



IOT Based Smart Irrigation System Using Raspberry Pi

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Abstract:

Water is the most essential contribution for upgrading agricultural productivity and therefore expansion of water system has been a key format in the improvement of farming in the nation. An Automated Sprinkler irrigation system divides water into crops/plants by spraying on it within the crops/plants as an all organic rain. Inside this informative article we'll build up an automated scatter system that'll enable a farmer/people to be conscious of his discipline, and also the standing of the plant in his own dwelling or else he will be living at just about any region of earth. This job helps the farmers to irrigate the farmland at a exact reliable manner together with automated irrigation process predicated in the humidity, soil, climate conditions .This sprinkler process may offer handle for dirt humidity, humidity detection to make certain plants is more watered if there's requirement, live loading and in addition provide sunlight warmth, humidity feeling, prediction research from additional weather options. Whenever there's a big change in humidity, humidity and present standing of rainfall within this environmental surroundings those sensors sensations the shift in humidity and temperature and supplies an obvious sign into the blossom pi. H2o extra irrigation maybe perhaps not just lessens plants generation but in addition damages dirt fertility and causes environmental threats for example water-wasting and salinity. In the past few years that the sense of energy and water dialog has caused the increased usage of sprinkler technique .Currently the automation is just one among the essential functions inside the lifetime span. It doesn't just provides relaxation but in addition reduce vitality, efficacy and timesaving. Currently per day that the businesses are employing a automation and get a grip on machinery that are saturated in price tag and also maybe perhaps not acceptable for utilizing within a garden & farm niche. Therefore within this job we'll look for a wise irrigation technological innovation located on IoT utilizing Raspberry-Pi. The suggested sprinkler process will likely probably be reduced in operational and cost by most farmers. Raspberry-Pi Is the Principal hub of the Total system.

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I. INTRODUCTION

India is one of the largest freshwater user in the world, and our country uses large

amount of fresh water than other country.

There is a large amount of water used in agriculture field rather than domestic and



industrial sector. 65% of total water is contributes as a groundwater. Today water has become one of the important source on the earth and most of used in the agriculture field. As the soil-moisture sensor and temperature sensor are placed in the root zone of the plants, the system can distributed this information through the wireless network. The raspberry pi is the heart of the system and the webcam is interfaced with Raspberry pi via Wi-Fi Module. Python programming language is used for automation purpose. The system is a network of wireless sensors and a wireless base

station which can be used to provide the sensors data to automate the irrigation system. The system can used the sensors such as soil moisture sensor and soil temperature sensor and also ultrasonic sensor. The raspberry pi model is programmed such that if the either soil moisture or temperature parameters cross a predefined threshold level, the irrigation system is automated, i.e. the relay connected to the

raspberry pi will turn ON or OFF the motor. This paper present an efficient, fairly cheap and easy automated irrigation system.

This system once installed it has less maintenance cost and is easy to use. By using the webcam with suitable application on mobile phone we can easily online monitoring the actual situation of the field and sensors such as soil moisture and temperature are used to provide the information about changes occurs in the

field. It is more advantageous than the traditional agriculture techniques.

II. LITERATURE SURVEY

The Ravi Kishore Kodali et.al manufactured a wise irrigation platform established MQTT Proto Col. They truly have been employing Esp8266 NodeMCU-12E, dirt moisture detector and drinking water pump. Inside this procedure communication Queue Telemetry Transport Protocol (MQTT) can be useful to transport the info amongst Esp8266 NodeMCU12E along with also the detector. Soil dampness transmits info to Esp8266 NodeMCU-12E, when dirt is sterile afterward Esp8266 NodeMCU-12E mail schooling to h2o heater and water heater may commence off out and moisture moves upward from a few significance it's going to away water pump. They're utilized liquid crystal display to produce the ongoing condition of dirt and drinking water pump. Minwoo The Ryu et.al create an approach to earn a wise FARM-ing by linking farms predicated on Internet of Things (IoT). Currently they're utilizing relaxation APIs to transport info, Mobius that will be IoT supportive platform and also Cube that's really actually just a middleware in among physiological apparatus i.e. detector and Mobius. Data that will be gathered from sensors sends to Mobius making use of block and end-user send an petition particular plantation making use of relaxation APIs into Mobius. End-user may view effect of petition Is Able to See Mobile Application creator suggested a platform using wireless sensor system utilizing RFID. Inside this technique, au thor set soil



