Sensor Based Automatic Irrigation System and Soil pH Detection using Image Processing.

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Abstract - *India's population is reached beyond 1.2 billion and the population rate is increasing day by day then after 2530 years there will be serious problem of food, so the development of agriculture is necessary. Today, the farmers are suffering from the lack of rains and scarcity of water. The main objective of this paper is to provide an automatic irrigation system thereby saving time, money & power of the farmer. The traditional farm-land irrigation techniques require manual intervention. With the automated technology of irrigation, the human intervention can be minimized. There will be moisture sensors installed on the field. Whenever there is a change in water content of soil these sensors sense the change gives an interrupt signal to the micro-controller. Soil is recognized as one of the most valuable natural resource whose soil pH property used to describe the degree of acidity or basicity which affect nutrient availability and ultimately plant growth. For capturing the images, the phone camera is used and after processing the captured image the PH value of the soil is determined and accordingly crops or plants are suggested that can be grown in that field. Due to detection of soil pH value the chances of crops destruction becomes less.*

Key Words: GPRS, GSM, Runoff, SDK, Solenoid.

1. INTRODUCTION

Generally, the current irrigation systems are manually operated. Those Systems are replaced with the Automated and Semi-Automated techniques suggested an automated concept of irrigation to use the water efficiently and effectively. Sensor based Automatic Irrigation System is based on Soil Moisture Sensor that will measure the level of moisture in the soil and sends the signal to the Raspberry pi and accordingly it will irrigate the crops. The Raspberry pi plays the role of Micro-controller. This Raspberry pi will compare the values received from moisture sensor with the predefined moisture levels already stored in the system. Based on the values received from the sensors, the Raspberry pi will turn the irrigation system ON/OFF. The Raspberry pi will also provide the functionality of calculating the pH value of soil. PH is a term that is used to describe the degree of acidity or basicity. The Raspberry pi uses pi camera for capturing the images of the Soil and after calculating the pH values the particular crops that can grow in the field are suggested to the farmer.

1.1 Motivation of the Project

India's population is reached beyond 1.2 billion and the population rate is increasing day by day then after 25-30 years there will be serious problem of food, so the development of agriculture is necessary. Today, the farmers are suffering from the lack of rains and scarcity of water. That's why, to full-fill this need we are motivated to develop this project.

The main objective of this paper is to provide an automatic irrigation system thereby saving time, money & power of the farmer. The traditional farmland irrigation techniques require manual intervention. With the automated technology of irrigation, the human intervention can be minimized.

1.2 Literature Survey

In GSM Based Automated Irrigation Control using Rain Gun Irrigation System mentioned about using automatic micro-controller based rain gun irrigation system in which the irrigation will take place only when there will be intense requirement of water that save a large quantity of water. These system brings a change to management of field resources where they developed a software stack called Android is used for mobile devices that include an operating system, middle-ware and key applications. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. Mobile phones have almost become an integral part of us serving multiple needs of humans. This application makes use of the GPRS feature of mobile phone as a solution for irrigation control system. These systems covered lower range of agriculture land and not economically affordable. The System Supports Excess Amount of water in the land and uses GSM to send message and an android app is being used they have used a methodology to overcome under irrigation, over irrigation that causes leaching and loss of nutrient content of soil they have also promised that Micro-controller used can increase System Life and lower the power Consumption. There system is just limited to the automation of irrigation system and lacks in extra ordinary features.
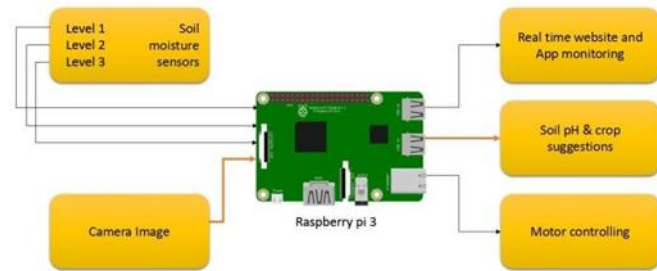
2. PROBLEM STATEMENT

Fig -1: System Architecture

The main objective of this project is to provide an automatic irrigation system there by saving time, money power of the farmer. With the automated technology of irrigation, the human intervention can be minimized. Whenever there is a change in water content of soil the moisture sensors sense the change and gives an interrupt signal to the microcontroller.

