# Agro Canopy and Aqua Reclaim System

SIVAIAH NAALI[1], ASHOK KUMAR KOPPOLU[2], LOHITH PRASANNA TEJA KAKUMANU[3], SATISH MANEPALLI[4], VAMSI KRISHNA REDDY MEKA[5]
[1, 2, 3, 4, 5] *Department of Electronics and Communication Engineering, Vasireddy Venkatadri Institute of Technology, Nambur(V), Guntur(Dt), Andhra Pradesh , India.*

***Abstract-*** ***Damaging of the crops due to unseasonal rain-fall is the major issue faced by our farmers. In the proposed system, data is taken from the sensors like rain, soil moisture, IR. Two motors are used in the proposed system which were controlled by L293D Motor Driver. By using this, we can make the motors run in clockwise and anticlockwise directions. When the rain sensor detects the rainfall, then Automated Roof which is attached with the Continuous Servo motor (SG90) runs over the entire field, otherwise the automated roof will not cover with the information from the IR sensor. The rain water is stored in the under water tank. When this soil moisture detects the soil is dry, the Water Pumping Motor pumps the water from the under water tank into the field else the Water Pumping will not pump the water. So, the proposed system is fully automated by using the Raspberry-pi 3 Model B and python programming.***

***Indexed Terms-*** ***Rain Sensor, Soil Moisture Sensor, IR sensor, L293D Motor Driver, Continuous Servo Motor (SG90), Water Pumping Motor.***

## I. INTRODUCTION

Agriculture is the major source of income to every country in this world especially in developing countries like India. Issues related to Agriculture have been increasing in the last few decades. The crop damage due to the unseasonal rains is the major concern. Therefore, the crop protection is done by using this system. As well as the rain water which is stored in the underwater tank can be used during the summer season or when the moisture content in the soil is decreased. By using this system we can reduce the damage to the crops and prevent soil erosion.

## II. RELATED WORK

The existing methods or systems in the field of agriculture are numerous to enhance the yield from the farm but there is no protection of crops against natural calamities and disasters. The Survey played a very vital role in this project, we analyzed the existing systems for protection of crops and plants during unseasonal rains, there were no methods to protect the crops and plants we noticed during the survey, some of them are the existing systems consisting of only sensors that measure soil moisture and temperature. Due to this, the field easily get damaged due to lack of protection for plants and the crops will be of no use for the farmers. So, we choose to do an automatic system which doesn't require any manual operation, which has rain sensors which get activated during any time of the day or night. By using the values from rain sensor, the automated roof will cover the field.

Some methods through various papers which we have surveyed are as follows:

- Chandan kumar sahu, Pramitee Behera [1] focus on A Low Cost Smart Irrigation Control System which is used to control the water motor automatically and select the direction of the flow of water in pipe with the help of soil moisture sensor. Therefore, the information (operation of the motor and direction of water) of the farm field will be sent to the mobile message and g-mail account of the user.
- R. Nageswara Rao, B.Sridhar [2] proposed a paper that aims at a high precision monitoring the data and control agriculture automation system with IoT technologies mainly focuses moisture variations correlated with temperature changes data by smart sensors and controls irrigation system based on the real time data coming from the crop field.
- Shweta B. Saraf, Dhanashri H. Gawali [3] proposed a paper on IoT Based Smart Irrigation Monitoring and Controlling System—Interconnection of number of devices through internet describes the Internet of things (IoT). This

paper proposes and evaluates a cloud-based wireless communication system to monitor and control a set of sensors and actuators to assess the plant's water needs based on the real time data.

## III. PROJECT OVERVIEW

The proposed system inspects the weather conditions in the field day and night by automating the whole setup. When the rain sensor detects the rain, the automated roof will cover the entire field by using the continuous servo motor (SG90), otherwise the automated roof will open with the data from the IR sensor. When the roof is closed, the rain water is stored in the underwater tank for future use. The soil moisture sensor checks the water content available in the soil. When the soil is dry, the water pumps the water from the underground tank into the field, otherwise the water pump motor is in off condition. The motors used in this system are controlled by an L293D motor driver. So, that the two motors can run in any direction i.e., clockwise or anti- clockwise direction. This proposed prototype is under the control of Python programming. Thus, the prototype or the system is fully automatic. The block diagram of the prototype is as shown. The components are interconnected with each other and information of the sensors will be send to the raspberry pi 3 model B and it will take necessary actions.

