Iot Based Automatic Plant Irrigation System Using Adruino

AjayS ,Prajwal P ,Bharath kumar M,Chakradhar N,

Monika Gupta

Department of Electronics and Communication Engineering
New Horizon College of Engineering and Research, Bangalore,Karnataka.

Abstract :IoT is changing the agriculture domain and empowering farmers to fight with the huge difficulties they face. The agriculture must overcome expanding water deficiencies, restricted availability of lands, while meeting the expanding consumption needs of a world population. New innovative IoT applications are addressing these issues and increasing the quality, quantity, sustainability and cost effectiveness of agricultural production. Agriculture is the backbone of Indian Economy. In today's world, as we see rapid growth in global population, agriculture becomes more important to meet the needs of the human race. However, agriculture requires irrigation and with every year we have more water consumption than rainfall, it becomes critical for growers to find ways to conserve water while still achieving the highest yield. But in the present era, the farmers have been using irrigation technique through the manual control in which they irrigate the land at the regular interval. The proposed system has been designed to overcome the unnecessary water flow into the agricultural lands. Temperature, moisture and humidity readings are continuously monitored by using temperature, moisture and humidity sensor and send these values to the assigned IP address. Android application continuously collects the data from that assigned IP address. Once the soil moisture values are exceeded the particular limit then the relay, which is connected to the arduino microcontroller controls the Automation of irrigation system using IoT motor. The android application is a simple menu driven application, with 4 options. This includes motor status, moisture, temperature and humidity values. The motor status indicates the current status of the pump.

Keywords: Iot ,MicroController ,Moisture Sensor, Rain sensor, Water Pump,Wifi Module…..

I. INTRODUCTION

India is the country of village and agriculture plays an important role for development of country. In our country, agriculture depends on the monsoons which has insufficient source of water. So the irrigation is used in agricultural field In Irrigation system, depending upon the soil type, water is provided to plant.In agriculture, two things are very important, first to get information of about the fertility of soil and second to measure humidity content in air. Nowadays, for irrigation, different techniques are available which are used to reduce the dependency of rain. And mostly this technique is driven by electrical power and on/off scheduling. In this technique, a temperature and humidity sensors are placed near the plant and near the module and gateway unit handle the sensor information and transmit data to the controller which in turns the control the flow of water through the pump.

II. LITERATURESURVEY

[1] In Wireless Sensor Network based Remote Irrigation Control System and Automation using DTMF code mentioned about using automated irrigation system for proper yield and handled remotely for farmer safety. Wireless sensor network and Embedded based technique of DTMF (Dual Tone Multiple Frequency) signaling to control water flow for sectored, sprinkler or drip section irrigation. Circuit switching instead of packet switching used by SMS controlled devices available currently in the market. The farmer can use his cell phone or landline phone for the purpose of starting and controlling the irrigation and the pesticide spraying, just by dialing and sending the DTMF commands over the GSM network. This system will be very economical in terms of the hardware cost, power consumption and call charges. Farmers have to control (on/off) the valves time to time (even at night) which increases the running cost because every time we have to make a call to on or off the valves and it is also very inconvenient. Farmers are unable to know the status of power supply at the field.

[2] In Wireless Sensor Network Based Automated Irrigation and Crop Field Monitoring System mentioned about using wireless sensor network based automated irrigation system for optimize water use for agricultural purpose. The system consists of distributed wireless sensor network of soil moisture, and temperature sensors placed in the crop field. To handle the sensor information Zig bee protocol used and control the water quantity programming using an algorithm with threshold values of the sensors to a microcontroller for irrigation system. The system continuously displays the abnormal condition of the land (soil moisture, temperature level). Using a GSM modem with GPRS facility feature provides the information to fanners and interface with PIC 18F77 A microcontroller. The Irrigation system is automatic and manual mode. This system increase the crop fields, improve the crop quality, increase the energy and reduce the non-point source pollution.Due to PIC microcontroller the length of the program will be big because of using RISC.

[3] In Automated Irrigation System Using a Wireless Sensor Network and GPRS Module mentioned about using automatic irrigation system in which irrigation will take place by wireless sensor units (WSUs) and a wireless information unit (WIU), linked by radio transceivers that allowed the transfer of soil moisture and temperature data, implementing a WSN that uses ZigBee technology. It takes a measure of temperature and moisture using sensor and controlled by microcontroller. The WIU has also a GPRS module to transmit the data to a web server via the public mobile network. The information can be remotely monitored online through a graphical application through Internet access devices. This irrigation system allows cultivation in places with water scarcity thereby improving sustainability and it is feasible system. But due to Zigbee protocol this system becomes more costly.

