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IOT BASED SMART IRRIGATION SYSTEM USING ARDUINO

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Abstract: Agriculture is the main occupation in India. Main resource of agriculture is water. The important climatic factor is water, which decides the growth of crops. If crops get required water supply then the desired growth of crops can be achieved. If crops get excess water supply then it is not possible to achieve desired crops growth. Therefore to reduce human effort and to supply required water to crop. This IoT based smart irrigation system using arduino is developed. This system will also reduce the excess water consumption. Water distribution will be even in different areas of the farm/field.

KEYWORDS: *Internet of Things (IoT), Smart Irrigation system, Arduino, Moisture, Temperature, Gas.*

I INTRODUCTION

As India is an agriculture dominated country, it has huge impact on the economy of India. The income source of 70% population in India is based on an agriculture system. In now a days, there is hug technologies are developed. Government of India also declared varies scheme in this sector due to which lots of farmer can take the benefit of this scheme. Water consumption is main problem in farming sector. Crops do not get the required water supply.

Using IoT based system, Moisture level is sense in the soil, depending upon the threshold level water provided to the crops. Sense value store to the cloud. Using that data

This system is solution to the crises that occur due to uneven use of water. Moisture sensor will sense the moisture level with threshold value if the moisture level is below the threshold value then it will send signal to arduino and also the data is stored to the cloud .It will automatically turn motor ON. It will supply required water to the crop .If moisture in the soil is above threshold level then automatically Water pump motor will turn OFF.

II. LITERATURE SURVEY

In [1], the purpose of an author is to develop an automated irrigation system, which will turns ON/OFF the pumping motor depending upon the dampness content of the soil. In the circuit, sensing arrangement contains op-amp IC LM 358 , microcontroller 8051, two stiffer copper wires , this sensing arrangement senses the dry condition then the relay driver IC receive command from microcontroller 8051 regarding Switching ON the motor and when the soil to be get wet then the motor will switch off .

In this system, less manpower is required. Water conservation takes place because water is directly transferred to the roots. The drawback of the system , if the system need excess water in any specific area then it will not possible using this system because it will only work depending upon sensing arrangement. This drawback can be overcome using DTMF Technology. Using DTMF Technology, User will be able to supply required water. It is also possible to provide excess water, if needed.

In [2], this system can create a device with the help of arduino and sensors which will collect data related to a crop like humidity, temperature, pH value and moisture sensor. Using an artificial intelligent the collected data will be analyze. Then we will able to generate result with a very high accuracy.

In this system is subdivided into three different sections. In first section dealing with the IoT based device which will deal with collecting the data which will be on different collection. Second section is including an artificial neural network model which will analyze the collected data in previous section then depending upon result it will decide automatically on/off the irrigation system. In third section web app and android app store the data related to the crop like moisture level, temperature level, humidity, pH level which will help researchers to develop efficient module.

In [3], the proposed of this system is to automatic control of irrigation. This system can provide required water through irrigation. As the system is embedded, it provide uniform and required water supply to plant. In this system varies sensors are being used. Humidity sensor, Temperature sensor, Moisture sensor. Depending on value sense by sensor the system will work accordingly. The system respond to threshold value, if the value is below threshold level then motor will turn on automatically. When water level reaches threshold value then motor will automatically turn off. In the future, this system can predicts atmosphere changes like rainfall. It will also inform when to harvest the plant.

In [4], this system GSM plays an important role which helps us to provide alert messages. This system is divided in some parts like moisture sensor, Arduino Uno, GSM module and water pump. Moisture sensor sense the water contain present in soil. Depending upon the moisture level in soil the arduino UNO

pin D7 receive signal, if moisture level is low then D7 will be high. It will turn on water pump. GSM module send message to the farmer that "Moisture level is low". If moisture level is high then D7 will be low. It will turn off water pump. GSM module send message to the farmer that "Moisture level is normal". In this system we can use IoT In future.

In [5], this is IoT based system, which can be used in different field like agriculture, parks and lawns .The purpose of system is to sense the moisture level in the soil then accordingly sprinkle water. This entire data will be sent to the user's using android application. In this system Hardware as well as software is used. Hardware part consists of soil moisture sensor, photocell sensor, pH sensor, arduino. Software part consists of IoT and android applications which will collect the data.

