IoT-based Irrigation System

Shruti Pawar[1], Tanvi Onkar[2] , Rutuja Pande[3], Prof.Aruna Kamble[4]
Department of Computer Engineering
[1,2,3,4] Bharati Vidyapeeth College Of Engineering , Navi Mumbai.

Abstract- *The agriculture is one of the most fundamental resources of food production. But there are several issues related to traditional methods of agriculture such as excessive wastage of water during irrigation of field, dependency on non-renewable power source, time, money, human resource etc. Since every activity now a days becoming smart it needs to smartly develop agriculture sector for growth of country. This paper aims at developing the Automatic Smart Irrigation System Using IoT Technology with an objective of automating the total irrigation system which provide adequate water required by crop by monitoring the moisture of soil in order to prevent the wastage of water resource. It will also have many advantages for farmers. The irrigation at remote location from home will become easy and more comfortable. In addition, it will not only protect the farmer from scorching heat & severe cold but also save their time for to and fro journey to the field*

Keywords- Arduino Uno, Sensors, IOT , Arduino Ethernet Shield, DC Motor.

I. INTRODUCTION

Populace on the planet is presently (2018-2019) developing at a rate of around 1.07% every year from 1.12% The present normal populace increment is evaluated at 82 million individuals for each year that implies sustenance creation must be raised to encourage the 33% more mouths. What's more, the agribusiness business is responsible for satisfying people's requirement for nourishment, vitality, and haven as it were. For the cutting edge agribusiness fields, information gathered from sensors would turn into the compost to develop crops. It's truly baffling, yet evident. IOT would reveal the new ways that tap the maximum capacity of farming yield and mitigate every one of the difficulties that blocks the development of the harvest can be limited.

In customary water system framework water sparing isn't considered. Since, the water is flooded legitimately in the land, plants under go high worry from variety in soil dampness, consequently plant appearance is decreased. Currently, agriculture accounts 83% of the total water consumption in India. While water saving is most crucial, it is equally important to provide water for irrigation to increase the food production and livestock husbandry, to ensure food security for the increasing population [1].

.The fundamental goal of this paper is to give a programmed water system framework along these lines sparing time, cash and human endeavors.

The principle topic of this task is to build up a gadget that can screen the dampness substance of the dirt and turn on/off the water siphon consequently at whatever point the dampness dips under or goes over an edge esteem. It likewise utilizes Rain Sensor which recognizes the downpour, on the off chance that it is sprinkling, at that point it kills the engine. This gadget can likewise be modified to send an email to the client with respect to the dampness status from a remote area.

II. LITERATURE REVIEW

Development of Smart Irrigation System designed by Archana and Priya (2016) proposed paper in which the soil and humidity moisture sensors are placed in the root area of the plant. Based on the sensed values the microcontroller ris used to control the supply of water to the plant. This system doesn't provides the status to the farmer [2].

Arduino based smart irrigation system using Iot is designed by R.Nandhini1 S.Poovizhi2,PriyankaJose3,MR.R.Ranjitha4 , Dr.S.Anila5(2017) proposed a paper in which soil parameters such humidity, soil moisture and temperature are measured for getting field information from soil.[3].

Ms. Swapnali B.Pawar1, Prof. Priti Rajput2, Prof. Asif Shaikh3 proposed a paper in which the system derives the system in a combination of wireless sensors and a wireless base station which can be used to provide the sensors data to automate the irrigation system.[4].

Smart irrigation system using moisture sensor using Iot is designed by S Nalini Durga1, M Ramakrishna2 has proposed a paper that can be used for application of accurate amount of fertilizer, water, pesticide etc [5].

Arif Gori1, Mangle Singh2 , Ojas Thanawala3,Anupam Vishwakarma4,Prof. Ashfaque Shaikh5 has Proposed a System in which the project aims at saving time and avoiding problems like constant vigilance. It also helps in conserving water by automatically providing water to the plants/field [6].