[4] In Sensor based Automated Irrigation System with IOT mentioned about using sensor based irrigation in which the irrigation will take place whenever there is a change in temperature and humidity of the surroundings. The flow of water is managed by solenoid valve. The opening and closing of valve is done when a signal is send through microcontroller. The water to the root of plant is done drop by drop using rain gun and when the moisture level again become normal then sensor senses it and send a signal to microcontroller and the value is then closed. The two mobile are connected using GSM. The GSM and microcontroller are connected using MAX232. When moisture of the soil become low moisture sensor sense it and send signal to microcontroller, then the microcontroller gives the signal to mobile and it activate the buzzer. This buzzer indicates that valve needs to be opened by pressing the button in the called function signals are sent back to microcontroller. Microcontroller used can increase System Life and lower the power Consumption. There system is just limited to the automation of irrigation system and lacks in extra ordinary features.

[5] In Smart drip irrigation system for sustainable agriculture mentioned about using fully automated drip irrigation system which is controlled and monitored by using ARM9 processor.PH content and the nitrogen content of the soil are frequently monitored. For the purpose of monitoring and controlling, GSM module is implemented. The system is used to turn the valves ON or OFF automatically as per the water requirement of the plants. The system informs user about any abnormal conditions like less moisture content and temperature rise, even concentration of CO2 via SMS through the GSM module. The moisture sensor output will help to determine whether to irrigate the land or not depending upon the moisture content. Along with moisture sensor the temperature sensor output can also be taken into consideration while irrigating the land. If the moisture content of soil is very low and the temperature is very high then there is need of irrigation for plants, but the time for which irrigation will be provided is different for different temperature range. Small amount of water is lost through deep percolation if the proper amount is applied.ARM processor is that it is not binary compatible with x86. This means you not going to be running windows any time soon. There are several Unixoperating systems that can run on ARM however, such as Linux and BSD.

