quality products

It provides high quality by detecting weed and spraying on weed.

E. Continuous Monitoring

This is a fully automatic system and it provides continuous monitoring.

F. Quick response

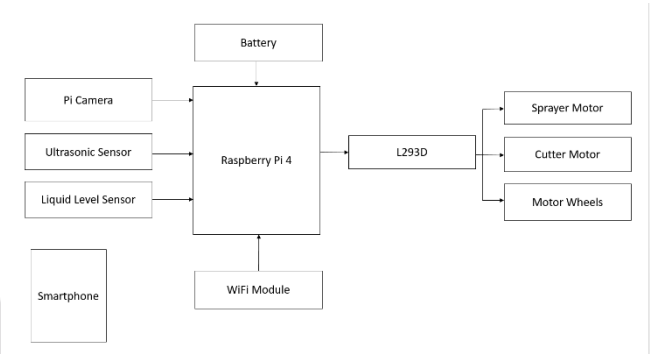
This system provides a very quick response.

III. BLOCK DIAGRAM

Figure 1.1 shows the block diagram of the robot. It is used for weed detection and spraying herbicide on weeds. It is used for continuous monitoring of farms.

This system consists of a Rasberry Pi controller, Solar panel, Pi camera, Ultrasonic sensor, liquid level sensor, battery, WiFi Module, Motor controller, Sprayer motor, and Cutter motor.

Pi camera in Agribot is to record the path of the agriculture field and will memorize it. After the path recording it will perform function of image processing and will capture the images of the weed and will provide the feedback to the controller so that the controller can decide whether to cut the weed or spray on it based on density of weed. For Spraying, nozzle will come into the function and spraying mechanism on weeds will take place . For cutting , Cutter will come into the picture and will cut the weed.



A. Raspberry Pi

- Raspberry Pi is used as a controller. this is like a mini-computer. We have used Python language to program this system. This controller has good connectivity. In cloudy environmental conditions also farmers can use robots to detect weeds.
- It supports 2GB, 4GB, or 8GB LPDDR4-3200 SDRAM so that it can support capturing images and store for detection of weed. It has having MicroSD card slot for operating system and data storage. It contains Ethernet as well as Bluetooth.

B. Battery

- Lead Acid (SLA) Battery is used in this system.
- The nominal Voltage of this battery is 12v, Nominal Capacity at 20hr rate (AH) is 7.0, the Discharge Current at 20hr rate (mA) is 350, Weight is 2.7 kg.

C. Motor Drive Controller

- L298 motor drive controller is used to drive the motors.
- The driver Model is L298N 2A, the Driver Chip is Double H Bridge L298N, the Maximum operating voltage is 24V, the Peak output current per channel is 2A, the Maximum logic voltage is 4.5 V, the Minimum logic voltage is 7V, the Maximum power is 25W.

D. Raspberry Pi Camera

- The Raspberry Pi camera is used to capture the crop and weed and provide input to the controller.
- Specifications are - Image Sensor-Sony IMX 219 PQ CMOS image sensor in a fixed-focus module, Resolution is 8-megapixel, Temp range Operating is -20º to 60º, Stable image is -20º to 60º, Still picture resolution is 3280 x 2464.

E. Ultrasonic Sensor

- The ultrasonic sensor is used to detect the obstacle coming in the path of the robot.

F. Liquid level sensor

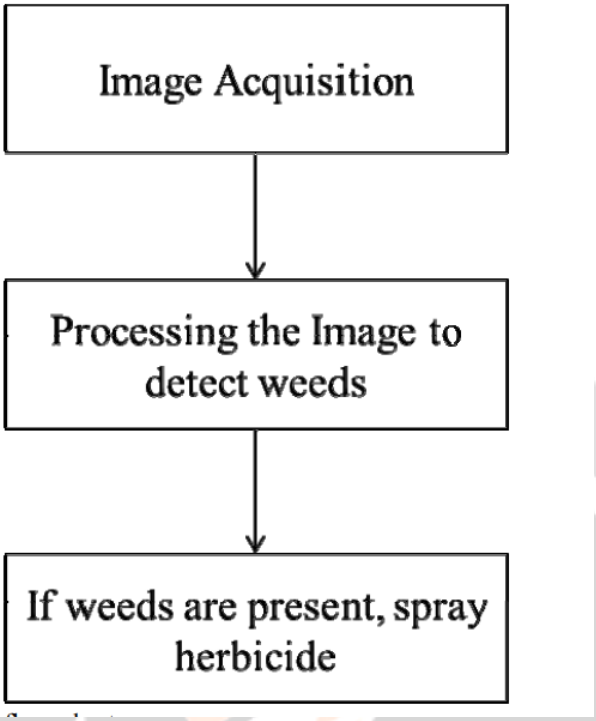
- It is used to detect the liquid level of herbicide in the tank so that farmers get notified when the herbicide is getting over.

G. Wheels

- Wheels are used to perform the moving mechanism of the robot.

IV. FLOW CHART

- A flowchart is a visual representation of the sequence of steps and decisions needed to perform a process. Each step in the sequence is noted within a diagram shape. Steps are linked by connecting lines and directional arrows. This allows anyone to view the flowchart and logically follow the process from beginning to end.



- Figure 1.2 shows the Spraying System Flowchart. Start the robot, if Weed is detected in range then the pump starts, and herbicide is pumped from the tank to the nozzle. The nozzle starts spraying herbicide and ends the operation.

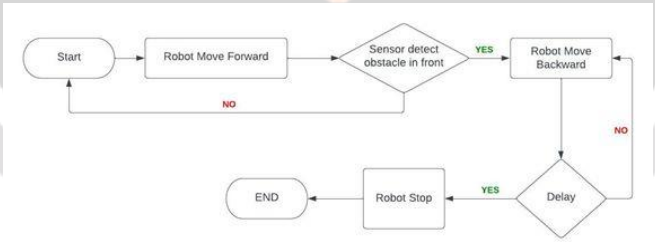


Fig: Navigation System

- Figure 1.3 shows the Navigation system Flowchart. It shows the path of the robot. Start the robot and move it in the forward direction. If the sensor detects obstacles in front of the robot then the robot will move backward direction. It will provide some delay and then the robot will stop movement. If an obstacle is not detected then the robot will move Forward.

V. APPLICATIONS

- Weed detection and removal on farms is the main application of this robot.
- It can be used in nursery planting.
- It is used for crop monitoring and analysis.
- It is used for Fertilizing and Irrigation

VI. CONCLUSION

In this system, I have designed and developed an agribot to detect weeds using a machine learning algorithm. By using our system, we can detect and separate weed and crop plants. By using YOLO algorithm we are processing information. The reason for developing such a system is to help the farmer by automating their farm.

ACKNOWLEDGMENT

We acknowledge all the people who helped in the development of this system. We express our hearty gratitude towards our guides Prof. Dr. S.S. Morade, Prof. Dr.D.M. Chandwadkar, Prof.Dr. K.N. Nandurkar.

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