Three soil moisture sensors will be interconnected to one another in top to bottom fashion i.e. level 1 (Top sensor), level 2 (middle sensor), level 3(deep sensor). They will be kept immersed dipped in soil. Sensors will detect the moistures in 3 ways: 1. if top sensor detects moisture the irrigation system will remain off. 2. If top sensor didn't detect moisture but level 2 sensor detects the system will be off. 3. But if both the top sensors didn't detect moisture then the irrigation will get started for a period even if the level 3 sensor detects some moisture.

This moisture's data i.e. the notifications will be sent on the cloud using IOT which can be accessed by website. The System will continuously send the data on the cloud. These Data can also be accessed using Bluetooth on Android app if there is no internet present. The farmer can control the irrigation system through the Android App I.e. Semiautomatic System.

2.1 Innovation

Soil is recognized as one of the most valuable natural resource whose soil pH property used to describe the degree of acidity or basicity which affect nutrient availability and ultimately plant growth. For capturing the images, the Pi camera is used and after processing the captured image the pH value of the soil is determined and accordingly crops or plants are suggested that can be grown in that field. This second system will give the farmers the particular crops that can be grown in their particular field.
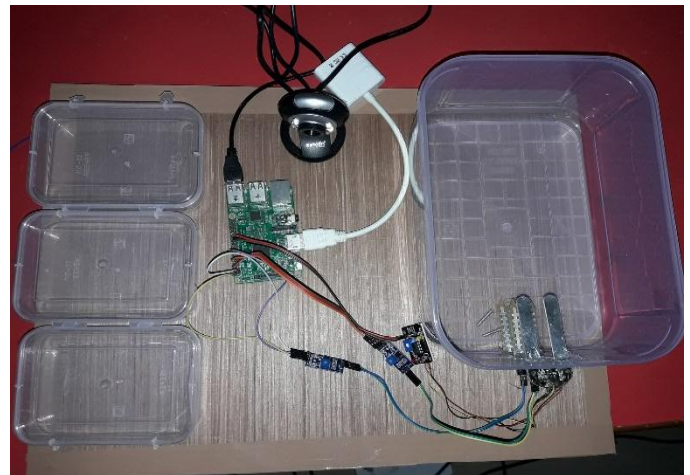
3. RESULTS

Fig -2: Working Model
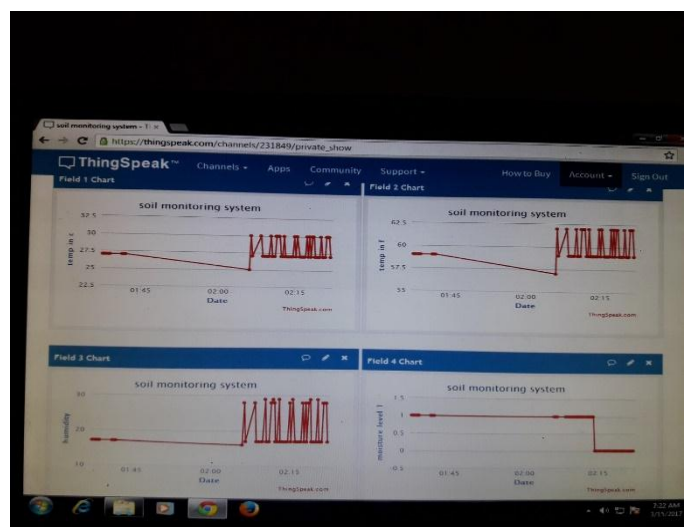

Fig -3: Capturing Image of Soil

Fig -4: Real Time Data Upload

4. CONCLUSIONS

The earlier system consumes more water and resulted to a Water Wastage. Installing the automatic irrigation system and determining the pH value it saves time and ensures judicious usage of water and farmers get to know earlier that what crops can be grown in his field. This system works in areas where there is no regular supply of electricity. The system is reducing human intervention therefore less energy of the farmer is required. In future the modules like Artificial Intelligence can be added to automatically learn the pattern of watering the crops.

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