REVIEW ON AUTOMATED IRRIGATION SYSTEM USING IOT

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Abstract - In the real world many farmers face problem in observing their farms. When huge lands are there it's more difficult to monitor all the farms at the time. Hence our project is to monitor the farms in the field using the concept of IoT (Internet of things). Here we monitor temperature, moisture, water level and according to the readings of the sensors automatically values are stored in cloud database. Here all the data are been hosted into the server and we are able to monitor the farms continuously and also we are able to monitor the health of farms. By using of this concept the development time gets reduced and we save more time for monitoring the farms. And also we don't have to worry about the health of crops because the readings are noted in the server automatically. Moisture sensor is used to check the soil humidity in land. Temperature sensor is used to sense the climate of environment. These values continuously monitored in LCD display. The automated irrigation system provides a web interface to the user so that the user can monitor.

Key Words: Internet of Things, Arduino UNO, Agriculture, water, Arduino IDE, Irrigation.

1. INTRODUCTION

Agriculture is the backbone of all traditional countries [3]. One of the main aspects of human survival is the agriculture which is the main source of food [2]. It uses 85% of available fresh water resources global and this percentage continues to be leading in water consumption because of population growth and enlarged food demand an automated irrigation system is needed to adjust water level for agricultural crops. The need of automated irrigation system is to overcome irrigation and under irrigation [3]. The system was studied and developed to build the wireless sensor network to assess the temperature, humidity and water level adjustment, and of the sensor node necessary for the best farming environment, and of the monitoring managing devices to collect and analyse such collected data from sensor node and to store them in the management server and to alert emergency [4]. By using the data from the sensor network, watering is automated. It saves 53% of water than sprinkler system and more than 80% of water when compared to traditional water fed system. Using the grouping of humidity, moisture, and light sensors, crop productivity can be increased [5]. The data logger on weather Station collects the data from sensors and transmits. Each farmer, seeking the service, is initially required to perform registration by providing the details of the field location, crop, crop type, soil type, and history of irrigation, fertilizer on the field [6]. Regulating all these operations will be through any remote smart device or computer connected to Internet and the operations will be performed by interfacing sensors, Wi-Fi and micro-controller and Arduino Uno [1].

2. LITERATURE SURVEY

G. Naveen Balaji*, V. Nandhini#, S. Mithra#, N. Priya#, R. Naveena# (2018) proposed a paper in which the different sensors used are temperature and humidity sensor and soil moisture sensor The information collected by the sensors is sent to the Arduino microcontroller ATmega328. The collected info can be shown in an LCD. A webpage is created and the information collected by the sensors is updated periodically in it through Wi-Fi. A GSM module is connected with the microcontroller through which the message about the farm condition is sent to the authorized person [2].

R.Nandhini1, S.Poovizhi2, Priyanka Jose3, R.Ranjitha4, and Dr.S.Anila5(2017) proposed a paper in which DHT11, PIR, Pressure sensor are connected to the input pins of Arduino

microcontroller. The detected values from the sensors are showed in LCD. If the sensed value goes beyond the threshold values the pump will be automatically switched ON/OFF. By using this system, the farmer can access the details about the condition of the field anywhere at any time [3].

Dr.G.Rajakumar1, M.Saroja Sankari2, D.Shunmugapriya3 and S.P.Uma Maheswari4 (2018) proposed a paper in which the field like temperature sensor, moisture, ultrasonic and humidity with the help of these sensors data is being measured. The water and insecticides are scattered by using spray motor and motor pumps. The ultrasonic sensor is used to observe the growth of the plants, one can spot the plants from anytime, anywhere in the webpage via IoT. Thing speak is added to the Arduino that supports the hardware platform. Observing the plant development by using an ultrasonic sensor sending the status to the webpage. Watering will be done automatically by predefined time delay [4].

S. KUMAR REDDY MALLIDI (2018) proposed a paper in which this work uses a Raspberry pi 3 and a gathering of sensors of temperature, humidity, soil moisture, water level, and light. It also has a small camera and a GSM module connected to it. The Raspberry pi sometimes gathers data from the sensors and sends it to the server, supplies it to the local database and also optionally to the farmer using the GSM module. The web server receives data from different devices and provides a web interface to the farmer. It also sends a Short Message Service (SMS) to the farmer on critical situations by processing the data collected from the farmer [5].

