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MEE1009 NEW PRODUCT DEVELOPMENT

Dr. Fathima Patham K

PROJECT REPORT

On

AUTOMATED IRRIGATION: IOT BASED SMART IRRIGATION SYSTEM

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Declaration

We hereby declare that the project report entitled "AUTOMATED IRRIGATION: IOT BASED SMART IRRIGATION SYSTEM" submitted by us is true and correct to the best of our knowledge. We further declare that the work reported in this report has not been submitted and will not be submitted, either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

Acknowledgement

We would like to express our special thanks to our faculty, Dr. Fathima Patham K, who gave us the golden opportunity to do this wonderful project which also helped us in doing a lot of Research and we came to know about so many new things. We are thankful to them. Secondly, we would also like to thank our parents and friends who helped us a lot in finalizing this project within the limited time frame.

Place: Vellore

Date: 30-11-21

INTRODUCTION

Agriculture is the major source of income for the largest population in India and is major contributor to Indian economy. However, technological involvement and its usability must be grown still and cultivated for agro sector in India. Although few initiatives have also been taken by the Indian Government for providing online and mobile messaging services to farmers related to agricultural queries and agro vendor's information to farmers. Based on the survey it is observed that agriculture contributes 27% to GDP, and Provides employment to 70% of Indian population

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,

The Internet of Things (IoT) is a technology where in a mobile device can be used to monitor the function of a device. The Internet of Things (IoT) is concerned with interconnecting communicating objects that are installed at different locations that are possibly distant from each other.

BACKGROUND AND PROBLEM

The economy of many countries depends on agriculture. Farmers are facing problems in meeting these standards, especially those living in poverty.

The project investigates in developing an automated irrigation system which ensures automatic watering based on high or low soil moisture content.

This system will work to minimize the number of workers in a crop field, control and save water and electricity, increase agricultural production using small quantities of water, minimize manual intervention in watering operations with increasing watering speed and preserve plants from weedicides.

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needs of humanity. However, agriculture requires irrigation and with every year we have more water consumption than rainfall, The Internet of Things (IoT) is a technology where in a mobile device can be used to monitor the function of a device. The Internet of Things (IoT) is concerned with interconnecting communicating objects that are installed at different locations that are possibly distant from each other.

KEYWORDS: Internet of things (IoT), Arduino, Temperature sensor, Soil moisture sensor, And Humidity sensor.

DESCRIPTION OF THE PROJECT

Our system automated irrigation will work to minimize the number of workers in a crop field, control and save water and electricity, increase agricultural production using small quantities of water, minimize manual intervention in watering operations with increasing watering speed and preserving plants from weedicides.

- Reduction in water consumption as compared to drip irrigation system
- Fully Automated system whereas drip irrigation requires some amount of labour work.

TECHNICAL FIELD OF INVENTION

This invention will change the irrigation pattern and make it more effective and reliable. This is Fully Automated system whereas drip irrigation requires some amount of labour work and reduces the water consumption by checking the soil moisture and irrigating the soil accordingly without any human interaction. There is even an option to regulate the irrigation manually if one wants to. As this is IOT based the power consumption is very low and we can always improve it more by integrating smart energy saving modules to the system.

BACKGROUND AND PROBLEM WITH EXISTING ART

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LIST OF PREFERRED AND OPTIONAL FEATURES

- The system can be expanded to include various other alternatives which could include mobile application control of motor and Wi-Fi controlled monitoring.
- The system can work upon Renewable resources of energy such as Solar power instead of batteries which will help to reduce future cost.
- This system has a vast potential when coupled with IOT and AI.

BRIEF DESCRIPTION OF THE DRAWINGS

- The soil moisture sensors which are nothing, but copper strands are inserted in the soil. The soil sensing arrangement measures the conductivity of the soil. Wet soil will be more conductive than dry soil.
- The soil sensing arrangement module has a comparator in it. The voltage from the prongs and the predefined voltage are compared and the output of the comparator is high only when the soil condition is dry.
- This output from the soil sensing arrangement is given to the analog input pin of the microcontroller. The microcontroller continuously monitors the analogue input pin.
- When the moisture in the soil is above the threshold, the microcontroller displays a message mentioning the same and the motor is off. When the output from the soil sensing arrangement is high i.e. the moisture of the soil is less.
- This will trigger the microcontroller and display an appropriate message on the LCD and the output of the microcontroller, which is connected to the base of the transistor, is high. When the transistor is turned on, the relay coil gets energized and turns on the motor which is connected to the piping system and irrigates the field.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

• Designing or engineering a product in order to facilitate the manufacturing process

• Reduce Manufacturing cost.