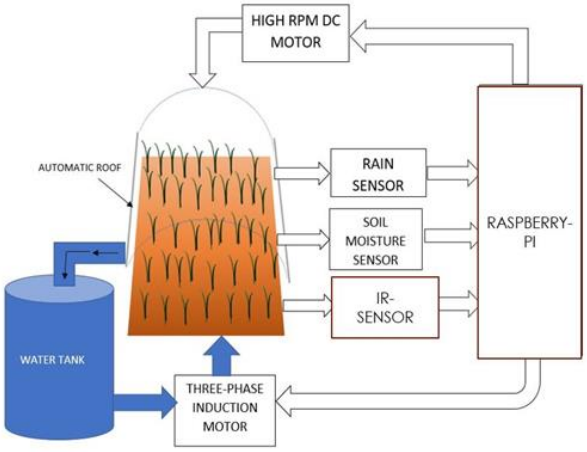



Fig 1: Block Diagram of the Proposed System

## IV. HARDWARE & SOFTWARE DESCRIPTION

### HARDWARE DESCRIPTION

- Rain sensor-

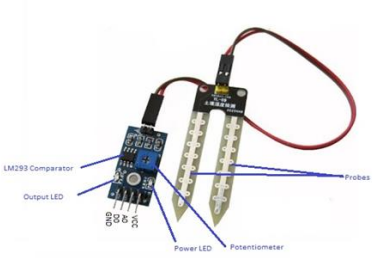
The rain sensor is resistive dipole. Basically, this board includes nickel coated lines and it works on the resistance principle. Based on the moisture level on the board, it shows the resistance. It creates a parallel resistance path to calculate through the operational amplifier.

For example, when the rain falls on the board, it shows more resistance. When it is dry and shows less resistance when it is wet.

- Soil moisture sensor-

This sensor measures the water content of the soil using capacitance, dielectric constant otherwise interaction with neutrons, and replacement of the moisture content.

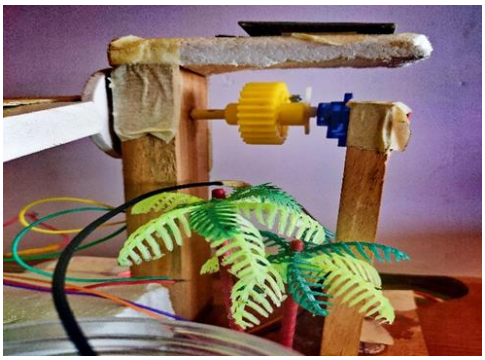
This soil moisture sensor should be inserted into the earth and the status of the water content in the soil can be taken in the form of a percent.




- Continuous Servo Motor (SG90) –

The SG90 rotates only in 90 or 180 degrees. By making some adjustments i.e., De solder the connection between the small DC motor inside and the internal circuitry. Connect the DC motor directly with

two wires- positive and negative and break the limiter of the gears in the gearbox. So that we can make it as a continuous servo motor that can handle large loads and this servo motor can rotate in both directions.



- Water Pumping Motor-

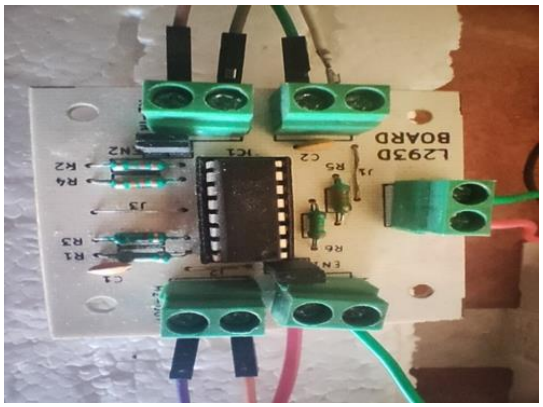
This Water Pumping motor pumps the water into the field at very high speed based on the voltage applied. When the soil is dry, it pumps the water into the field based on the moisture level. For the soils which are wet, it will not pump the water.


- IR Sensor-

The IR sensor is mostly used to detect the obstacles. This sensor is used to make the automated roof to open when there is no rain by using sensor principle.

