

FARMERS ASSISTANT USING RASPBERRY PI

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ABSTRACT

Climate changes and rainfall has been erratic over the past decade. Plants required good climatic condition for his optimal growth. Due to the changes in climate changes the yield of crops is been reduced for long a year. To overcome this the automated agricultural assistant will guide us if any conditions fall out of the optimal range. Aim of the project is to assist the farmers to improve agricultural practices using the image processing technique. High precision camera and image processing technique will be used to monitor the agriculture field. Sensors will be used to monitor the relevant agricultural parameters. Data will be stored in the cloud and can be retrieved at any time for future use and also use animal repellent to reduce the animals and birds in the farm land. So we can maximize the crop and increase the production.

Keywords: *Optimal growth, Image processing, High precision camera, optimal range, Increase in production.*

I. INTRODUCTION

Pesticides are used in worldwide agriculture. Between 30% and 40% of crop losses can be prevented when harmful insects and diseases are eliminated by use of pesticides. This pesticides are destroy the diseases but that affect the human. This affection can reduced by this project. Here image processing is done by using the raspberry pi the frequency of this controller is high when compared to arduino, this can done by various parameter of images that can feed into the controller whenever the camera can detect the crop, the image can compare with various parameter and then controller gives the exact result, the crop can affected by infection or not. If the crop can be infected the sprayer can spray the pesticides into the crop otherwise it cannot be spray. The rover can move this position through overall crop land by using line follower technique. The crop can be identify by using proximity sensor and also using animal repellent for removing the insects from the crop land.

II. OBJECTIVE

- [1] The farmer can be safe while spraying of pesticide in the farm land and also reduction of manual cost.
- [2] Reduce the toxic content in the food.

III. LITERATURE SURVEY

It survey is conducted to understand the different spraying methods.

N.Gandhiraj [1], FEB 2016 studies the Quad copter UAV based fertilizer and pesticide spraying system. But this one is costlier when compare to manual one, here analysing the pesticide spraying system.

Dr.S.Thangalakshmi [2], AUG 2015 studies the Electronic Trapping and monitoring of the insects pests troubling the Agricultural fields. But here drones are used, but these kinds of drones are restricted in some areas.

R.Pramodh [3], AUG 2016 studies the Concept, Design, Analysis and Fabrication of Pesticide Sprayer for Rose Farming. But here Copter with a pulley model was used, Healthy plants also got pesticides spray.

