FIELD MONITORING AND RAIN WATER HARVESTING AUTOMATION USING INTERNET OF THINGS

Rajasekaran C*, Naveen Kumar K**, Santhosh P*', Sathish S*, Tarun Prasaath S**

*1Professor, K.S.Rangasamy College of Technology(Anna University),Namakkal, India.
*2**3**4**5Under Graduate Students, Department of ECE, K.S. Rangasamy College of Technology, Tiruchengode, Tamilnadu, India.

ABSTRACT

In the developing countries like India and not only developing countries also the whole world wherever the people they need food. But in some areas or countries they were lacking in the production of food. The Agriculture is still there but the production going low and there by coming new technologies in this area and farmers were used the technologies and gained. In here the automation in monitoring the farm field and checking the farm needs according to the crops grown. And there by harvesting the rain by collecting in one area and get used in the farm field and also there is ground level water increasing process. By this automation, everyone not only farmer will think to take a step-in agriculture without any fear. It will help the beginner to learn things in the farming. And they can start the agriculture without any fear in entering this field. The world around is getting automated replacing manual procedures with the advancement of technology, since it is energy efficient and engross minimal power. The system overcomes limitations of traditional agricultural procedures by utilising water resource efficiently and also reducing labour cost.

Keywords: Internet of Things (IOT), Micro controller, Sensors, Rain Water Harvesting.

I. INTRODUCTION

The Agriculture in India is diminishing day by day which affects the production capacity of ecosystem. There is an exigent need to solve the problem in the domain to remove vibrancy and put it back on higher growth. Farmers need agricultural information and pertinent knowledge to make knowledgeable decisions and to satisfy informational needs.

Here, this project will clear the field problems of farmers by introducing monitoring method by using various sensor for different functions and it will be displayed in the display. The exact plans of water irrigation system and fertilizer plans and amount of fertilizer, kind of fertilizer which is needed for particular crop grown. The above information is available in the system which was given by the agricultural universities, agriculture experts, neighbour farmers, and several other organisations. It is connected to cloud so that it will gain information to the farmer in several ways. The field monitoring processes includes Reminder - remind the farmer on scheduled activities, Irrigation Planner- makes a set of plans to irrigate various section in field. Crop Profit Calculator, Calamites Check, Problem Identifier, Optic Monitor, Well Dry Check, Field Dry Check, Identify the soil type and soil deficiency.
The automation in water irrigation shows in the Figure 1 this is a major one because after planting the crops, there should be a schedule to supply water for the crops. Which we have to remember but by entering it in the monitor we can schedule it in the display by manually or by giving the specific crops that going to plant and it will schedule automatically. The automation process helps the farmer in various ways as they don't want to remember the water irrigation, they just want to reschedule the planner for every new planting.

And while doing farming rain water is considered the major thing, because it will help to increase the ground water level and excess amount of rain water also damage the crops planted. While raining the rain water is gathered to one point in the field and the all-other field water are intersected in one point to send through one hole to the underground pathway. In the entering point it will have one filter to remove the dusts that come with rain water. Then the water will arrive filtration tank. The tank is customized according to the farmer. There the water is filtered and the filtered water goes to the water tank. After then the water is used for water irrigation system which is automated. The Figure 2 represents the rain water harvesting in the agriculture field.

![Figure 2: Rain Water Harvesting for Agriculture](image)

The water is a major thing because of this may of us having fear in entering this field. And the water here is obtained by naturally and this is automated also so the water problem is almost done in this. And the beginner farmers also get information about a farming field should have to done. All information needed to transfer the normal land to the farming land is are available in monitor. The Error! Reference source not found. shows the rain water harvesting for agriculture.

And operating the display is also precision button attached so the operating the device is also easy. And also, the translation in this is available so that we can gain knowledge from various country experts around the world too. Let’s see the knowledge required to develop the project and will do some review required to develop this project in the upcoming chapters.

II. BLOCK DIAGRAM

![Figure 3: Block Diagram](image)

The overall view of this method is shown in
Figure 3. The block diagram describes our idea which is going to be implement into prototype. The idea of this project is to maintain, automate the agriculture field, to help the beginner in agriculture and rain water harvesting for water irrigation. The power supply is separately given to the microcontroller, sensors, drivers and pumps. The monitoring of the field is done by integrated sensors for live temperature, humidity, moisture. In this project, the selected crop by farmer is compared with nutrient requirement of crop and the current land nutrient and to tell a farmer whether the field condition good or bad for crop yield.