- L293D Motor Driver-

This IC (Integrated Circuit) uses the H-Bridge circuit to run the motors in both clockwise and anti-clockwise directions.

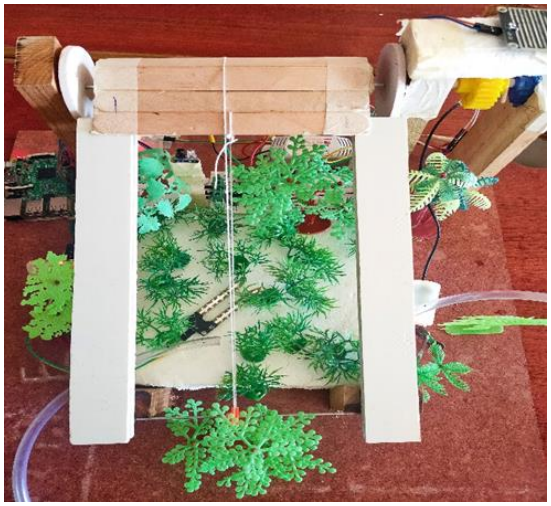


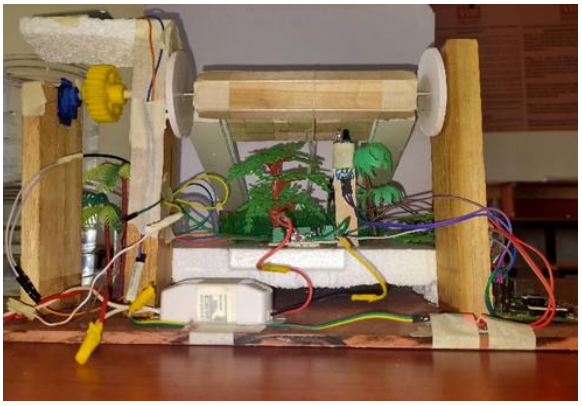

SOFTWARE DESCRIPTION

Python is a wonderful and powerful programming language that is easy to use and with Raspberry Pi that makes your project or system or prototype to connect to the real world. Python syntax is also very easy to learn, peer understandable with Standard English words. Sensors and motors can be controlled easily.

## V. HARDWARE DESIGN

In this proposed model, we have used Raspberry-pi 3 Model B. The sensors like rain, soil moisture and IR are interfaced with raspi GPIO pins. The data is collected from these sensors. We have also used Continuous servo motor for automated roof as well as Water pumping motor. To control these motors in any direction we have an L293D motor driver. These are also linked with raspi. Data collected from these sensors is in analog form, there is an ADC linked (assembled) with these sensors. Python software is used to control all these sensors and motors. Rainfall is detected by the rain sensor and the automated roof will cover the farm, otherwise the roof will not cover the field with the data from the IR sensor. The soil condition is frequently observed by the soil moisture sensor. When the water level crosses the mentioned value, the water pumping motor pumps the water into the soil, otherwise the motor will not pump. The whole prototype is self-automated by the raspi.





## VI. ADVANTAGES

- Crops can be protected from heavy rainfall during monsoon seasons or during the sudden climatic changes.
- Rain Water can be stored in the under water tank.
- The stored rainwater can be used for cultivating the crops during summer season, where the water availability is less at that time.
- Soil Surface Evaporation in the summer season and Soil Erosion can be prevented.

## VII. APPLICATIONS

- Polyhouses are the best place where we can extend this system to protect them.
- This can be implemented in Outdoor sports, Concerts for protecting the ground during rainfall.
- This can be used in Rooftop and Terrace cultivation.
- To protect the clothes in rainy season.
- Irrigation Field applications

## VIII. OUTCOME

The design of Agro Canopy and Aqua Reclaim system was tested for the limited area of the field. This system works efficiently to protect the crops against the unseasoned rainfall. The Stored rainwater can be properly used according to the soil conditions.

## ACKNOWLEDGEMENT

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## CONCLUSION

There are no methods or systems to protect the crops from these unconditional rains. So, this Agro Canopy and Aqua Reclaim System will help the farmers from this problem. This design doesn't require man power and less power as this system is perfectly automated. Rain water resources can be used in a better manner, when there is no rainfall in the summer season and in some weather conditions. Thus this system works with full efficiency.

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