• Designer should consider the Type of Raw Material and the form of raw material

• Optimize all the Manufacturing functions: fabrications, assembly, test shipping, delivery, service and repair

• Assure the best cost, quality, reliability, regulatory compliance, safety, time-to-market and customer satisfaction.

• It involves minimizing the cost of assembly.

• Reliability is defined as the probability that a component, equipment or system will Satisfactorily perform its intended function under given circumstances.

• We will also add a siren aur speaker attached to the microcontroller so that it will make a noise whenever there is some malfunction reducing the chances of failure.

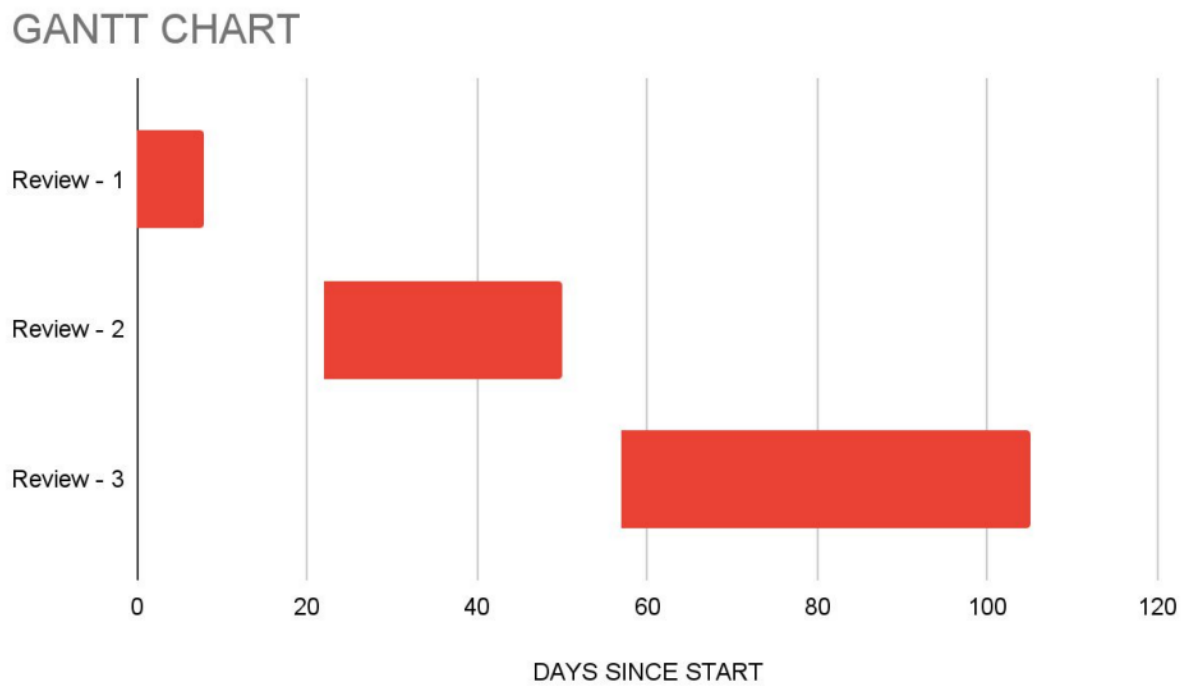
• Adding a LM393 driver in case of a system failure the irrigation will work for a few minutes.

