Smart Irrigation System using IOT

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Abstract: — Agriculture in villages plays an essential role in developing the country. Basically, agriculture depends on the monsoons which have not enough water source. To overcome this problem, the irrigation system is employed in the field of agriculture. In this system, based on the soil type, the water will be provided to the agricultural field. In agriculture, there are two things, namely, the moisture content of the soil as well as the fertility of the soil. At the present time, there are several types of techniques available for irrigation to reduce the need for rain. This type of technique is driven by on/off schedule using electrical power. This article discusses the implementation of a smart irrigation system using IoT. Smart farming based on IoT technologies will enable growers and farmers to reduce waste and enhance productivity ranging from the quantity of fertilizer utilized to the number of journeys the farm vehicles have made. In IoT-based smart farming, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.) and automating the irrigation system. The farmers can monitor the field conditions from anywhere. IoT-based smart farming is highly efficient when compared with the conventional approach.

***Index Terms -IOT*, Irrigation system, Soil moisture sensor and Wifi module, Raspberry pi.**

I. INTRODUCTION

Healthy nation is far to be achieved. Despite of being self-reliant in food production, starvation death is frequent in India. Water shortage in India is also a particularly acute crisis. Between 1947 and 1967 India underwent the Green Revolution, resulting in a huge increase in agricultural production, making India one of the world's biggest exporters of grain. Unfortunately, this huge surge in agriculture required significant water resources for irrigation and accelerated the onset of present water shortages.

As the world is trending towards new technologies and implementations it is a necessary goal to trend up in agriculture too. Many researches are done in the field of agriculture and most of them signify the use of wireless sensor network that collect data from different sensors deployed at various nodes and send it through the wireless protocol. The collected data provide the information about the various environmental factors. Monitoring the environmental factors is not the complete solution to increase the yield of crops. There are number of other factors that decrease the productivity . Hence, automation must be implemented in agriculture to overcome these problems. In order to provide solution to such problems, it is necessary to develop an integrated system which wills improve productivity in every stage. But, complete automation in agriculture is not achieved due to various issues. Though it is implemented in the research level, it is not given to the farmers as a product to get benefitted from the resources. Hence, this paper deals about developing smart agriculture using IoT and given to the farmers.

II. RELATED WORK

The new scenario of decreasing water, drying up of rivers and tanks, unpredictable environment, present an urgent need of proper utilization of water. To cope up with this use of temperature and moisture, sensors are placed at suitable locations for monitoring the crops. After research in the agricultural field, researchers found that the yield of agriculture is decreasing day by day. However, use of technology in the field of agriculture plays an important role in increasing the production as well as in reducing the man power . Some of the research attempts are done for betterment of farmers that provide systems which use technologies helpful for increasing the agricultural yield. The cloud computing devices create a whole computing system from sensors to tools that observe data from agricultural field and accurately feed the data into the repositories .This idea proposes a novel methodology for smart farming by linking a smart sensing system and smart irrigaton system through wireless

communication technology. It proposes a low cost and efficient wireless sensor network technique to acquire the soil moisture ,Humidity , temperature from various locations of field and as per the need of crop water motor is enabled .It proposes an idea about how automated irrigation system was developed to optimize water use for agricultural purposes.

SMARTPHONE IRRIGATION SENSOR An automated irrigation sensor was designed and implemented to use in agricultural crops. The sensor uses a smartphone to capture and process digital images of the soil nearby the root zone of the crop, and estimates optically the water contents. The sensor is confined in a chamber under controlled illumination and buried at the root level of the plants. An Android App was developed in the smartphone to operate directly the computing and connectivity components, such as the digital camera and the Wi-Fi network. The mobile App wakes up the smartphone, activating the device with user-defined parameters. Then, the built-in camera takes a picture of the soil through an antireflective glass window and an RGB to gray process is achieved to estimate the ratio between wet and dry area of the image. After the Wi-Fi connection is enabled, the ratio is transmitted via a router node to a gateway for control an irrigation water pump.

III. PROPOSED WORK

Smart irrigation solutions are the evolving trend in day to day lives. The technology has completed a full circle by giving back to irrigation the latest trends and techniques that have been developed. Connectivity using existing wifi networks using the available hardware is one major advantage for Smart agriculture. The proposed system allows users to continuously monitor the water level in the tank, remotely on mobile operations through the internet. The mobile operations can be used to shut the water supply automatically, irrespective of the physical location of the user, provided the user has internet connectivity. Thus the task of convert off the motor manually has been programmed. The smart irrigation system can be connected in farms to monitor the moisture content of the soil continuously. It would turn on the sprinklers automatically when the water content of the soil goes below a certain level. The user can check if the farm is well irrigated remotely on the mobile operations, without visiting the farm.

The abstraction of high-level information from raw sensory data is one of the most crucial aspects of IoT. The machine interpretable data is processed to obtain useful information, which is the basis of performance of the proposed model. The Arduino board, a microcontroller, is the main component of the system. It controls the digital connections and acts as a bridge between the sensors and the mobile phone application.