III. PROPOSED SYSTEM

The System consists of Arduio UNO, which is brain of the system. A software called BOLT (IoT device) is used for communication. The user has to give one time command just to start the system and the rest of whole irrigation process will be controlled by the device automatically.

All the 32 registers are straightforwardly associated with the Arithmetic Logic Unit (ALU), enabling two free registers to be gotten to in a solitary guidance executed in one clock cycle. The subsequent engineering is more code productive while accomplishing throughputs up to multiple times quicker than customary CISC microcontrollers.

• Soil Moisture sensor

This sensor can be used to test the moisture of soil, when the soil is having water shortage that low moisture level then the module output is at high level, and else the output is at low level. By utilizing this sensor one can consequently water the blossom plant, or some other plants requiring smart watering method. It is likewise utilized in various research applications, for example in farming science and agriculture including water system arranging, atmosphere look into, or natural science including solute transport contemplates and as assistant sensors for soil breathes estimations .

• DC Motor

A DC motor is an electrical machine which changes over electrical vitality into mechanical vitality. The working of DC motor depends on the rule that when a current conveying conductor is put in an attractive field, it encounters a mechanical power.

• LCD

LCD (Liquid Crystal Display) screen is an electronic showcase module and locate a wide scope of utilizations. A 16x2 LCD show is exceptionally fundamental module and is all around regularly utilized in different gadgets and circuits. These modules are favored more than seven fragments and other multi portion LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters animations and so on.

• Arduino Ethernet Shield

The Arduino Ethernet Shield permits an Arduino board to associate with the web. It depends on the Wiznet W5100 Ethernet chip. The Wiznet W5100 gives a system (IP) stack fit for both TCP and UDP. It bolsters up to four concurrent attachment associations. We can utilize the Ethernet library to compose portrays which associate with the web utilizing the shield. The Ethernet shield interfaces with an Arduino board utilizing long wire-wrap headers which reach out through the shield. This keeps the stick format flawless and enables another shield to be stacked on top.

• Relay

A relay is an electrically worked switch. Many relays utilize an electromagnet to precisely work a switch, yet other working standards are likewise utilized, for example, solid-state relays. Relays are utilized where it is important to control a circuit by a different low-power signal, or where a few circuits must be constrained by one signal. Relays are utilized wherever it is important to control a high power or high voltage circuit with a low power circuit, particularly when galvanic disconnection is attractive. Relays can work either as switches or as a amplifier. ULN2003A:- ULN2003A is an array of seven NPN Darlington transistors capable of 500 mA, 50 V output. It is known for its high-voltage capacity, high current.

• Rain sensor

Rain sensor is a switching device activated by rainfall. It is used water conservation device connected to an automatic irrigation system that causes the system to shut down in the event of rainfall.

SOFTWARE DESIGN

The different software used in designing the complete system are –

• Arduino UNO

This software is used to embed the c code in microcontroller. It is an open-source software that makes it easy to write the code and upload it to the board. It runs on Windows ,Linux and Mac OS X. A program written with the arduino IDE is called a sketch [7].These Sketches are saved on the development computer as text files with the file extension .ino.

• Blynk

Blynk is another stage that enables you to rapidly assemble interfaces for controlling and observing your equipment ventures from your iOS and Android gadget. In the

wake of downloading the Blynk application, you can make an undertaking dashboard and organize catches, sliders, charts, and different gadgets onto the screen. Utilizing the gadgets, you can turn sticks on and off or show information from sensors.

V. SYSTEM WORKING PROTOTYPE

The Smart irrigation System is basically working upon the idea of water level management. We are using a Soil moisture Sensor which will read and collect the data from the sensor and send it to the Arduino board. Rain Sensor informs about raining status and according to that turns on/off the motor.

A pipe with rain gun irrigation mechanism is attached to the water pump, the other end of the pipe is in the plant. Whenever the moisture level from the plant drops down the threshold value, LED lights up indicating water pump to start till the moisture level matches the threshold value. The Rain Sensor senses the rain and immediately stops the water pump. Arduino UNO can be programmed to process the data and turn on/off the pump to supply water based on the moisture level. This device can also be programmed to send the user an update via email regard to the moisture level changes from a remote location.