ADVANTAGE OF SMART IRRIGATION SYSTEM

1. In this paper, soil moisture sensor, temperature and humidity sensors placed in root zone of plant and transmit data to android application. Threshold value of soil moisture sensor that was programmed into a microcontroller to control water quantity.
2. This paper on "Automatic Irrigation System on Sensing Soil Moisture Content" is intended to create an automated irrigation mechanism which turns the pumping motor ON and OFF on detecting the dampness content of the earth
3. This proposed paper is Arduino based remote irrigation system developed for the agricultural plantation, which is placed at the remote location and required water provides for plantation when the humidity of the soil goes below the set-point value.
4. Microcontroller based Controlled Irrigation System for Plantation" In this paper old generation with lesser memory microcontroller is used to control the system but proposed system made use of Arduino uno board which is user friendly and it helps to dump the programs easily

5. A wireless application of drip irrigation automation supported by soil moisture sensors" in this paper irrigation is carried out using soil moisture values but extend to this proposed system displays temperature and humidity values 6
6. A wireless application of drip irrigation automation supported by soil moisture sensors" in this paper irrigation is carried out using soil moisture

GANTT CHART



PROPOSED SYSTEM

IT is a overall block diagram of Arduino based automatic irrigation system which consist of three sensors which are connected to controller and sensed values from these sensors are send to the mobile application.

Future Scope

- The system could be expanded to include various other alternatives which could include mobile application control of motor and Wi-Fi controlled monitoring.
- The system will be able to work upon Renewable resources of energy such as Solar power instead of batteries which will help to reduce future cost.
- This system will have a vast potential when coupled with IOT and AI