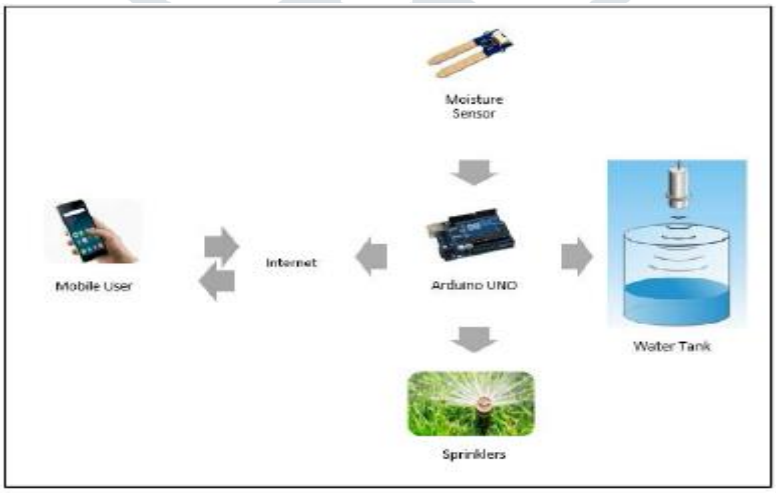

Fig.2: Proposed System

IV. METHODOLOGY

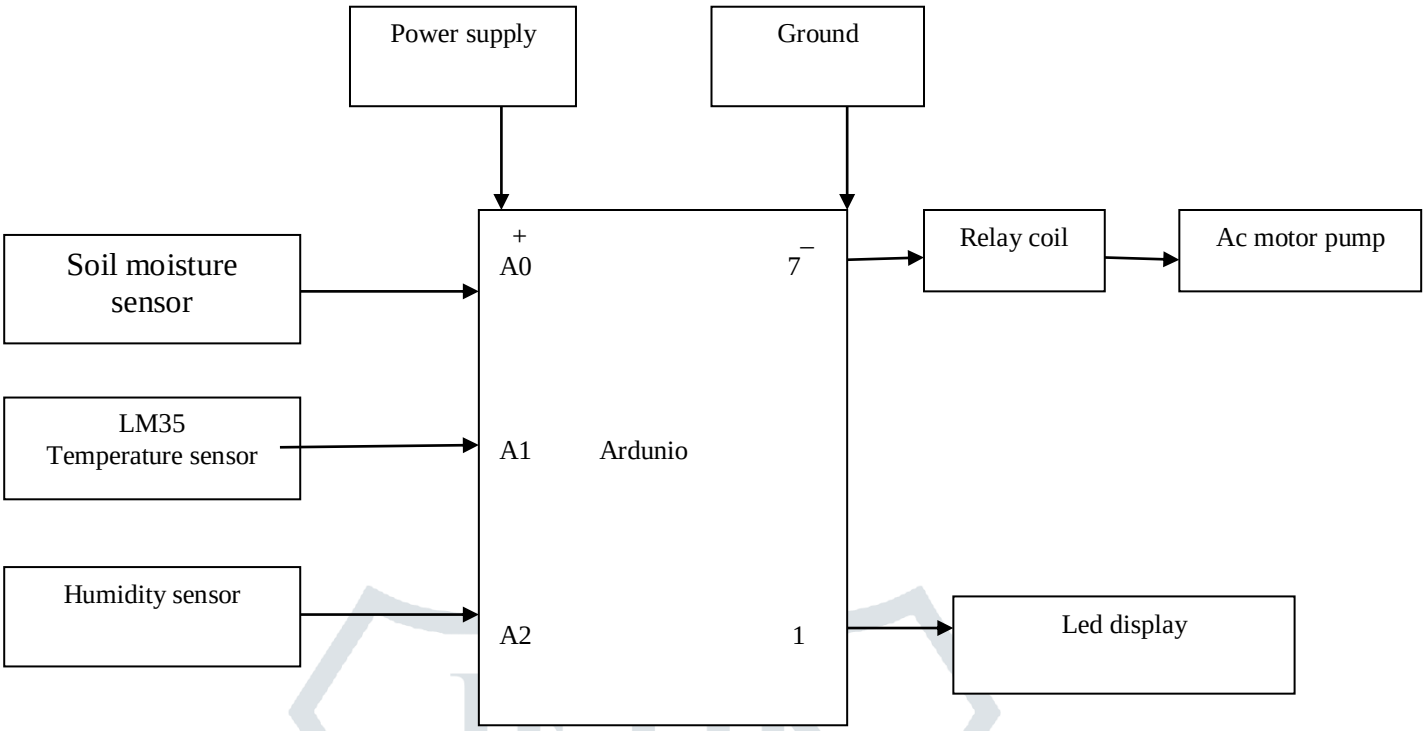

Fig.3: Architecture

4.1Data Acquisition from Hardware

Data acquisition is the initial stage where the sensor data is read from the hardware used in the wrist-wearable device. The data obtained from the sensor i.e., GY80 IMU is continuously collected with the delay of 200ms and the sensor data is further cleansed in Arduino UNO to limit the decimal to two points. Then sent to the server through Node MCU. Similarly, the passive RFID tag info is sent to the reader and the same info is transmitted to the Arduino and then to the android on the caretaker's end.

a)Arduino

The hardware components used in the device areas are: Arduino UNO, Node MCU, GY 80 IMU, RFID Reader and Tags. An Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. This board is equipped with set of digital and analog input/output (I/O) pins that can be interfaced to various expansion boards (shields) and various circuits. Fig.4 represents the Arduino UNO used in our work.

