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IOT based Precision Agriculture

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ABSTRACT: The purpose of this project is to provide a complete irrigation solution to the farmer with use of internet of things (IoT). To create a cost effective automated irrigation system to reduce water's waste is a challenge. It is important to measure different parameters to calculate the efficient quantity of water for plants. The proposed system is composed of different types of low cost and low power consumption sensors. For example- soil moisture sensor, temperature sensor. Setup of Raspberry Pi with sensors is used to control opening of the irrigation valve. Smart phone is used for a remote monitoring.

KEYWORDS: Precision Agriculture (PA), irrigation, IoT (Internet of things), Raspberry Pi, Sensors

I. INTRODUCTION

In India, even today, traditional farming practices are used. Farming is heavily dependent on natural factors. Along with this massive manpower is used for farming task. Due to hard working in a farming, most farmer's children prefer to select other career options. It is found that farmers are selling their lands to the builders to earn more easy money rather than farming. This has made it necessary to increase productivity from the shrinking farmlands which will able to feed the billion plus people of India in the future. Precision agriculture will provide a solution to do it.

Precision agriculture (PA) is nothing but an approach to farming that uses information technology to ensure that the crops and soil receive exactly what they need for optimum health and productivity. The goal of PA is to ensure profitability, sustainability and protection of the environment

IoT is the coming together of electronics engineering and computer sciences to solve traditional problems of farming. This is relying upon specialized equipment and software and IT services. This approach accesses real time data about the conditions of the water content in soil, environment temperature, along with other relevant information. The software uses the data to provide guidance to farmer about irrigation, harvesting times, soil management and crop market rate. However, agriculture is a vast area; it can be subdivided into many fields of expertise. The system examines the role IoT can play in the irrigation process. It includes different types of sensors integrated with Raspberry Pi connected to smartphone using IoT.

Agriculture is going through an evolution. Technology has become an essential part of precision agriculture. Adoption rate of technology is increasing in PA. Precision agriculture is making the practice of agriculture more accurate and controlled. A crucial component of farm management is the use of information technology. The fundamental aim of precision agriculture is to make sure profitability, sustainability and efficiency while protecting the environment. PA provides benefit with reduced use of water, fertilizers, herbicides and pesticides, improve the quality, quantity and reduced cost of production besides the farm equipment's. Farmers have no longer to take uninformed decisions, and then worry about unpredictable environmental changes. With Internet of Things, it is possible to receive highly accurate, real time information of agricultural processes like irrigation, planting of seeds, harvesting, management of agricultural task without investing on man hour and so on. Farmers can also gather real time information on latest improvement in farming, the quality of soil, weather conditions, market rate of the crop and many more

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II. PROPOSED WORK

This is a smart system that would help farmer. It collects real time data from sensors placed in the farm. Sensors sense the soil moisture and the temperature of surrounding, and this information is sent to Farmer’s mobile. This system keeps the farmer updated by timely notifications. Mobile application has feature to control and monitor the motor and street light located in farm. This reduces human effort and also make sure that required amount of water is given to the crops thus reduces water wastage and also help to improve the crop quality and economic output of the farm.

The processing unit of system is Raspberry Pi (controller). The Pi is connected externally to the 5V power supply. It manages and controls all the system input and output. Sensors provides the input data, here the soil moisture sensor and temperature sensor provides the data to the Raspberry Pi in defined time. When the threshold value of the moisture data is reached, pump will be triggered. The farmer can see the sensor’s value and will take appropriate action with the help of mobile app.