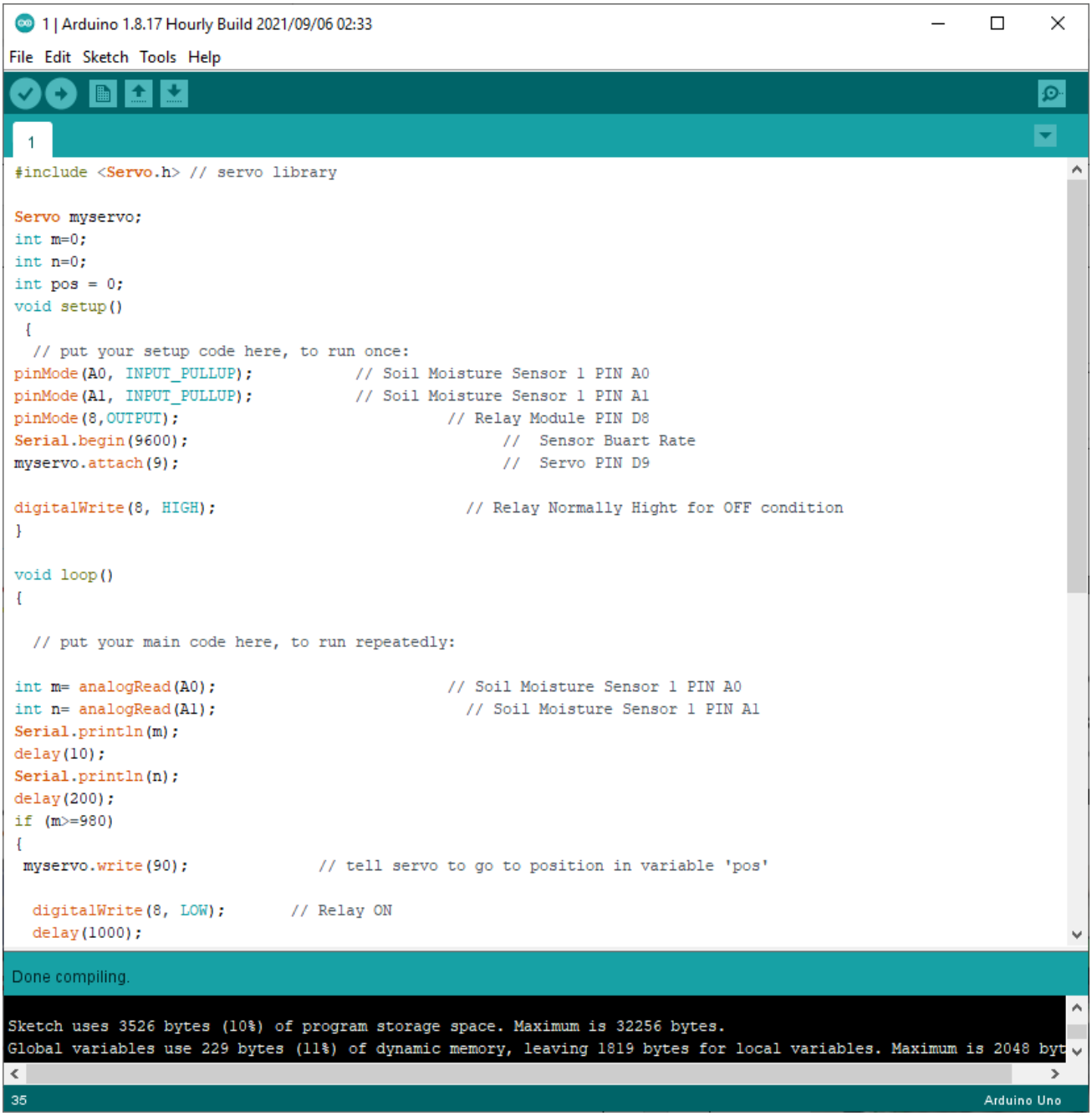
WORKING OF THE IRRIGATION SYSTEM IN THE FIELD

The Arduino Uno is a boot loader which has inbuilt ATMEGA microcontroller, programmer and an assembler. Thus, it functions like a micro controller. The initial step of working is that the signals are send from Smartphone through the Bluetooth HC05 to the Arduino Uno. Four types of sensors are humidity sensor, moisture sensor, water level sensor and LDR sensor. To check the level of water in the wells, water level sensors are employed, and it works like switch. When the sensor is floating in water, it sends a digital 0 to the Arduino and the circuit operates in closed manner indicating that there is adequate water in the well. Similarly, when the sensor is not floating in water, it indicates that the water content in the well is low; the circuit becomes open and sends a digital 1 signal to the Arduino. Thus, the Arduino OFF the Motor using the relay driver and sends an alert message through the Bluetooth as "Water Level Low". Humidity sensors detect the relative humidity of the immediate environments in which they are placed and when it is likely to rain, the sensor read a high value which leads to tripping of the Motor when moisture is low in soil by the Arduino. It is indicated to the farmers by sending a message that "Humidity occurred" and the Motor can be OFF by sending "2" through the Bluetooth. A Light Dependent Resistor (LDR) or a photo resistor is a device that senses the light radiation. Thus, it is also known as photo conductors, photo conductive cells or photocells. The motor is turned on and off by a relay. After collecting the information, it is displayed on the 16X2 LCD screen. Finally, the Arduino transmits alert information to the farmer's Smartphone through the Bluetooth.