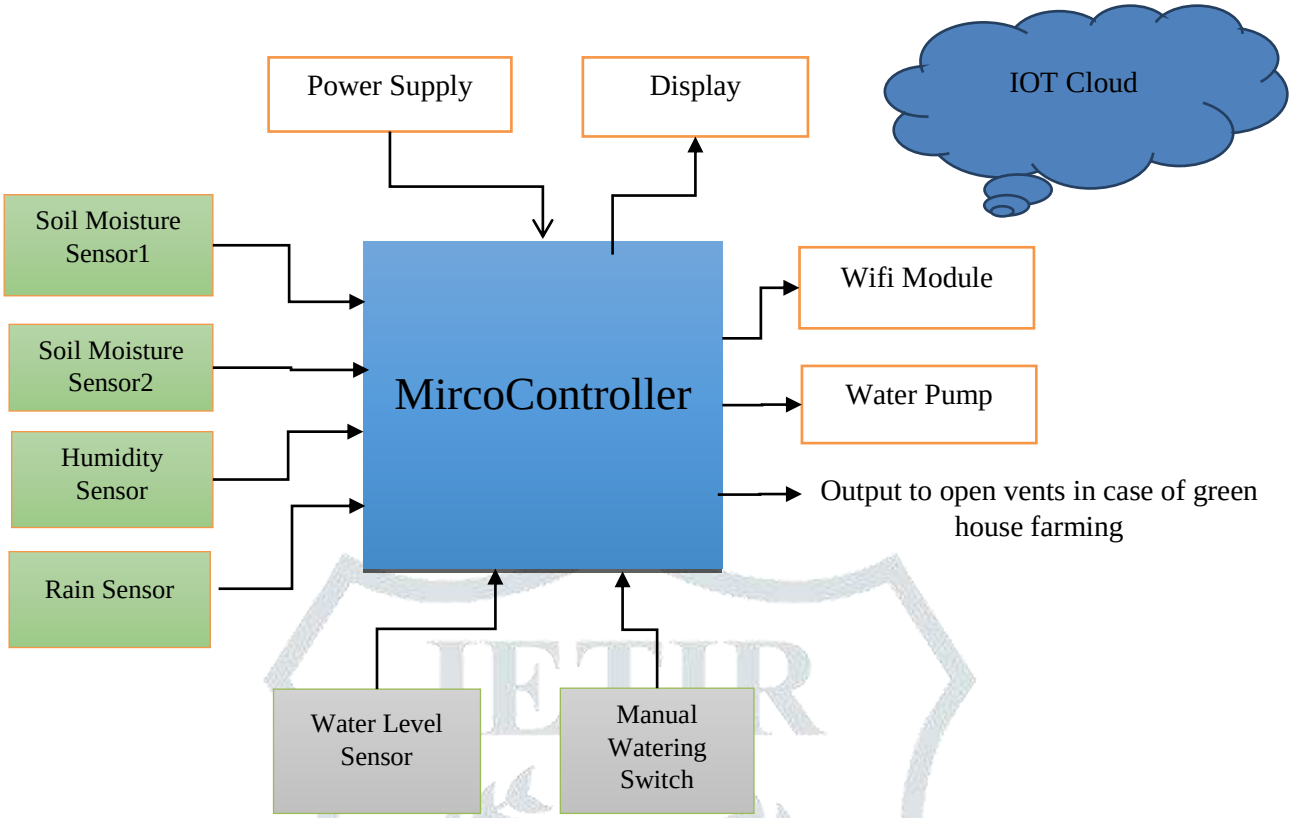
III. COMPARISION OF EXISTING AND PROPOSEDSYSTEM

The project is designed to develop an automatic plant watering system using IOT which switches the pump motor ON/OFF on sensing the moisture content of the soil. In the field of agriculture, use of proper method of irrigation is important. The advantage of using this method is to reduce human intervention and still ensure proper irrigation.

A. BLOCKDIAGRAM

This project is divided into 4 sections :

- Input
- Controller Unit
- Output
- IOT cloud.



B.

Fig 1. Block Diagram

C. COMPONENTS:

1. Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P

It has 14 digital input/output pins 6 analog inputs, a 16 MHz quartz crystal, a USB Connection, power jack, an ICSP header and a reset button as shown in Fig.(a)

Fig.2.(a) Arduino Uno

2. Moisture Sensor

This **soil** moisture sensor module is used to detect the moisture of the soil. It measures the volumetric content of water inside the soil and gives us the moisture level as output. The module has both digital and analog outputs and a potentiometer to adjust the threshold level.

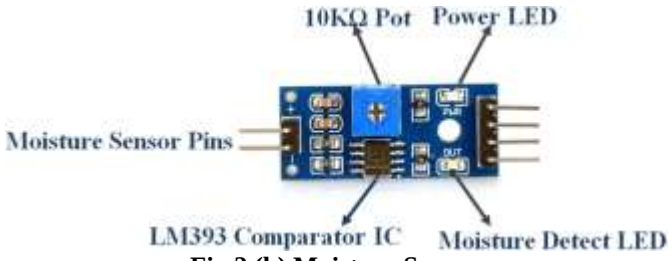


Fig.2.(b) Moisture Sensor

3. DHT11-Temperature And Humidity Sensor

The DHT11 Sensor is factory calibrated and outputs serial data and hence it is highly easy to set it up. The connection diagram for this sensor is shown below.

Fig.2.(c) DHT11-Temperature and Humidity Sensor

As you can see the data pin is connected to an I/O pin of the MCU and a 5K pull-up resistor is used. This data pin outputs the value of both temperature and humidity as serial data. If you are trying to interface DHT11 with Arduino then there are ready-made libraries for it which will give you a quick start.

4. LCD

One of the most common devices attached to a micro controller is an LCD display. Some of the most common LCD's connected to the many microcontrollers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively. The LCD requires 3 control lines as well as either 4 or 8 I/O lines for the data bus.

Fig.2.(d) LCD

5. Rain Drop Sensor Module

Raindrop Sensor is a tool used for sensing rain. It consists of two modules, a rain board that detects the rain and a controlmodule, which compares the analog value, and converts it to a digital value. The raindrop sensors can be used in the automobile sector to control windshield wipers automatically to sense rain and it is also used in home automation systems.

Fig.2.(e) Rain Drop Sensor module

6. Water Pump

Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA. Just connect tube pipe to the motor outlet, submerge it in water and power it. Make sure that the water level is always higher than the motor. Dry run may damage the motor due to heating and it will also produce noise.