IV. SYSTEM BLOCK DIAGRAM

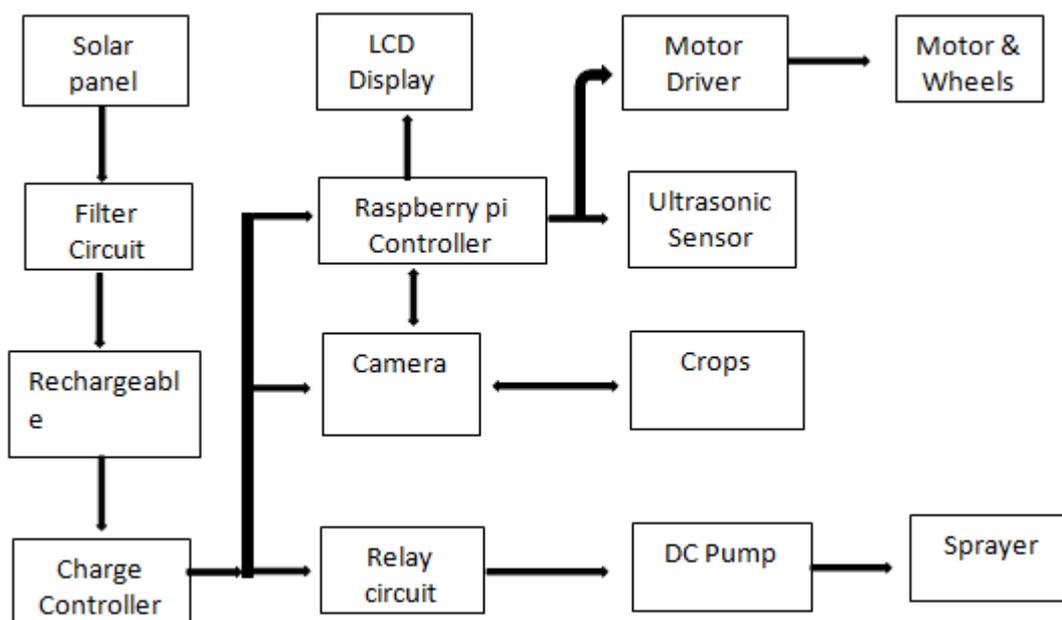


Figure2: Block Diagram

V. HARDWARE DESIGN

[1] Power supply module

Assemblies of solar cells are used to make solar modules which are used to capture energy from sunlight. Here we have used 3W solar panel. The buck–boost converter is a type of DC-to-DC converter that has an output voltage magnitude that is either greater than or less than the input voltage magnitude.

[2] Control module

The Raspberry pi Processor speed ranges from 700 MHz to 1.4 GHz and memory range is 256MB. Secure Digital (SD) cards are used to store the operating system and program memory. The boards have one to four USB ports. For video output, HDMI and composite video are supported, with a standard 3.5 mm tip-ring-sleeve jack for audio output. Lower-level output is provided by a number of GPIO pins, which support common

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protocols like PC and this is used to image processing for the crop this controller is used to analysis the affecting crops by matching the various parameter.

[3] Driver Module

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16- pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. The L293D can drive small and quiet big motors as well. It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction as voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H bridge IC are ideal for driving a DC motor for this purpose.

[4] Spray Module

A Relay driver is an electro-magnetic switch that will be used whenever we want to use a low voltage circuit to switch a light bulb ON and OFF which is connected to 220V mains supply. The required current to run the relay coil is more than can be supplied by various integrated circuits like Op-Amp, etc. Relays have unique properties and are replaced with solid state switches that are strong than solid-state devices.

In order to drive the relay, we use transistor and only less power can be possibly used to get the relay driven. Since transistor is an amplifier so the base lead receives sufficient current to make more current flow from Emitter of Transistor to Collector. The conduction of transistor can be controlled using base current and thus the spraying.

[5] Obstacle avoidance module

Ultrasonic sensor HC-SR04 is used to detect the presence of human or object while moving of the vehicle. To start measurement, Trig of SR04 must receive a pulse of high (5V) for at least 10 micro seconds, this will initiate the sensor to transmit out 8 cycle of ultrasonic burst at 40 kHz and wait for the reflected ultrasonic burst. When the sensor detected ultrasonic from receiver, it will set the Echo pin too high (5 V) and delay for a period (width) which is proportional to distance. To obtain the distance, measure the width (Ton) of Echo pin. Now if distance is within a limit system stops and sends information.

[6] Level Sensor

Level sensor detects the level of liquids and other fluids. The level measurement can be either continuous or point values. Continuous level sensor measure within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicates whether the substance is above or below the sensing point. Generally the latter detect levels that are excessively high or low. when the pesticides is goes on below to particular level then buzzer will be on . It indicates the pesticides quantity.

VI. WORKING

In these project the mechatronics and electronics system are combined and making a robot with spraying system. The robot & sprinkler operated wirelessly. The aim of our project is spray pesticides on the plants who are affected by diseases and other organisms. For that purpose we are making the wireless operated robot with sprayer and it is operated by using RF module. The transmitter section of RF module is on user side that is

remote section and receiver section is mounted on robot. The remote contains seven keys for forward, backward, right turn, left turn these keys used for robot control and the up & down key used for adjusting the height of sprinkler, one other key start and stop the spraying system. The power supply for the robot is comes through a 9V battery. The Raspberry pi microcontroller is used to the operate many operations like move robot, spray pesticides, adjusting height at one time for that we selected the Raspberry pi microcontroller because it specifies our requirements and also with high precision. Another thing is battery that is of 12V rechargeable is used & regulated power supply is used to gives the supply for microcontroller and for the motors. The power supply gives to motors through motor driver circuit (L293D IC). Here we use the level sensor to detect the level of the pesticides and alarm us when the level of pesticides is goes below on that level sensor, when the level goes below to the level sensor then buzzer.will be ON and we knows that pesticides tank is empty. We use the two sprayer to spray pesticides on two sides at a time. When robot is running the sprayer spray pesticides on both sides of robot.

