

Irrigation System using Internet of Things

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Abstract: India is mainly an agricultural nation. Agricultural is the most imperative occupation for the huge majority of the Indian families. It assumes imperative part in the advancement of farming nation. In India, agriculture contributes around 16% of aggregate GDP and 10% of aggregate exports. Water is primary asset for Agriculture. Irrigation is one method to supply water but in some cases, there will be lot of water wastage. The principle goal of arduino based automatic irrigation system using IoT project is to give an automatic irrigation system there by saving money, time and power of the farmer. The customary farm-land irrigation system methods require manual mediation. With the automated technology of irrigation the human mediation can be minimized. In this project, we are utilizing different sensors like temperature, humidity and soil moisture sensors that sense the different parameters of the soil. In addition, based on soil moisture value land is automatically irrigated by ON/OFF of the motor. These sensed parameters will be displayed on user mobile device.

Keywords: green house, iot, arduino

1. Introduction

The intention of this Project is to monitor and control the water stream to an irrigation system utilizing Mobile telephone. This can be accomplished by utilization of soil moisture sensor, which detects the water content in the soil. This sensor yield is given to Arduino based control system for further data processing. Main objective of Project is to send a sensed information from the sensor to farmer regarding irrigation system. This system also supports water administration choice which decides the controlling time for the procedure. In this system we make use of one Arduino Uno controller which is committed at the water pump. The Arduino shapes the core of system and there are additionally soil moisture sensors which are intended for recognizing the dampness in the soil. Likewise ESP modem which will act as interface between arduino and farmer mobile device. Agricultural irrigation based on Internet technology is based on crop water necessity rules. By using Internet technology and sensor network technology we can reduce water wastage and to maximize the scientific technologies in irrigation methods. Hence it can extraordinarily enhance the usage of water and can build water efficiency.

India's real wellspring of incomes from agribusiness segment and 70% of agriculturist and general people rely upon the farming. In India the majority of the water system frameworks are worked physically. These outdated strategies are supplanted with semi-automated and automated techniques. The accessible customary methods are like terraced irrigation, ditch irrigation,

drip irrigation, sprinkler system. The worldwide irrigation scenario is divided by expanded for higher agricultural yield, poor execution and diminished accessibility of water for agribusiness. These issues can be properly rectified if we use automated system for irrigation.

As we realize that India is a developing nation and more wired connection. We present another the main part of our GDP development rate has a place with system which will have wireless connection among agriculture alone. So we can say that agriculture is the server and nodes. Compared to the wired link web in the economic development of country from the time when the server system. This system is characterized by having no Independence. Major part of our expenditure is spent on wires between the web server and terminal nodes. These agriculture alone and in spite of that we not getting systems have lower cost and having more flexibility of the required output. In India, there is irregular biological network topology. This project has been designed to conquer the needless water flow into the agriculture lands. Temperature, dampness and moistness readings are persistently observed by utilizing mugginess, moisture and temperature sensor and send these values to the assigned IP address. Android application persistently gathers the information from that assigned IP address. Once the soil dampness esteems are surpassed as far as possible then the relay, which is connected with the arduino microcontroller controls the motor.

2. Literature review

Primary investigation is carried out under the following stages, such as Understanding the existing approaches, Understanding the requirements, developing an abstract for the system. In this term paper, soil moisture sensor, temperature and humidity sensors located in root zone of plant and transmit data to android application. Edge estimation of soil dampness sensor that was modified into a microcontroller to control water amount. Temperature, humidity and soil moisture values are displayed on the user mobile device.

Izzatdin Abdul aziz, Mohdhilmihasan, Mohd Jimmy Imail, Mazlina Mehat and Nazleeni Samiha Haron, 2008 [2] propose an work in which Remote Monitoring in Agricultural Greenhouse Using Wireless Sensor and Short Message Service (SMS). In this project they are sending data via sms but proposed system sends the values to user mobile device. This project is arduino based remote irrigation system developed for the agricultural

cultivated area, which is located at the remote location and essential water provides for cultivated area when the humidity of the soil goes under the set-point value. But in this we did not aware about the soil moisture level so to overcome this drawback proposed system included with extra feature soil moisture value and temperature value which displayed on the farmer mobile application.

