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Agricultural Robot with Leaf Disease Detection Using Raspberry PI

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ABSTRACT

Even though India is agricultural country lot of challenges are faced by farmer. Every year farmer experiences large losses due to pest infestation in crop & this in turn affect his lifestyle.These losses are basically due to discontinuous monitoring of farm, various diseases on crop and improper management of pesticides. Plant disease reduces product of farmer both in quality and quantity. So quick detection and identification of disease plant are of more importance. It also needs continuous monitoring of farm. To overcome above problem it is necessary to develop such system which continuously monitor the farm and detect the disease as quick as possible.

Introduction

In this project we solved this problem by continuously monitoring crops using Agri-Robo and techniques called Image Processing. Image Processing give the good solution to above crisis. Image processing gives fast, automatic and accurate solution to user. We developed an agri-robo system to monitor crops and for identifications and monitoring of diseases & pesticides. This agricultural -robo not only detects disease but also spray pesticides to protect them from disease. The robot helps the farmer to take informed decision locally or allows connecting with other existing services.

This agri-robo find diseases on various infected leafs. Patterns of diseases are so many complexes that finding affected area is difficult. Therefore system that provides information about disease will play important role in disease management for famer. For this project we have selected clustered crop. Hence, the diseases are detected for 15 samples of crops using machine learning algorithm This process gives high accuracy when compared to state of art methods.

Agriculture is the backbone of rural India. Farmers face problems such as lack of timely availability of efficient workforce, as many have migrated from country side. Hence, to reduce the burden of farmers, automation in the field of farming is necessary. The main reason behind automation of farming processes is saving the time and energy required for performing repetitive farming tasks and increasing the productivity of yield by treating every crop individually using precision farming concept. The robot is able to automatically seed and water, spray pesticides according the path set by the user using the GUI that was developed. we also detect the disease that in plants by using mat lab analysis. We uses embedded technology to develop the project. An embedded system is one kind of a computer system mainly designed to perform several tasks like to access, process, and store and also control the data in various electronics-based systems. Embedded systems are a combination of hardware and software where software is usually known as firmware that is embedded into the hardware. One of its most important characteristics of these systems is, it gives the o/p within the time limits. Embedded systems support to make the work more perfect and convenient. So, we frequently use embedded systems in simple and complex devices too. The applications of embedded systems mainly involve in our real life for several devices like microwave, calculators, TV remote control, home security and neighborhood traffic control systems, etc

LITERATURE SURVEY

[1]Abhishek Choudhary,DivyaPal, Rajani Gupta, Farooq Husain :

The proposed system is an embedded system which will closely monitor and control the microclimatic parameters of a greenhouse on a regular basis round the clock for cultivation of crops or specific plant species which could maximize their production over the whole crop growth season and to eliminate the difficulties involved in the system by reducing human intervention to the best possible extent. The system comprises of sensors, Analog to Digital Converter, microcontroller and actuators. When any of the above-mentioned climatic parameters cross a safety threshold which has to be maintained to protect the crops, the sensors sense the change and the microcontroller reads this from the data at its input ports after being converted to a digital form by the ADC. The microcontroller then performs the needed actions by employing relays until the strayed-out parameter has been brought back to its optimum level. Since a microcontroller is used as the heart of the system, it makes the set-up low-cost and effective nevertheless. As the system also employs an LCD display for continuously alerting the user about the condition inside the greenhouse, the entire set-up becomes user friendly. Thus, this system eliminates the drawbacks of the existing set-ups mentioned in the previous section and is designed as an easy to maintain, flexible and low cost solution.

[2] P. Usha, V. Maheswari, Dr. V. Nandagopal

In Modern world, Automation robot is used in many of the fields such as defence, surveillance, medical field, industries and so on. In this paper, the robot system is used to develop the process of cultivating agricultural land without the use of man power. The aim of the paper is to reduce the man power, time and increase the productivity rate. All the basic automation robot works like weeding, harvesting and so on. Here the designing systems like plough the land, sowing the seed, watering the plant or spraying the fertilizer and navigate the vehicle motion are preferred by this autonomous robot using microcontroller. Based on movement of this robot in the land, the ultrasonic sensor helps in obstacle detection, thereby performs turning the position of robot either in left or right or forward direction. The navigation part has been done in simulation with the help of proteus.