SOURCE CODE

```
#include <Servo.h> // servo library

Servo myservo;
int m=0;
int n=0;
int pos = 0;
void setup()
 {
pinMode(A0, INPUT_PULLUP);          // Soil Moisture Sensor 1 PIN A0
pinMode(A1, INPUT_PULLUP);          // Soil Moisture Sensor 1 PIN A1
pinMode(8,OUTPUT);                              // Relay Module PIN D8
Serial.begin(9600);                                   //  Sensor Buart Rate
myservo.attach(9);                                    //  Servo PIN D9

digitalWrite(8, HIGH);                          // Relay Normally Hight for
OFF condition
}
```

```
void loop()
{

int m= analogRead(A0);                          // Soil Moisture Sensor 1
PIN A0
int n= analogRead(A1);                          // Soil Moisture Sensor 1
PIN A1
Serial.println(m);
delay(10);
Serial.println(n);
delay(200);
if (m>=980)
{
 myservo.write(90);             // tell servo to go to position in variable
'pos'

  digitalWrite(8, LOW);         // Relay ON
  delay(1000);
  }

else if(m<=970)
{
 digitalWrite(8, HIGH);         // Relay ON
 }

if (n>=980)
{

  myservo.write(0);             // tell servo to go to position in variable
'pos'

  digitalWrite(8, LOW);         // Relay ON