The different role of sensors are as follow: Moisture sensor sense the moisture level in soil, pH sensor sense the nutrient level required to plant, Photocell sensor sense weather plants get required light or not, if not then artificial light. Arduino is also plays the important role in the system, it is the open platform for all. It is best way to learn coding in electronic department.

In [6], this system, two technologies are used one of them is cloud and another one is IoT .Using this technologies cost will be reduced and production will increase. It compares different parameter for executing required task. The main component of system is Atmega328P IC. Different sensors are used like moisture sensor which will sense the water level in soil, rain sensor sense the rain.

BOLT module sense the data then control the whole system using internet, relay provides switching operation for switch on/off the motor. In future, more sensors can be use for analyzing the climatic condition which will help in increasing productivity of plant.

In [7], Sprinklers method is used in this system because of this method water molecules are divided into small water droplets which will be uniformly distributed. Water is spread uniformly due to which water consumption is reduced. In this system, varies sensors are used likewise moisture sensor, humidity sensor, raindrop sensor, temperature sensor. Moisture sensor sense the moisture level in soil, temperature and humidity sensors record changes in temperature, raindrop sensor sense how much amount of rain absorbed by soil.

All the sensors are connected to arduino board, Atmega328. Depending upon the threshold level it will switch ON/OFF the water pump. Using could the data will be stored and system can be controlled automatically. Android application is used to controlling and monitoring the whole system.

In [8], this system is IoT based smart irrigation which is depending upon weather. It will control and monitor irrigation system automatically. Also collect the climatically data such as temperature, rainfall, humidity. In this system, there are some parts which are control unit for water supply unit, soil moisture unit, Wi-Fi unit.

Web application is used to control and monitor smart irrigation system based on IoT. This application is developed using HTML and PHP. The data regarding moisture level, temperature and humidity is collected after every two minute. As system uses web application user can also control and monitor water supply.

In [9], this system, it will collect all field data like electrical conductivity and leaf wetness, humidity, temperature. Raspberry pi technology used which will act as a local server. The data will display on graphical user interface (GUI).This system is represented as a Wireless sensor network application, it will monitor varies environmental parameter which will affect crop development. Different type of sensor is used to monitor environmental parameter like temperature, humidity, electrical conductivity, soil moisture sensor. Using arduino and X-bee all circuitry of sensor is collectively known as sensor nodes.

In [10], this system uses the PH, temperature, humidity and moisture sensor. Temperature sensor is used to sense the temperature of land the value of temperature is greater than 32 (threshold value) the motor in ON. Humidity sensor is used to sense the humidity value of soil if the value is less than 30% then motor is ON otherwise it is OFF

PH sensor is used to sense the alkalinity and acidity of soil if it is less than 7(threshold value) then the motor is ON otherwise it is OFF. These all sensor value is display on mobile by using Wi-Fi module and gives the value in message form

III.PROPOSED SYSTEM

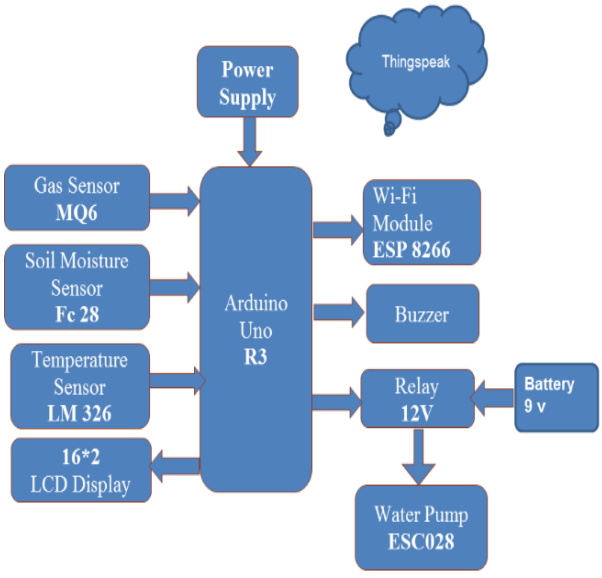

Figure 1: Block Diagram of IoT based Automatic Irrigation System Using arduino

This below Figure 1 is a complete block diagram of IoT based Automatic Irrigation System Using arduino which is combination of three sensors which will sense the value and send the sensed value to the Cloud. It will automatically control and monitor the irrigation system.