Kajal N. Dhawale, Dr. Narendra Bawane (2019) proposed a paper in the entire field that is embedded with sensor nodes including soil moisture sensors, humidity sensors, soil Ph sensor, a controller node, solar panels, irrigation sprinkler, and control valves. For all the events, the information about the status of the water level, motor on/off, moisture and temperature level will be notified to the user via SMS [6].

3. METHODOLOGY

In this work, the automatic irrigation system based on a low power microcontroller was technologically advanced and deployed. To overcome the disadvantages of the existing system like a high price, problematic in maintenance and wired assembling, we introduce a new system that will have a wireless connection between server and nodes. We introduce a new design of embedded web servers making use of the Arduino controller. The automated irrigation system consists of a distributed sensor network built using a soil moisture sensor, temperature sensor, humidity sensor, and water level sensor. The water level sensor senses the extra water in the field. Earlier, farmer faced the problem of sending SMS and making calls, overcoming which we are designing a desired application which does the works depends upon sensor values.

The advantages are**:**

1) It allows farmers to maximize yields using minimum resources such as water, fertilizers, seeds, etc.
2) Solar-powered and mobile operated pumps save the cost of electricity.
3) Smart agriculture use drones and robots which help in many ways. These improve the data collection process and helps in wireless monitoring and control.
4) It is a cost-effective method.
5) It delivers high-quality crop production.

4. COMPONENTS REQUIRED

4.1 Arduino UNO

The Arduino Uno is an open-source microcontroller panel based on the Microchip ATmega328P microcontroller. The ATmega328 on the board comes pre-programmed with a boot loader that allows uploading new code to it without the use of an exterior hardware programmer [7].

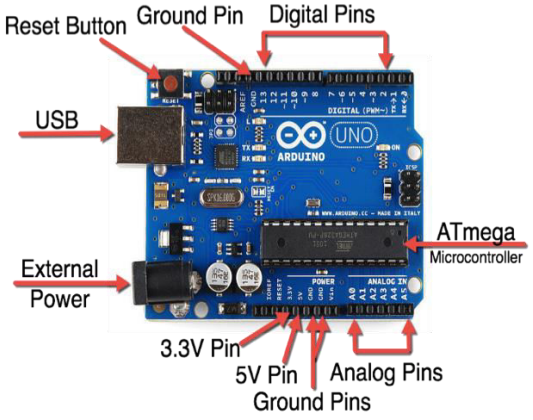

Fig-1 Arduino UNO

4.2 Soil moisture sensor

Soil moisture sensor measures the water level in soil. It uses the property of the electrical resistance of the soil. The relationship among the measured property and soil moisture is calibrated and it may vary depending on environmental factors such as temperature, soil type, or electric conductivity. Here, it is used to sense the moisture in field and transmission it to microcontroller in order to take controlling action of switching water pump ON/OFF [1].

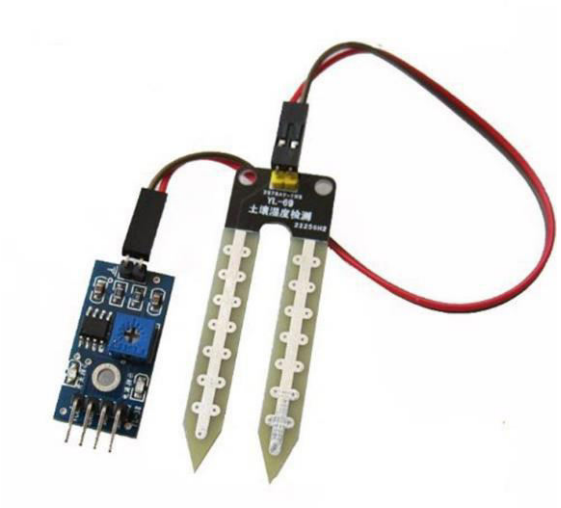

Fig- 2 Soil moisture sensor

4.3 DTH11 Sensor

The DHT11 is a low-cost numerical temperature and humidity sensor. It gives out digital value of the microcontroller and hence we can give its output directly. It has a capacitive sensor for measuring humidity and temperature. The only real shortcoming of this sensor is that one can only get new data from it only after every 2 seconds [1]. This DHT11 Temperature and Humidity Sensor features a standardized digital signal output with the temperature and humidity sensor capability.