  delay(1000);

  }

else if(n<=970)
{

  digitalWrite(8, HIGH);        // Relay OFF
  }

else
{
  digitalWrite(8, HIGH);    // Relay OFF
  }
}
```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File Edit Sketch Tools Help
1
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int n=0;
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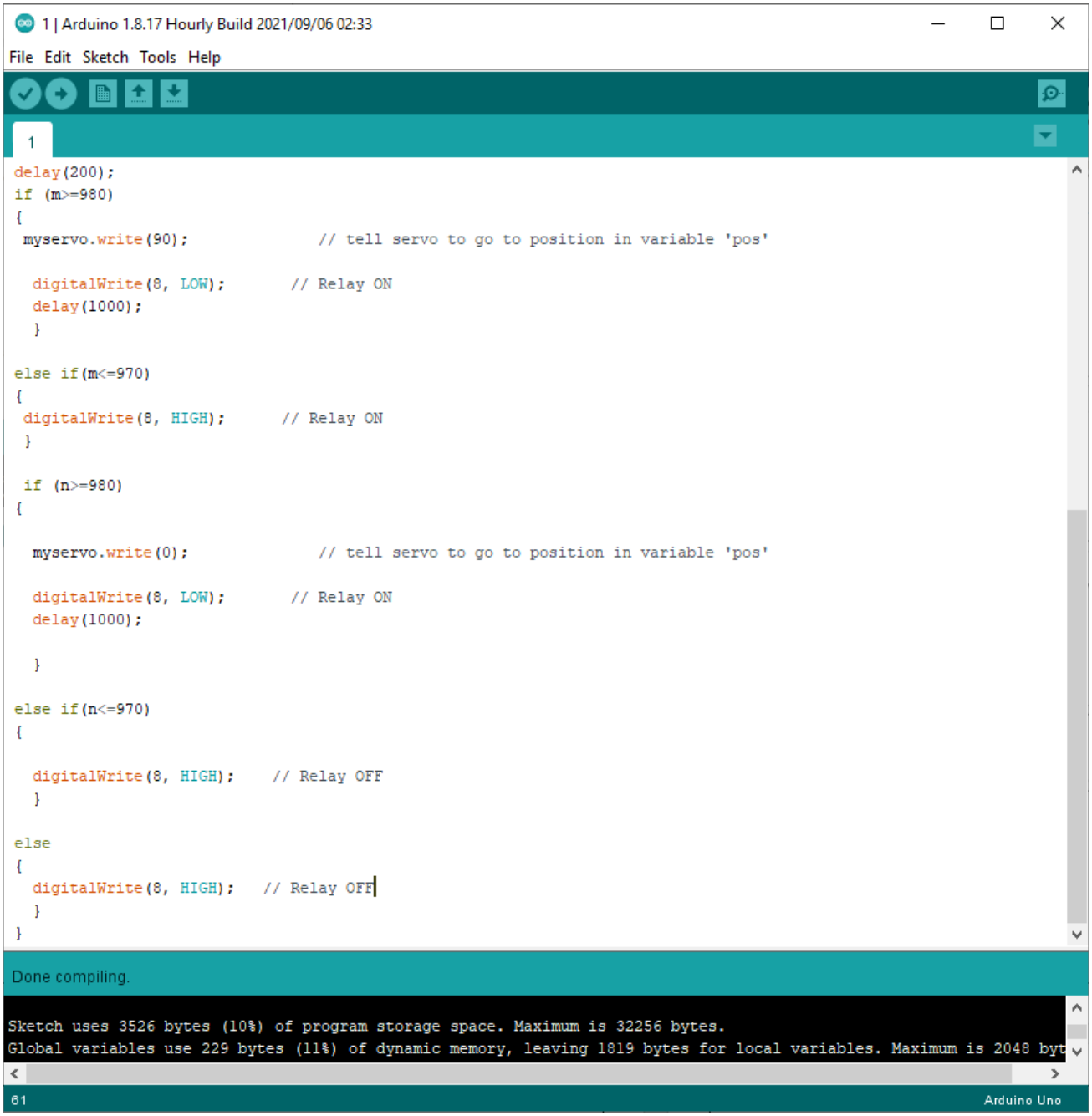
digitalWrite(8, HIGH); // Relay Normally Hight for OFF condition
}
void loop()
{
// put your main code here, to run repeatedly:
int m= analogRead(A0); // Soil Moisture Sensor 1 PIN A0
int n= analogRead(A1); // Soil Moisture Sensor 1 PIN A1
Serial.println(m);
delay(10);
Serial.println(n);
delay(200);
if (m>=980)
{
myservo.write(90); // tell servo to go to position in variable 'pos'
digitalWrite(8, LOW); // Relay ON
delay(1000);
Done compiling.
Sketch uses 3526 bytes (10%) of program storage space. Maximum is 32256 bytes.
Global variables use 229 bytes (11%) of dynamic memory, leaving 1819 bytes for local variables. Maximum is 2048 byt
35
Arduino Uno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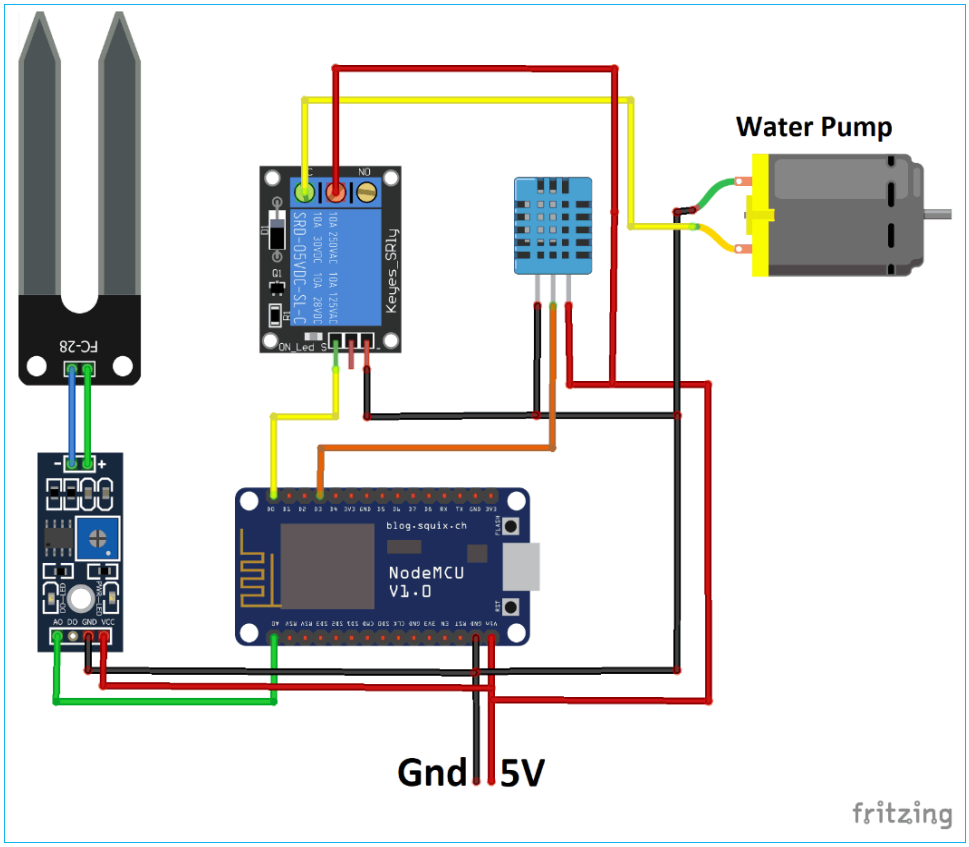