III. COMPONENTS AND DESCRIPTION

ATMEGA328P
The ATmega328P is a low-power CMOS 8-bit microcontroller which is used to read the data from the sensors placed in the field. And it also helps to display the information from the sensors to LCD display. The microcontroller also controls the water irrigation system. It decides the water source according to the level of the water in rain water tank.

Moisture Sensor
The moisture sensor detects the moisture level in water and give inputs to the controller and then the controller reacts to it level indication. The Figure 4 shows the moisture sensor.

![Moisture Sensor](image)

Figure 4: Moisture Sensor

Moisture sensors pick up changes in the resistance value of the sensor element in response to the change in the moisture

DHT-11 Sensor
The

Figure 5 shows the DHT-11 Sensor is a commonly used Temperature and humidity sensor. The DHT-11 sensor detects humidity and temperature level of the field. So that it will help the controller to decide which is good at this weather condition. By detecting the weather, the ESP Wi-Fi module delivers the real-time output of the weather through cloud.

![DHT-11 Sensor](image)

Figure 5: DHT-11 Sensor
PH Sensor

The Figure 6 represents the pH sensor detects the nutrient content of the soil like magnesium, potassium etc. so that it helps the user to know the soil nutrient content and according to the level of crop requirement nutrient the crop to be yielded is chosen. The pH sensor also helps the user to decide what fertilizers are needed to increase the nutrient content in the soil.

![Figure 6 pH Sensor](image)

**Pump**

A pump shown in the Figure 7 is Submersible pump which is placed inside the water tank so that the motor works powerfully and helps to get more force in water. A pump is connected to AC separately so that we can switch on/off whenever we want to irrigation system.

![Figure 7 Pump](image)

**Relay**

There are three relays used in the setup. One to connect the power coil and controller coil so that we can give the controls of water pump to the controller and power source to the AC. The other two relays are used to the water pump motors from water tank and rain water harvesting tank. The Figure 8 shows the relay.

![Figure 8 Relay](image)

**Ultrasonic Sensor**

The Figure 9 ultra-sonic sensors are used to detect the level of water in the tank. According the level of water in tanks the sensor gives the output to the controller as input So that the micro-controller decides to take water from the sources.

**Distance = Speed × Time**
ESP8266 Wi-Fi Module
ESP8266 Wi-Fi Module delivers the conductivity level status, Humidity, temperature status to the user through the website using cloud. So, the user gets information from anywhere in the field. ESP8266 also programmed to display in understandable manner so that the user gets the output as status as abnormal or normal. The shows the Wi-Fi-module used in the setup.

Figure 10: ESP8266 Wi-Fi module

IV. EXPERIMENTAL SETUP
The Figure 11 shows the Top view of the experimental setup of the project.

A. CROP YIELD ESTIMATION
In the Error! Reference source not found. represents the input field displayed in the MATLAB and here the user will enter the crop that is going to be yielded.

Figure 12: Input given by the user in MATLAB
In the

Figure 13 shows the MATLAB output which is the comparison between the past data and current field data of the crop.

V. RESULT AND DISCUSSION

A. Hardware Output

In Figure 14 shows the hardware Output of the project. The LCD display prints the status of Water Source selected and nutrient content balance status. In the Mobile Output (a) and Mobile Output (b) below shows the nutrient is balanced and nutrient is not balanced respectively.

B. Mobile Output

In the Figure 15: Mobile Output (a) and Error! Reference source not found. shows the output to the user based on the nutrient balance calculation done in MATLAB. It shows the conductivity level, light, temperature, humidity levels and water source selected and the nutrient balance status.
Figure 16: Mobile Output (b)

VI. CONCLUSION

The project entitled "FIELD MONITORING AND RAIN WATER HARVESTING AUTOMATION USING IOT" is an effective prototype and safety system using IOT by ATMEGA 328p that meet our objectives of the project with less cost and long-lasting network lifetime by using automation. Farmers will receive farming guidance throughout the entire cultivation period including solutions for diseases attacks. This will attract new younger generation into the farming sector and also increase the quality of the produces. Automation of the water irrigation system will reduce the man power required and the necessary of the former to stay in the field.

VII. REFERENCES


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