Fig.2.(f)Water pump

IV. WORKING*:*

Input

The First input which we have used in our project is Soil Moisture Sensors which is a device that can detect the moisture of the soil and give output as an analog voltage ranging from 0V to 3.3V depending on the moisture content in the soil.Second input used is a humidity sensor which is used to capture the moisture contain in the air. This sensor also has the feature of detecting the temperature of the environment. Output of this sensor is serial data of temperature and humidity value measured, which can we used to drive certain outputs of controller.Third input is a rain sensor which is can detect the rainfall condition. This sensor can send the wet or dry status to the controller in two formats i.e. Analog voltage or Digital Output.Water level sensor is used to detect the amount of water present in the water tank. This sensor helps the motor to stop then there is no water present in the tank.Apart from the automatic function, it also has a manual switch to operate the motor when needed.

Controller unit

The Controllerused in our project is aArduino UNO with Atmega328p. The Controllerdoes all the computation and execution based on the inputs from the all the Sensors.

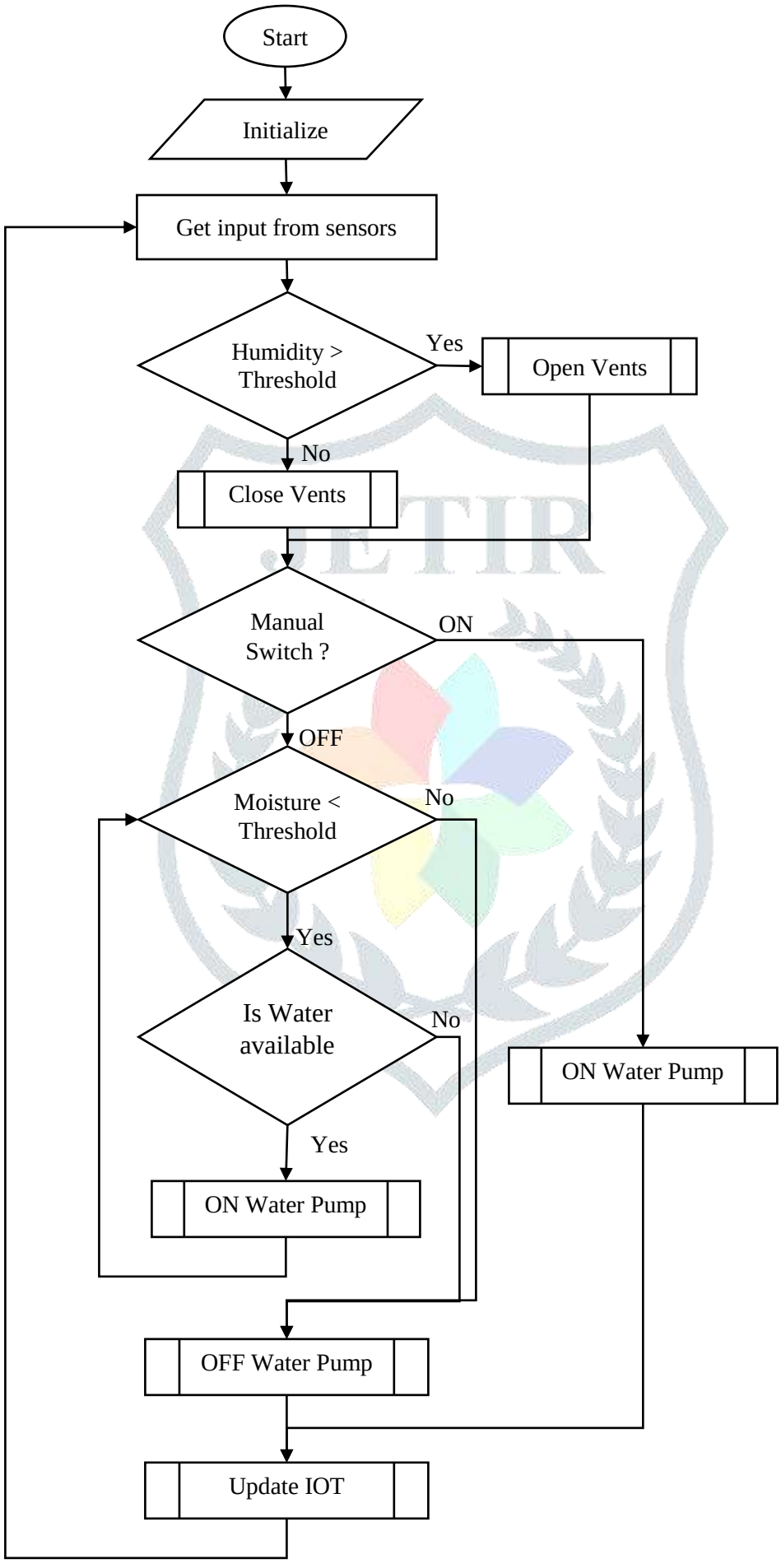
Output

Output is the Water pump used to water the plants/crops depending on the needs.Depending on the value from the moisture sensor, if moisture is greater than the threshold value then output can be driven to open the vents of green house.