humidity on separate place while inside the discipline i.e. farm or it may function as quite described as considered a farm and also each detector has its own distinctive ID. Currently detector transmits an info to ZigBee in 2.45 GHz. Currently detector transmits that info to base channel of creator suggested a platform using wireless sensor system utilizing RFID. Inside this technique, author set soil humidity

on separate place while inside the discipline i.e. farm or it may function as quite described as considered a farm and also each detector has its own distinctive ID. Currently detector transmits an info to ZigBee in 2.45 GHz. Currently detector transmits that info to base channel of course, should soil is sterile afterward pump channel can begin scatter water just on this section of the area.

III. RELATED WORK

After extensive research in the agricultural field, many researchers found that the agriculture area and its productivity are decreasing by the day. With the Use of different technology in the field of agriculture we can increase the production as well as reduce manual efforts. This paper shows the technology used in agriculture sector based on IOT and Raspberry Pi. Chandan kumar Sahu proposed a system on “A Low Cost Smart Irrigation Control System”. It includes a number of wireless sensors which are placed in different directions of the farm field. Each sensor is integrated with a wireless networking device and the data

received by the “ATMEGA318” microcontroller which is on the “ARDUINO-UNO” development board. The Raspberry pi is used to send various types of data like text messages and images through internet communication to the microcontroller process [1]. Supraha Jadhv proposed, automated irrigation system using wireless sensor network and raspberry pi that control the activities of drip irrigation system efficiently [2]. Sebastian Hentzelt proposed a paper on the water distribution system and gave results to decompose the original nonlinear optimal control problem (OCP) [3]. Joaquin Gutierrez attempted a paper that research automated irrigation system using a wireless sensor network and GPRS module instead of the Raspberry pi [4]. Ms. Deweshvree Rane Proposed “Review paper based on Automatic Irrigation System Based on RF Module” it is based on the RF module, this device is used to transmit or received radio signal between two devices. It’s design is complex because of the sensitivity of radio circuits and the accuracy of the components [5]. Karan Kansara proposed “Sensor based automatic irrigation system with IoT”, this irrigation system is used a rain gun pipe, one end connected to the water pump and another to the root of plant. It doesn’t provide water as a natural rainfall like sprinkler and also it uses only soil moisture sensor [6]. G. Parameswaran proposed “Ardino based smart irrigation system using Internet of Things”, the

researcher has not used Raspberry pi instead the work is done using arduino controller without use of soil moisture ensors [7].

IVPROPOSED SYSTEM

The block diagram of the proposed system as shown in Fig.1 and Fig.2. The main components of this diagram are Sensors, Raspberry Pi module, Wi-Fi connection, LDR, relay, motor, and lamp.

1. Transmitting section

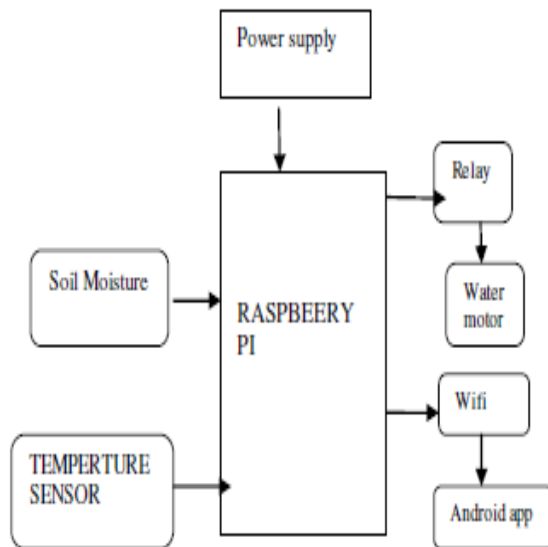


Fig 1: Irrigation Control System (Transmitting Section)

The above figure shows that main block diagram of Irrigation control system. In that main model is Raspberry pi 3 model, Relays, LDR, Sensors. In this control system three sensors are such as soil moisture sensor, temperature sensor, ultrasonic sensors are connected to the raspberry pi 3 model also Fig 3.2.1: Soil Moisture Sensor Wi-Fi connection is connected to the model. The connection of raspberry pi is given to the relay 1 and relay 2 which are again given

to the motor and lamp respectively. LDR connection is given to the relay 2.