MahirDursun and SemihOzden, 2012 [5] A wireless application of drip irrigation computerization supported by soil moisture sensors" in this paper irrigation is carried out using soil moisture values but extend to this proposed system displays temperature and humidity values.

S. R. Kumbhar and Arjun P. Ghatul, 2013 [4] propose a work on 'Microcontroller based Controlled Irrigation System for cultivated area in this project old generation with lesser memory microcontroller is used to control the system but proposed system made use of arduino uno board which is user friendly and it helps to dump the programs easily.

LaxmiShabadi, NandiniPatil, Nikita. M, Shruti. J, Smitha. P and Swati. C, 2014 [3] they are worked on system 'Irrigation Control System Using Android and GSM for Efficient Use of Water and Power' this scheme made use of GSM to control the system which may cost more so to overcome that proposed system used arduino Uno board and wifi module.

Jeonghwan Hwang, Changsun Shin, and Hyun Yoe, 2013 [9] propose a work on 'Agriculture Environment Monitoring System Using Wireless Network' in this project they have built up a brilliant remote sensor arrange (WSN) for an agriculture domain. Checking farming condition for different factors, for example, temperature and dampness alongside different elements can be of importance. In this project with the help of sensors we will trace the soil parameters similar to moisture, ph, temperature and also wetness of air. Then by the help of lesser memory microcontroller PIC 16F87XA they will process those parameters but proposed system made use of sufficient memory microcontroller such as arduino uno board which is user friendly and it helps to dump the programs easily.

Bishnu Deo Kumar, Prachi Srivastava, Reetika Agrawal, Vanya Tiwari, 2017 [20] propose an work on 'Microcontroller Based Automatic Plant Irrigation System' The aim of this paper is to present information about automatic irrigation to the plants which helps in saving money and water. The whole system is controlled using ATMEGA 328 microcontroller which is giving the suspend signal to the motor. Temperature sensor and humidity sensor are associated with inside ports of small scale controller by means of comparator, at whatever point there is a vacillation in temperature and dampness of the condition these sensors detects the adjustment in temperature and stickiness and gives an intrude on flag to the miniaturized scale controller and in this manner the engine is enacted, alongside this ringer is utilized to show that pump is on. In this paper irrigation is carried out using soil moisture values and temperature values but extend to this proposed system humidity values and this system use of GSM to control the

system which may cost more so to overcome that proposed system used arduino Uno board and wi-fi module. By referring all above proposed works it is found that no such systems are existed with all integrated features but proposed system includes these all features such as displaying temperature, humidity and soil moisture values and also automatic switching on and off of motor by considering soil moisture values.

A. Problem definition

Arduino based automatic irrigation system using IOT is based on concepts mechatronics. In recent projects related to automatic irrigation system are uses only soil moisture value is considered or soil humidity value is considered but it is necessary to display temperature and humidity value on farmer mobile device but proposed system includes these all features such as displaying temperature, humidity and soil moisture values and also automatic switching on and off of motor by considering soil moisture values. The recent project related to automatic irrigation system uses GSM technologies for sending data via SMS to monitoring the system, which may cost more so to overcome that in our proposed project use Wi-Fi module for sending the data to user.

B. Objectives

The core goal of this project is to provide an automatic irrigation system in this manner saving power, time and money of the farmer. The customary farm-land irrigation techniques require manual intercession. With the automated technology of irrigation the human intercession can be limited.

3. Hardware components of automatic irrigation system

The Fig. 1 is an overall block diagram of arduino based automatic irrigation system which consist of four sensors which are connected to controller and sensed values from these sensors are send to the user mobile device using assign IP address.

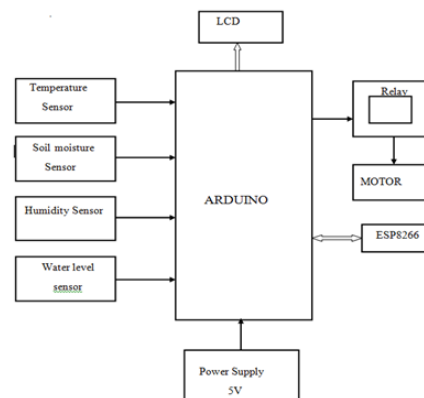


Fig. 1. Block diagram of arduino based automatic irrigation system.