IOT Cloud

All the data fetched from the sensor are updated on the IOT cloud so that the user can monitor the realtime data from anywhere.

FLOW CHART:


Start
Initialize
Get input from sensors
Humidity > Threshold
Yes
Open Vents
No
Close Vents
Manual Switch ?
ON
OFF
Moisture < Threshold
No
Yes
Is Water available
No
ON Water Pump
Yes
ON Water Pump
OFF Water Pump
Update IOT

IMPLEMENTATION

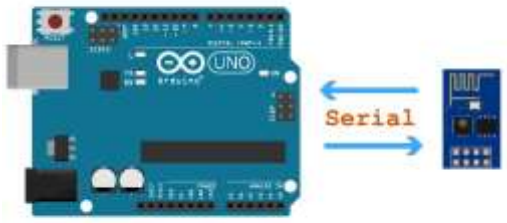


Fig.3.Adruino Board

PSEUDO CODE

	Program File	Hardware
1	Arduino.ino	Arduino UNO
2	Esp8266.ino	ESP8266

Arduino code

Ardiuno Controllers program can be divided into two sections:

- void setup():executes only once on start of the controller.
- void loop(): executes repeatedly in a loop.

CIRCUIT :

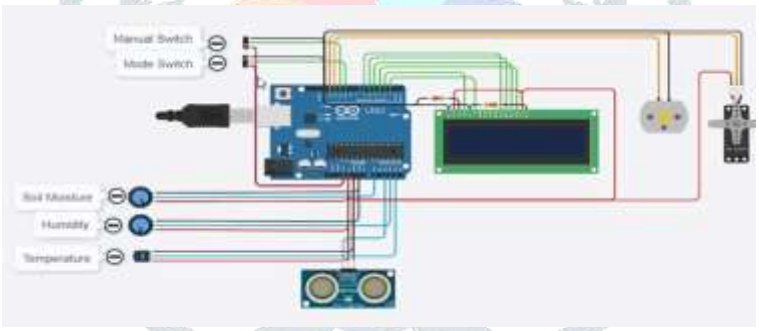


Fig.4.Circuit Diagram

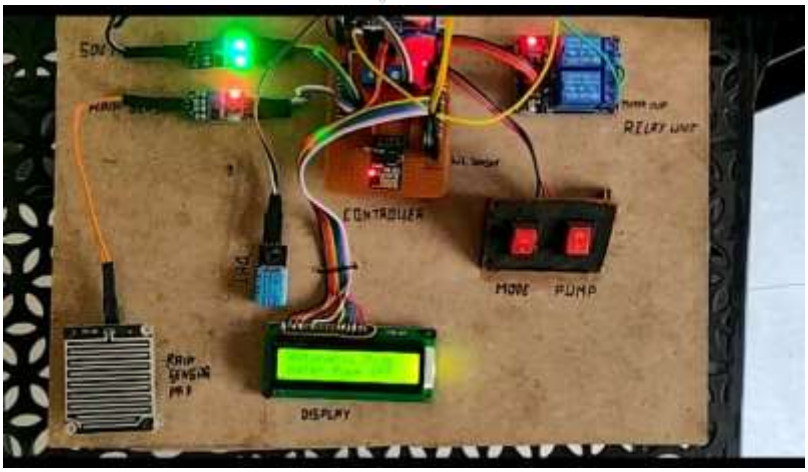


Fig.4.Circuit

V. RESULT

Fig.5.1.LCD Display

Fig.5.2.LCD Display

I. CONCLUSION

The automated plant watering system has been designed and implemented in this paper. The system developed is beneficial and cost effective manner. It reduces the water consumption to a greater extent. It needs minimal maintenance .The powerconsumption has been reduced very much. The system can be used in green houses. The System is very useful in areas where water scarcity is major problem .The crop productivity increases and the wastage of crops is very much reduced using this irrigation system. The developed system is more helpful and gives more feasible results.

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II. REFERENCES

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