Figure : Block Diagram

VI. RESULTS

Reading of Soil moisture and rain sensor in Blynk:

The optimum water moisture level for clayey sand is 11~10%. The moisture level is different for different soil. The optimal level is programmed in the Arduino based on the soil , if the water level goes below condition the plant is watered .
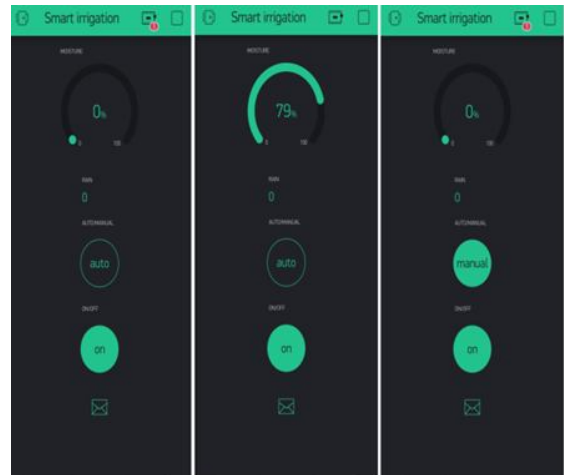

Figure: Screenshots of Blynk Manual Control

Readings on LCD Display:

Figure above and below Shows that the real time parameters of the soil that is the soil temperature, rain sensor level of the crop.

Whenever the soil moisture is below the span of reference value then the signal is transmitted to the user through the Wi-Fi module and the IoT server that signal is received by the user device and the command is sent though the same path and the corrective action is taken place.
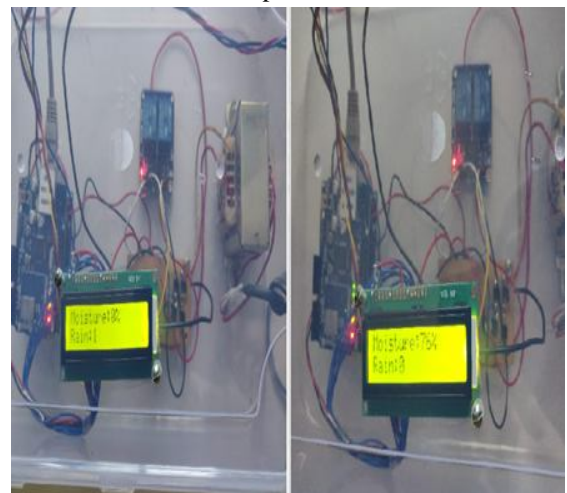

Figure: Moisture level and Rain sensor reading on LCD

Working model:

Figure below shows the setup of proposed irrigation system. In which every one of the segments referenced in the block diagram is associated with measure the constant estimations of the soil.

Figure : Irrigation System Working Model

VI. CONCLUSION

The main objective of this smart irrigation system is to make it more innovative, user friendly, timesaving and more efficient than theexisting system.Automated irrigation system has a huge demand and future scope too. It is time saving, led to removal of human error in adjusting available soil moisture levels and to maximize their net profits in accordance to factors like sales, quality and growth of their product.

REFERENCES

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[3] R.Nandhini , S.Poovizhi , Priyanka Jose , R.Ranjitha , Dr.S.Anila Proposed and implemented a project based on Iot for Water Management and intruder detection which measures the soil moisture, PH, Temperature and pressure sensor at National Conference of information and computing technologies issue on 16 December 2017

[4] Ms. Swapnali B.Pawar1, Prof. Priti Rajput2, Prof. Asif Shaikh3 Proposed The system can be used to control the water motor automatically and can also monitor the growth of plant by using webcam. We can watch live streaming of farm on mobile

[5] S Nalini Durga1, M Ramakrishna2design this paper presents irrigation monitoring and controlling system.

[6] Arif Gori1, Mangles Singh2,Ojas Thanawala3,Anupam Vishwakarma4,Prof. Ashfaque Shaikh5 has Proposed a System.