IoT based Agriculture Monitoring and Smart Irrigation System using Raspberry Pi

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Abstract – Internet of Things (IoT) is a shared Network of items where these gadgets interact through Internet. One of the essential programs of IoT is Smart Agriculture. Smart Agriculture reduces wastage of water, fertilizers and increases the crop yield. Here a system is proposed to screen crop-field the usage of sensors for soil moisture, humidity and temperature. By tracking these parameters, the irrigation gadget can be computerized if soil moisture is low.

Keywords - Soil moisture sensor, IoT, Cloud As the networking, Wi-Fi networking, Raspberry Pi.

I. INTRODUCTION

As the sector is trending in the direction of new technologies and implementations it's far a vital intention to fashion up in agriculture too. Many researches are done in the area of agriculture and most of them signify using wireless sensor network that collect records from one-of-a-kind sensors deployed at diverse nodes and ship it thru the wireless protocol. The collected records offer the records approximately the diverse environmental factors. Monitoring the environmental factors is not the complete way to growth the yield of crops. There are range of other elements that decrease the productiveness. Hence, automation should be carried out in agriculture to conquer those problems. In order to provide way to such problems, it's miles important to expand an integrated machine which wills enhance productivity in each stage. But, whole automation in agriculture isn't achieved because of various issues. Though its miles applied in the research level, it isn't always given to the farmers as a product to get benefitted from the resources. Hence, this paper deals approximately developing clever agriculture the use of IoT and given to the farmers.

II. LITERATURE SURVEY

The new scenario of decreasing water, drying up of rivers and tanks, unpredictable environment, gift an urgent want of right utilization of water. To cope up with this use of temperature and moisture, sensors are positioned at suitable places for tracking the crops. After studies inside the agricultural discipline, researchers found that the yield of agriculture is reducing day by means of day. However, use of technology in the subject of agriculture performs an essential function in growing the production in addition to in reducing the manpower. Some of the research attempts are performed for betterment of farmers that offer structures which use agriculture plays an important role in increasing the production as well as in reducing the manpower. Some of the research attempts are done for betterment of farmers that provide systems which use Technologies beneficial for increasing the agricultural yield. The cloud computing gadgets create a whole computing device from sensors to equipment that observe statistics from agricultural field and as it should be feed the information into the repositories. This concept proposes a unique methodology for clever farming through linking a smart sensing gadget and smart irrigation machine through wireless communication technology. It proposes a low fee and green wifi sensor network approach to accumulate the soil moisture, Humidity, temperature from various places of field and as per the need of crop water motor is enabled. It proposes an idea approximately how automated irrigation device became developed to optimize water use for agricultural purposes.

III. SYSTEM OVERVIEW

The venture is composed of 4 main components: Raspberry Pi, DHT11Sensor, Soil Moisture Sensor, Relay. The block diagram is shown below:

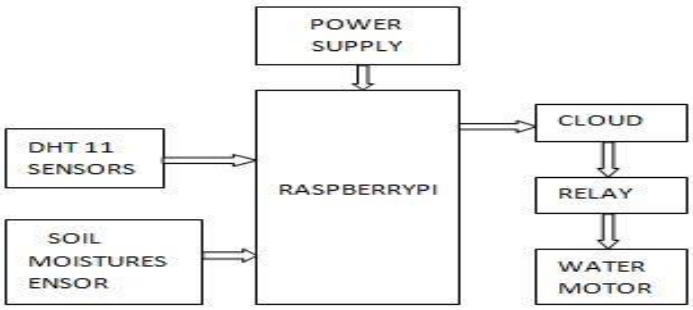

Fig.1 Block Diagram

IV. HARDWARE USED

A. Raspberry Pi

The Raspberry Pi is small pocket size laptop used to do small computing and networking operations. It is the main element within the discipline of net of things. It gives get admission to the net and subsequently the connection of automation system

With remote location controlling device becomes possible. Raspberry Pi is to be had in numerous versions. Here, version Pi 2 version B is used, and it has quad-middle ARM Cortex-A53 CPU of 900 MHz, and RAM of 1GB. It additionally has: forty GPIO pins, Full HDMI port, four USB ports, Ethernet port, 3.5mm audio jack, video Camera interface (CSI), the Display interface (DSI), and Micro SD card slot.

Fig. 2 Raspberry Pi

Fig. 3 DHT eleven Sensor

B. DHT eleven Sensor

The DHT11 is a basic, low-fee virtual temperature and humidity sensor. It gives out virtual value and hence we will deliver its output without delay to information pin rather than ADC. It has a capacitive sensor for measuring humidity. The most effective real shortcoming of this sensor is that one can only get new facts from it most effective after every 2 seconds.

C. Soil Moisture Sensor (YL-69)

Soil moisture sensor measures the water content in soil. It uses the assets of the electric resistance of the soil. The relationship the various measured belongings and soil moisture is calibrated, and it varies depending on environmental factors consisting of temperature, soil type, or electric conductivity. Here, it is used to experience the moisture in discipline and transfer it to raspberry pi a good way to take controlling movement of switching water pump ON/OFF.

Figure 4: Soil Moisture Sensor

Figure 5: Relay

D. Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other working principles are also used, which includes solid-nation relays. Relays are used where it is important to manipulate a circuit through a separate low-electricity signal, or where numerous circuits should be controlled by using one signal.

V. SOFTWARE USED

A. Python

Python is an interpreted high-level programming language for general-cause programming. Created by way of Guido van Rossum and first released in 1991, Python has a design philosophy that emphasizes code readability, and a syntax that lets in programmers to specific principles in fewer strains of code,[25][26] appreciably using considerable whitespace. It gives constructs that enable clean programming on both small and big scales.

E. ThingSpeak

ThingSpeak is an open source Internet of Things utility and API to save and retrieve records from things the use of the HTTP protocol over the Internet or through a Local Area Network. ThingSpeak permits the advent of sensor logging applications, vicinity monitoring applications, and a social network of things with fame updates. ThingSpeak was launched as a service in aid of IoT applications.

Graph Plots: The outputs of sensors are shown below:

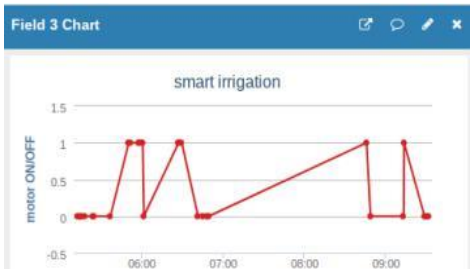

Figure 5: Experimental Result

Figure 6: Sensor Output

The sensors are linked to raspberry pi and electricity deliver is given. The raspberry pi reads the values from Sensors and posts the data to the cloud server. If the values are much less than the already set threshold values, then the relay receives ON, and the relay switches ON the motor. The motor remains in ON condition till the thing that is much less than the threshold fee reaches the threshold fee. When the threshold cost is reached, the relay mechanically switches off the motor. The connections of the experiment are proven below.

VI. CONCLUSION

The sensors are efficiently interfaced with raspberry pi and wireless verbal exchange is achieved. All observations and experimental tests prove that this assignment is a complete approach to the field activities irrigation problems. Implementation of such a device inside the discipline can certainly help to improve the yield of the vegetation and aids to control the water resources correctly lowering the wastage.

VII. FUTURE SCOPE

Our challenge may be improvised by the use of a sensor to be aware the soil ph value such that utilization of pointless Fertilizers can be reduced. A water meter may be hooked up to estimate the amount of water used for irrigation and as a result giving a price estimation. Further, it additionally reduces the funding of farmers.

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