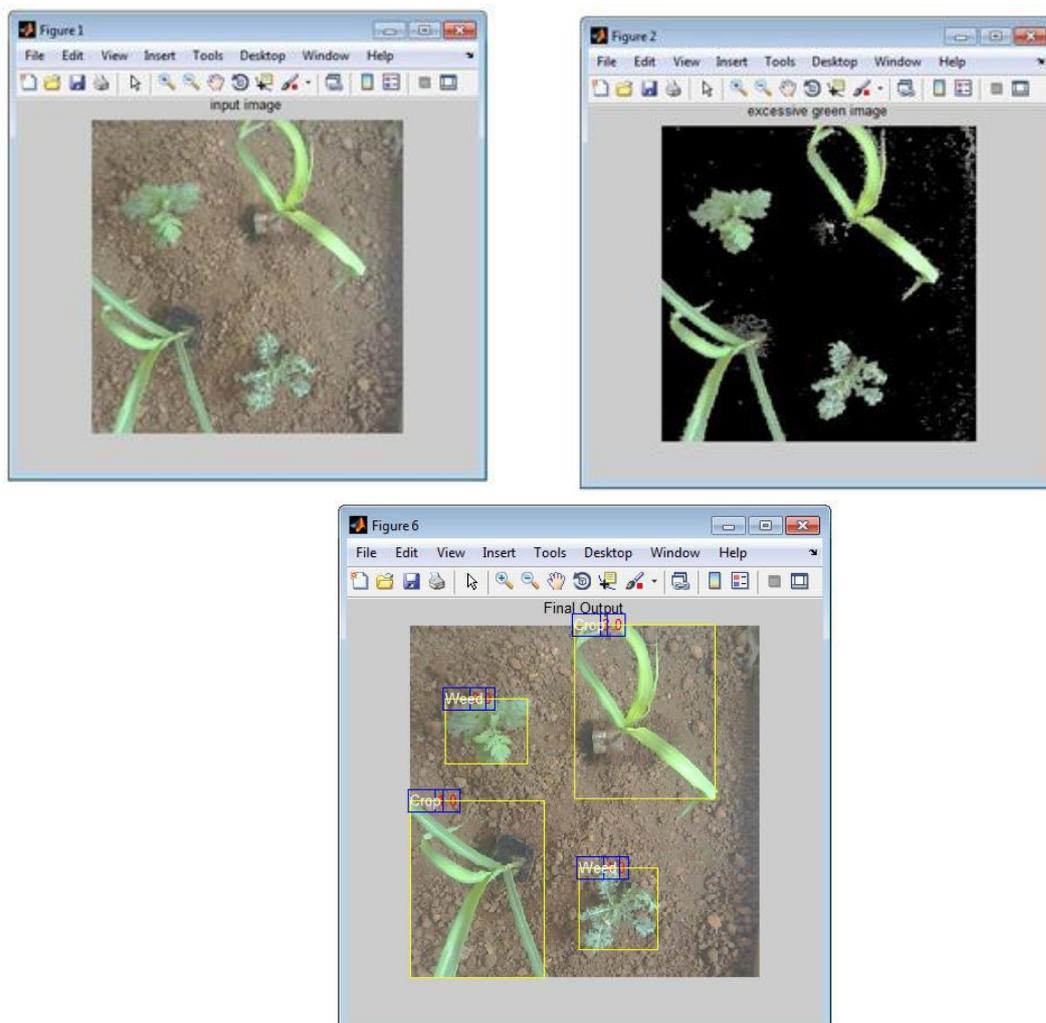


Figure 3: Image processing for detection of infecting crops.