2. Receiving section

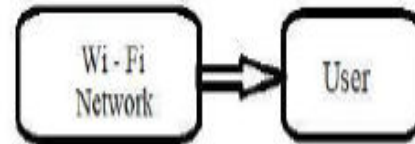


Fig 2: Monitoring Unit (Receiving Section)

Above figure shows that receiving section of the main module i.e Monitoring unit. In that two section are present one is Wi-Fi network and user. This connection again given to the raspberry pi 3 module.

3.2. SENSORS

A sensor is a device, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a computer processor. In short sensors are the device which

converts the physical parameter into the electric signal. A sensor's sensitivity indicates how much the sensor's output changes when the input quantity being measured changes. The system which shown in fig.1 consists of Soil moisture sensor - used to measure the moisture content of the soil. Temperature sensor - used to detect the temperature of the soil. Ultrasonic sensor - used to measure the water level in the water tank.



Fig 3.2.1: Soil Moisture Sensor



Fig 3.2.2: DHT 11 (Temperature Sensor)

3.3. RASPBERRY PI

Raspberry Pi is a small sized single board computer which is capable of doing the entire job that an average desktop computer does like spread sheets, Word processing, Internet, Programming, Games etc. It contain 1GB RAM, 2 USB, ARM V8 Processor and an Ethernet port, HDMI & RCA ports for display, 3.5mm Audio jack, SD card slot (bootable), General purpose I/O pins, runs on 5v.



3.4 RELAY

A relay is an electrically operated switch. Relays are used where it is necessary to control a circuit by a separate low-power signal. A relay with calibrated operating characteristics and sometimes multiple

operating coils are used to protect electrical circuits from overload. As shown in above figure raspberry pi is connected to the devices via relay. Here relay can be operated as switch to on or off the devices.



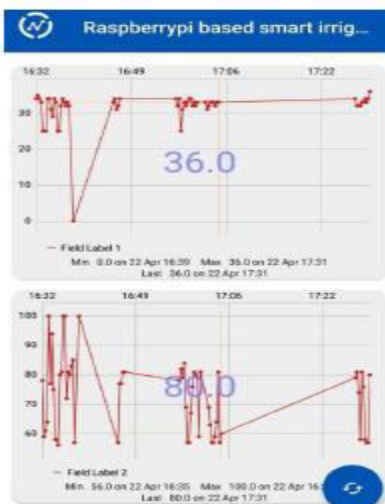
Fig 3.4: Relay

As the Raspberry Pi is the heart of the system. This system contain webcam which is interfaced to Raspberry Pi via Wi-Fi module. The Raspberry Pi Model zero incorporates a number of enhancements and new features. This features of raspberry pi are improved power consumption, increased connectivity and greater IO which made this powerful, small and lightweight ARM based computer. The Raspberry Pi cannot directly drive the relay. It has only zero volts or 3.3 V. It needs 12V to drive electromechanical relay. In that case it uses a driver circuit which provides 12V amplitude to drive the relay. Various sensors are connected to the Raspberry Pi board give a resistance variation at the output. This output signal is applied to the comparator and signal conditioning circuit which has potentiometer to decide the moisture level above which the output of comparator goes

high. This output signal is given to the Raspberry Pi board. If the soil moisture value is above the moisture level then the 3 phase induction motor will be OFF, whereas if the moisture level is low motor will be ON through the relay. LDR (Light Dependent Resistor) is used to control the light automatically and by using this we can monitor the farm at night also.

V . Humidity and Moisture measurement

Results



VI . HARDWARE PART AND RESULT



VII. CONCLUSION

The Raspberry-Pi is an increasingly equally significant part system that can cope with the working and processing. Within this suggested process we utilised quite a few sensors such as dirt dampness to quantify dampness of dirt, fire detection detector to find flame along with ultra sonic detector to get the drinking water amount also. GSM module to inform the farmers regarding ongoing condition of these

farms. If dirt demands water we'll send material in addition to e mail to gardener around water along with water amount. To inform the farmer around dryness we put point price. If rely goes to this count technique will inform that the predator. If flame remains present in plantation, machine may even inform famer relating to this via email and message. System additionally ship inform concerning water-level of effectively.

VIII . REFERENCES

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