Fig.4.1: Arduino UNO

b) DHT 11 Sensor:

The DHT11 is a main, low-cost digital temperature and humidity sensor. It gives out digital value and hence we can give its output directly to data pin instead of ADC. It has a capacitive sensor for measuring humidity. The only real shortcoming of this sensor is that one can only get new data from it only after every 2 seconds.

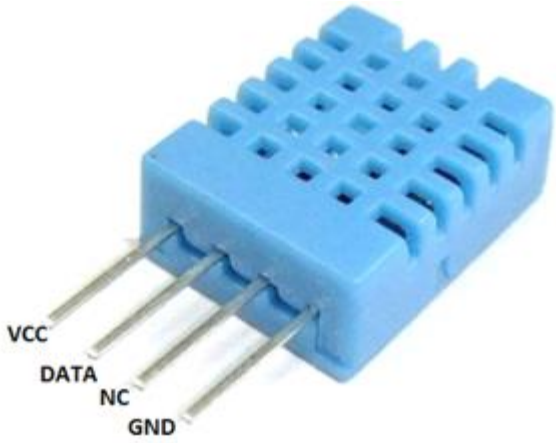

Fig 4.2:DHT11 sensor

c) Soil Moisture sensor(YL-69):

Soil moisture sensor amplification the water content in soil. It uses the equity of the electrical resistance of the soil. The relationship among the measured equity and soil moisture is graded and it varies depending on environmental factors such as temperature, soil type, or electric conductivity. Here, It is used to sense the moisture in field and deportation it to raspberry pi in order to take controlling action of switching water pump ON/OFF.

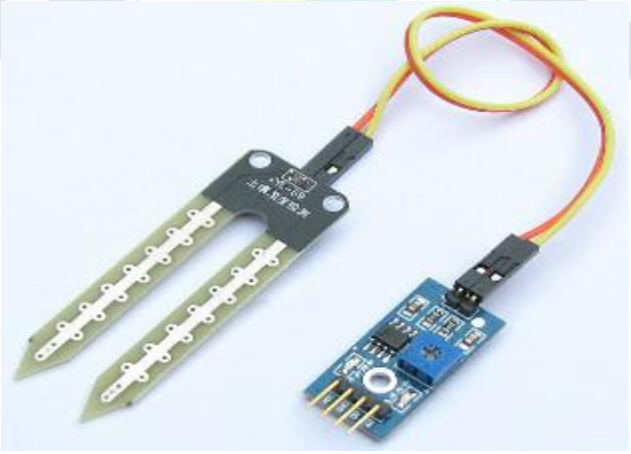

Fig 4.3:Soil moisture sensor

d)Relay:

A relay is an electrically managed switch. Many relays use an electromagnet to regualrly operate a switch, but other operating fundamental are also used, such as solid-state relays. Relays are used where it is basic to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal.

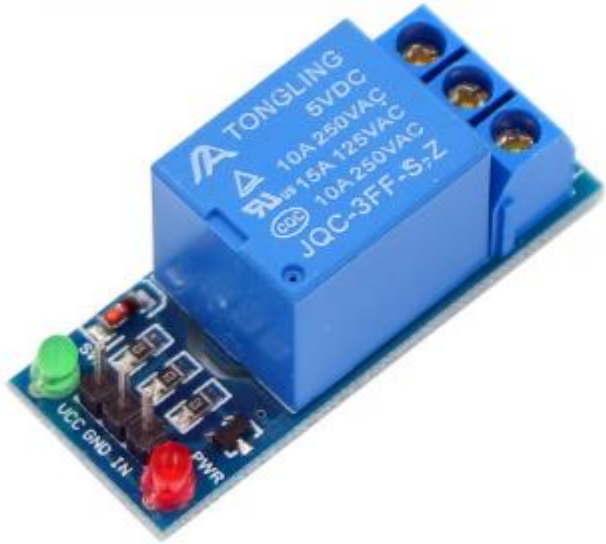

Fig 4.4:Relay

e)Water pump:

A **pump** is a device that moves fluent (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three considerable groups according to the apporach they use to move the fluid: *direct lift*, *displacement*, and *gravity* pumps.

Fig 4.5:Water pump

VI. CONCLUSION

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The sensors are successfully interfaced with raspberry pi and wireless communication is achieved. All observations and experimental tests prove that this project is a complete solution to the field activities irrigation problems. Implementation of such a system in the field can definitely help to improve the yield of the crops and aids to manage the water resources effectively reducing the wastage.

References

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