[3] Nikesh Gondchawar, R. Kawitkar

He proposed that agriculture plays vital role in the development of agricultural country. In India about 70% of population depends upon farming and one third of the nation's capital comes from farming. Issues concerning agriculture have been always hindering the development of the country. The only solution to this problem is smart agriculture by modernizing the current traditionalmethods of agriculture. Hence the project aims at making agriculture smart using automation and IoT technologies. The highlighting features of this project includes smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, bird and animal scaring, keeping vigilance, etc. Secondly it includes smart irrigation with smart control and intelligent decision making based on accurate real time field data. Thirdly, smart warehouse management which includes temperature maintenance, humidity maintenance and theft detection in the warehouse. Controlling of all these operations will be through any remote smart device or computer connected to Internet and the operations will be performed by interfacing sensors, Wi-Fi or ZigBee modules, camera and actuators with micro-controller and raspberry pi.

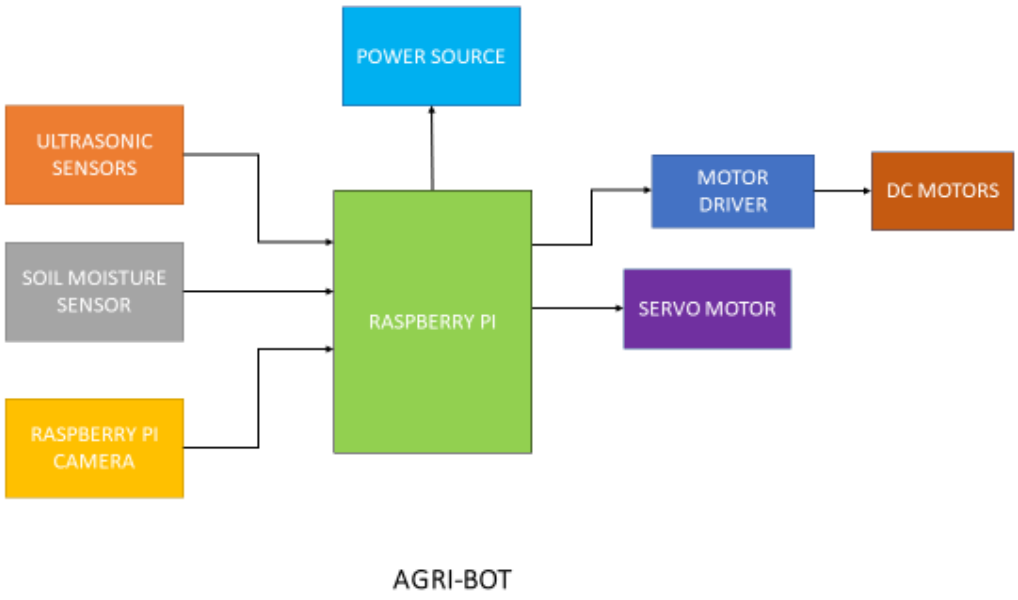
EXISTING SYSTEM:

- It uses soil moisture sensor and send the information using GSM.
- Temperature and soil moisture content updated in webpage using internet. Implementation is costly

PROPOSED SYSTEM:

- We designed a robot that can be used to monitor crops and identify the plant diseases.
- Raspberry pi is the core of the system and is attached with camera module.
- As we can control the robot by using wireless technology like Bluetooth.
- Camera captures the pictures of various plants and it will analyse what type of disease by using ML algorithms -tensor flow
- This information is informed to farmer/respective persons to take action on it.

BLOCK DIAGRAM



AGRI-BOT

Hardware Requirements

- Raspberry Pi 4
- Soil Moisture Sensor
- Raspberry Pi Camera
- Ultra Sonic Senor
- Power bank
- Servo motor
- Robot Chassis
- Motor Driver
- Jumper Wires
- DC motor

SOFTWARE DETAILS

- Raspberry Pi OS
- TensorFlow
- Pycharm IDE
- Python

ADVANTAGES OF AGRICULTURAL BOT

- Open sources
- Cost Effective
- More accurate output
- Remote monitoring and controlling

APPLICATIONS OF THE PROJECT

- Automated Watering

- Automated gardening
- Detecting leaf diseases by scanning.
- Spraying Pesticides

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