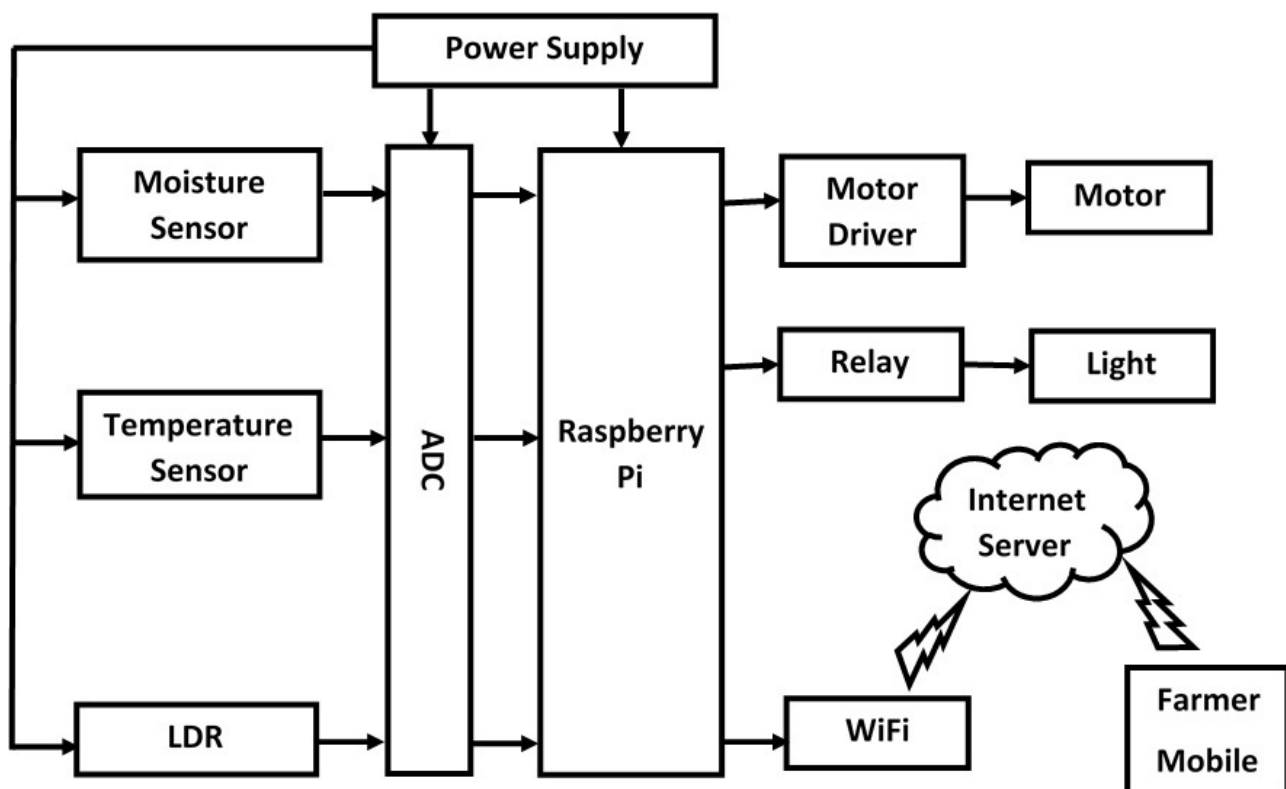


Fig. 1. System Architecture

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III. ALGORITHM

Step 1: Start the Process

Step 2: Login to Mobile App.

Step 3: Power is supplied to Raspberry Pi.

Step 4: Check the moisture level and temperature on mobile.

Step 5: If the moisture level is less than required criteria, start irrigation, start motor

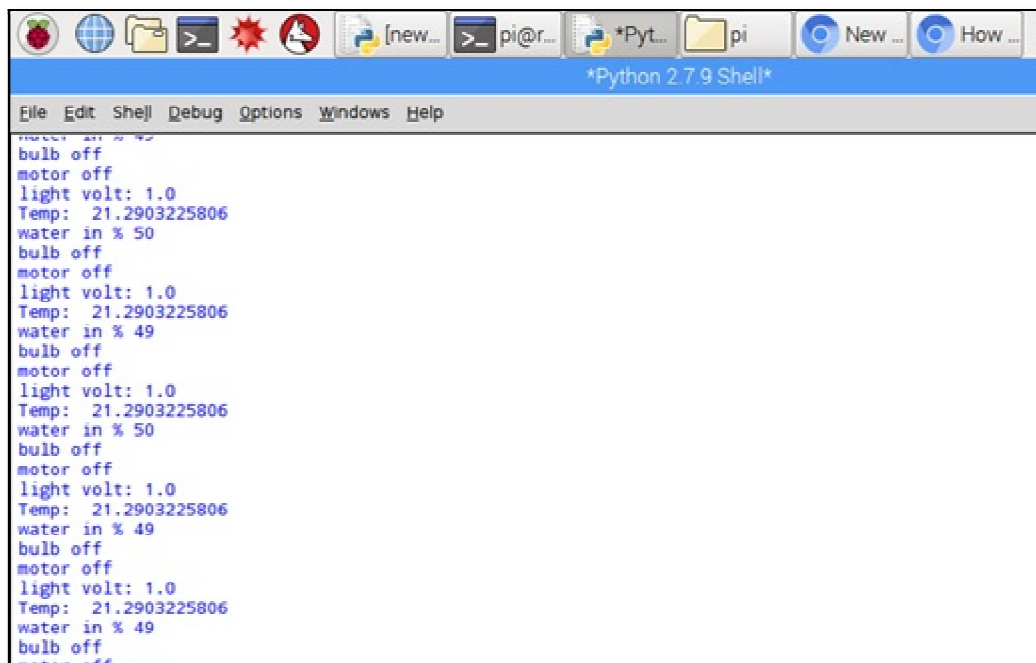
Step 6: Switch ON the light if the light intensity is less otherwise OFF

Step 7: After process completed, moves to the original state

Step 8: Stop process

IV. EXPERIMENTAL RESULTS

Figure shows the output of Raspberry Pi. It is real time data collected from soil moisture sensor and temperature sensor. It also denotes the motor and light condition. The status of motor and light whether it is ON or OFF.



```
File Edit Shell Debug Options Windows Help
bulb off
motor off
light volt: 1.0
Temp: 21.2903225806
water in % 50
bulb off
motor off
light volt: 1.0
Temp: 21.2903225806
water in % 49
bulb off
motor off
light volt: 1.0
Temp: 21.2903225806
water in % 50
bulb off
motor off
light volt: 1.0
Temp: 21.2903225806
water in % 49
bulb off
motor off
light volt: 1.0
Temp: 21.2903225806
water in % 49
bulb off
motor off
```

(2)

Fig. 2. Real time data from soil moisture sensor and temperature sensor and the status of motor and light

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V. CONCLUSION

We have implemented an automatic sensor-integrated precision farming module. It successfully detects the soil moisture and temperature of the surrounding and will help the farmer at great extent to manage the farm task. This project is based on implementing IOT in farming. Remotely monitored systems for agriculture have become a new necessity for farmers to save energy, time and money

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