Farmers begin to use different monitoring and controlled system to expand the yield with help of automation of a agriculture parameters like temperature, humidity and soil moisture are monitored and control the system which can help

the farmers to progress the yield. This project incorporates an implanted fram for programmed control of irrigation. This project has remote sensor organize for ongoing detecting of irrigation system. This system gives uniform and required level of water for the rural homestead and it keeps away from water wastage. At the point when the dampness level in the soil reaches beneath threshold value then system automatically switch ON the motor. At the point when the water level achieves ordinary level the motor automatically turn OFF. The sensed parameters will be displayed on user's mobile device.

A. Components required

Hardware components required:

- Arduino Uno board
- Soil moisture sensor
- Humidity sensor
- Temperature sensor
- Water level sensor
- ESP8266 Wi-Fi module
- Liquid Crystal Display
- Relay
- Motor
- Power supply

The Arduino based automatic irrigation system using IoT project is use the software Arduino IDE.

4. Implementation of irrigation system

Fig. 2, shows schematic diagram of arduino based automatic irrigation system using IOT. As shown in the Fig. 2 the Soil Moisture sensor, Humidity sensor and Temperature sensor outputs are connecting to analog pins A0, A1 and A2 of arduino controller respectively and Water level sensor output is digital signal that is connecting to 7th digital input or output pin of arduino.

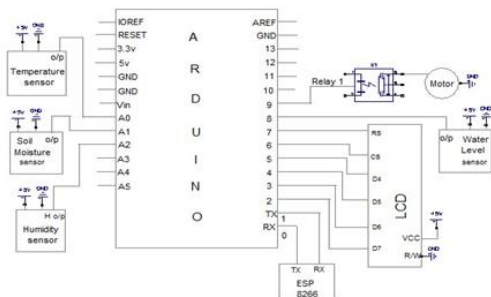


Fig. 2. Schematic diagram of automatic irrigation system.

The Wi-Fi module transmitter connecting to receiver pin of Arduino and receiver of Wi-Fi module connecting to the transmitter pin of Arduino. A 16*2 LCD is connected with arduino in 4-bit mode. Control pin RS, RW and En are specifically associated with arduino pin 7, GND and pin 6 of arduino and data pin D4-D7 is connected with 5, 4, 3 and 2 of arduino. Relay connected to pin 9 of arduino and here 12V relay is used and it act as interface between arduino and motor. The

motor ON/OFF is based on the predefine soil moisture sensor level, if soil moisture level less than predefine value then motor ON otherwise motor will be OFF.

5. Results

Result of Arduino based automatic irrigation system is display information about soil moisture of field, field surrounding air humidity and temperature using soil moisture, humidity and temperature sensor display on mobile device as shown the Fig. 3.

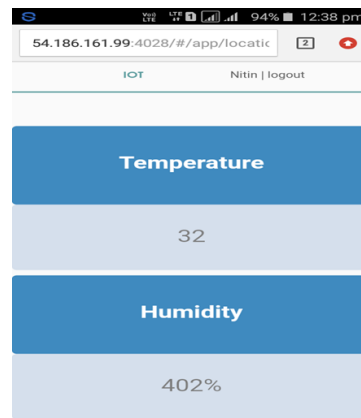


Fig. 3. Sensor value display on farmer mobile device

In the Fig. 3, shows field air Temperature and humidity are 32oC and 402% and also shows LDR is 511% means that soil wetness is less than the predefine value then arduino switch ON the motor. The Fig. 3, shows water level is Low.

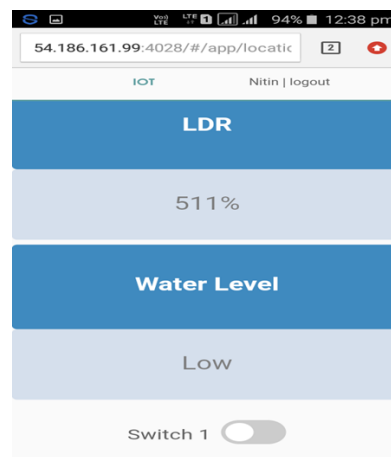


Fig. 4. LDR and water level

6. Conclusion

This paper presented the implementation of the irrigation system using internet of things.

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