Fig.-3 DTH11 Sensor

4.4 WI-FI Module

The ESP8266 is a low-cost Wi-Fi module with full TCP/IP stack and MCU (microcontroller unit) capability. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connection [2].The ESP8266 Wi-Fi module is integrated with TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 module is a very cost effective board with a huge, and ever growing, community.

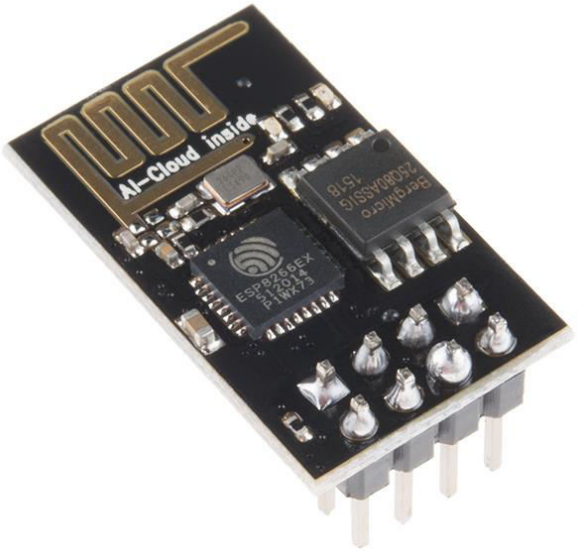

Fig.-4 Wi-Fi module

4.5 LCD DISPLAY

LCD (Liquid Crystal Display) is a type of level panel display which uses liquid crystals in its main form of operation. LCDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones and computer monitors.

Fig-5 LCD Display

4.6 **Buzzer**

Buzzer is an electrical device. When the soil moisture goes beyond the level it makes sound similar to a bell or buzzing noise and is used for signaling.

Fig-6 Buzzer

4.7 DC pump

The developed system consists of different IoT devices like a water pump. This information will be sent to the cloud and the user can analyze the amount of water. These sensor values are sending to the water pump via the relay to turn on/off the pump.

Fig-7 Buzzer

4.8 Relay

A relay is an electrically activated switch. That works on the principle of an electromagnetic attraction. Relays are used where it is required to control a circuit by a free low-power signal, or where many circuits must be controlled by one signal. In current electric power systems, these functions are done by digital instruments.

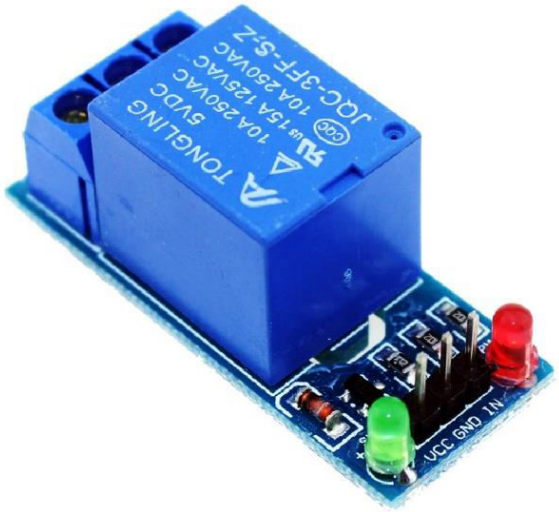

Fig-7 Realy

4.9 Arduino IDE

The Arduino Integrated Development Environment (IDE) is a cross-platform application that is written in functions from C and C++. The Arduino IDE supplies a software collection from the Wiring project, which provides some common input and output procedures.

Fig -9 GSM Module

5. CONCLUSION

The soil moisture sensor can effectively measure the moisture level present in the soil so it will be very convenient to irrigate the agriculture field. The help of the dht11 sensor temperature and humidity. Hence three parameters such as moisture, temperature and humidity can be easily measured. Arduino Uno board is the best choice. Arduino IDE is an open source integrated development environment to write and upload computer program (C and C++ Program) to connect with physical board. By using these component, Agriculture monitoring system can be easily developed.

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