In our system we use the temperature sensor, gas sensor, and soil moisture sensor is used. We also use the ThingSpeak using which Wi-Fi module to communicate the system. It will Control and monitor system.

IV.WORKING OF SYSTEM

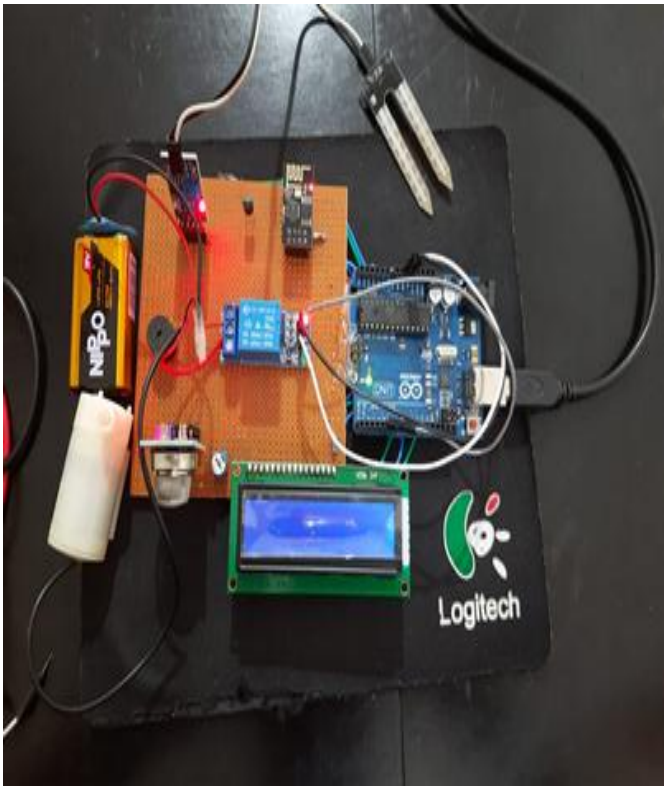

Figure 2. Hardware setup of Proposed System

The temperature sensor is used the sense the temperature of environment if the value of temperature sensor is greater than the threshold value then buzzer in ON and water pump in ON automatically and give this message to the mobile using Wi-Fi module and also collect the data to ThingSpeak. LCD will display the value of sensor.

The soil moisture sensor is used to sense the moisture content in a soil if the soil content is dry or it is less than threshold value the buzzer is ON and water pump is ON automatically otherwise it is OFF and give this message to the mobile using Wi-Fi module and also collect the data to ThingSpeak. LCD is also display the value of sensor.

The gas sensor is used to sense the smoke of environment if they sense gas and value of this gas sensor is greater than threshold value the buzzer is ON and water pump is ON automatically otherwise it is OFF and give this message to the mobile using Wi-Fi module and also collect the data to ThingSpeak. LCD is also display the value of sensor.

V. TEST RESULT

Figure 3 Shows the Values of moisture displayed on LCD

Figure 4. Shows the Values of Gas displayed on LCD

Figure 5. Shows the Values of Temperature displayed on LCD

Table 1: Test Result

Parameter	Threshold	Initial Value	Initial status of Motor/buzzer	Final Sensed value	After motor/buzzer status
Condition 1					
Moisture	20	1-2	Motor ON	66- 74	Motor OFF
Temperature	27	19	Buzzer OFF	29	Buzzer ON
Gas	20	16	Motor OFF	36	Motor ON
Condition 2					
Moisture	30	17	Motor ON	55	Motor OFF
Temperature	28	23	Buzzer OFF	32	Buzzer ON
Gas	30	11	Motor OFF	45	Motor ON

VI. CONCLUSION

This system will minimize the efforts of farmers and enable them to use the advanced technology in agriculture field. The temperature sensor, moisture sensor, and gas sensor will help to avoid the problems such as like wastage of water, electricity supply, fire accidents and crop growth control. As it is an automatic system, there is no need to monitor the fields frequently, thus human intervention is minimized.

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