VII. FLOW CHART

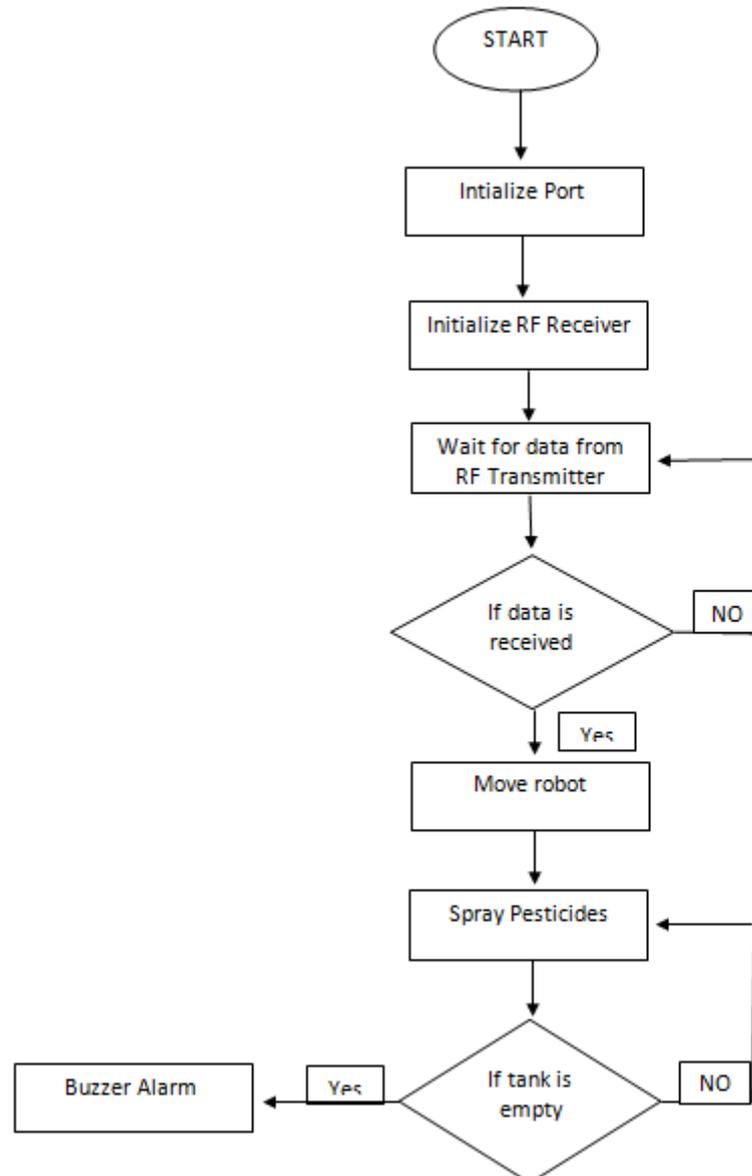
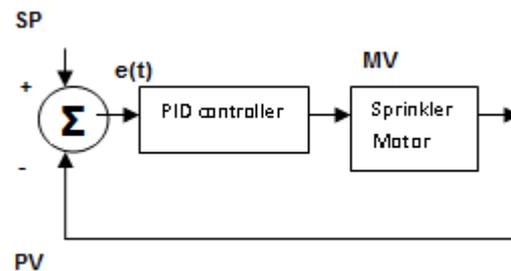


Figure 4: Flow chart

VIII. SPRINKLER MOTOR WITH PID CONTROLLER

The sprinkler motor is used to spray pesticides. In order to achieve precision in spraying and to improve the efficiency various new technologies have been proposed. Pre mixing of pesticides to a constant thickness will not be efficient as the pesticide requirement varies with each crop so this will lead to wastage of pesticides and the results will not be optimum [15]. When Microprocessor, Differential pressure flow meter, Electrical control injector is used in a system the test results were as follows static and steady state errors were reduced significantly. Further improvements can be done to achieve the better spray rates of pesticides. When a PID

controller is used in the closed loop feedback of the sprinkler motor for online flow control for variable rate spray, linear and automatic flow control can be obtained



Here,

SP- Set point

MV is the Manipulated variable

$e(t)$ - Error Signal

PV is the Process variable



Figure 5: Output of PID

IX. CONCLUSION

The paper was aimed at not just to extend the application of advanced technology in the field of agriculture, but also to bring the technology close to the reach of farmers in financial aspect, in a very convenient way. The paper proposes smart machinery for agriculture which promises to overcome certain challenges which lie in the present day agriculture. It encourages the use of technology to improve the productivity in agriculture. It reduces certain tedious work in agriculture and hence encourages many people to take up agriculture as an occupation. In this regard, the paper proposes an agriculture vehicle which proves to be feasible and economical to all classes of farmers who do both large scale and small scale farming. The vehicle is easy to operate and is user friendly. It also helps the farmers in hitting their target of high productivity along with secured farming. The agricultural vehicle for spraying pesticides proposed in this paper is a collaboration of all basic feasible technologies, to bring out a new and needy vehicle to assist farmers in tasks involving risks. Projects like this

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encourage people to take up cultivation as full time and part time jobs. This is very essential in developing countries, especially India, where agriculture is the backbone of the economy.

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