CLAIMS

Principal claim:

1. Simplify the irrigation system by installing and designing the whole irrigation system. Make the system easy to use by farmers.
2. Fully Automated system.

Dependent claim:

- Reduction in water consumption as compared to drip irrigation system
- Fully Automated system whereas drip irrigation requires some amount of labour work.
- Ensures proper nutrition to plants as compared to drip irrigation.
- Ensuresproperirrigationtothefieldduetouniformdistributionnetwork during the initial growth

  phase of the crops as compared to drip irrigation.

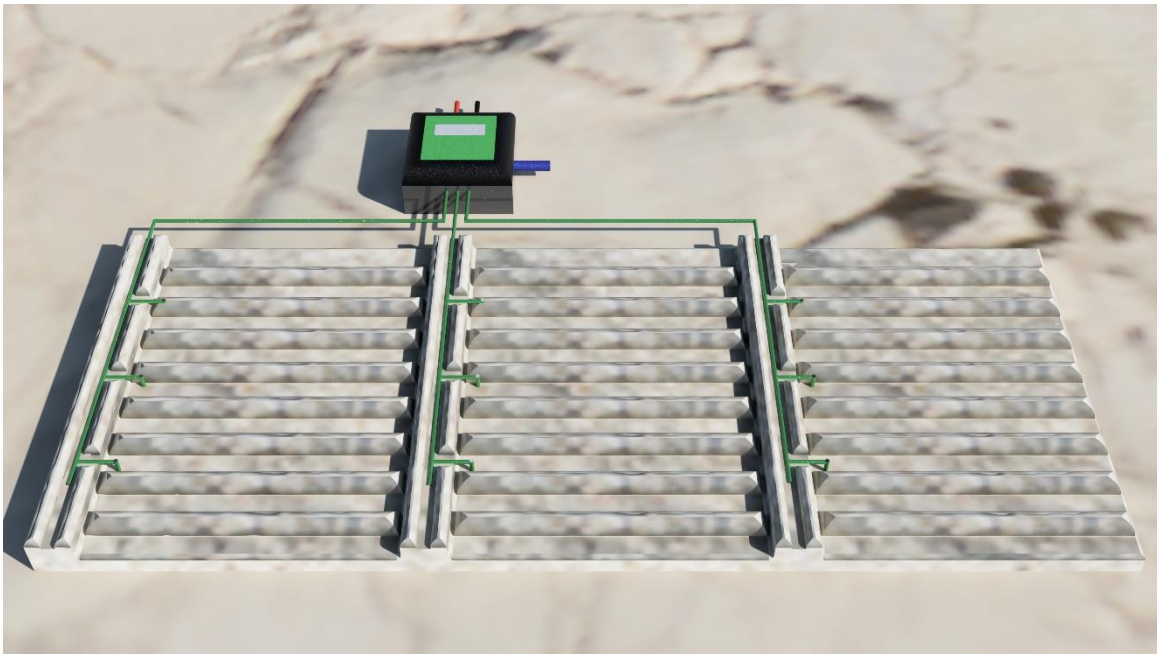
ABSTRACT OF THE INVENTION

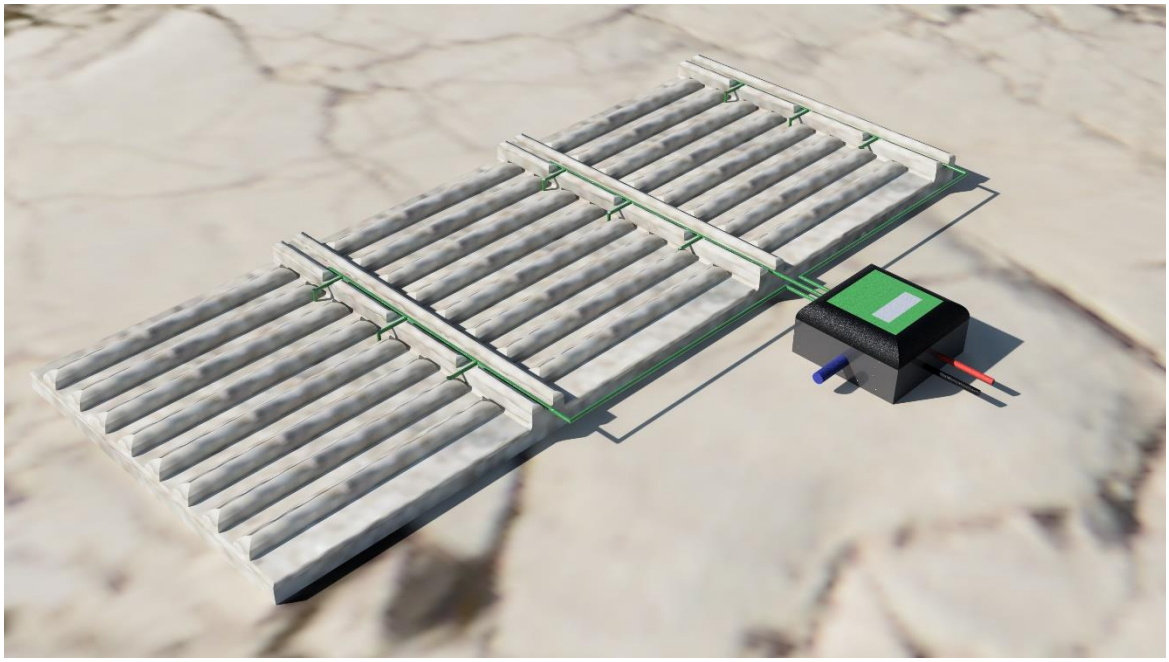
• As you Can see in the diagram, we have added a temperature sensor for DFM

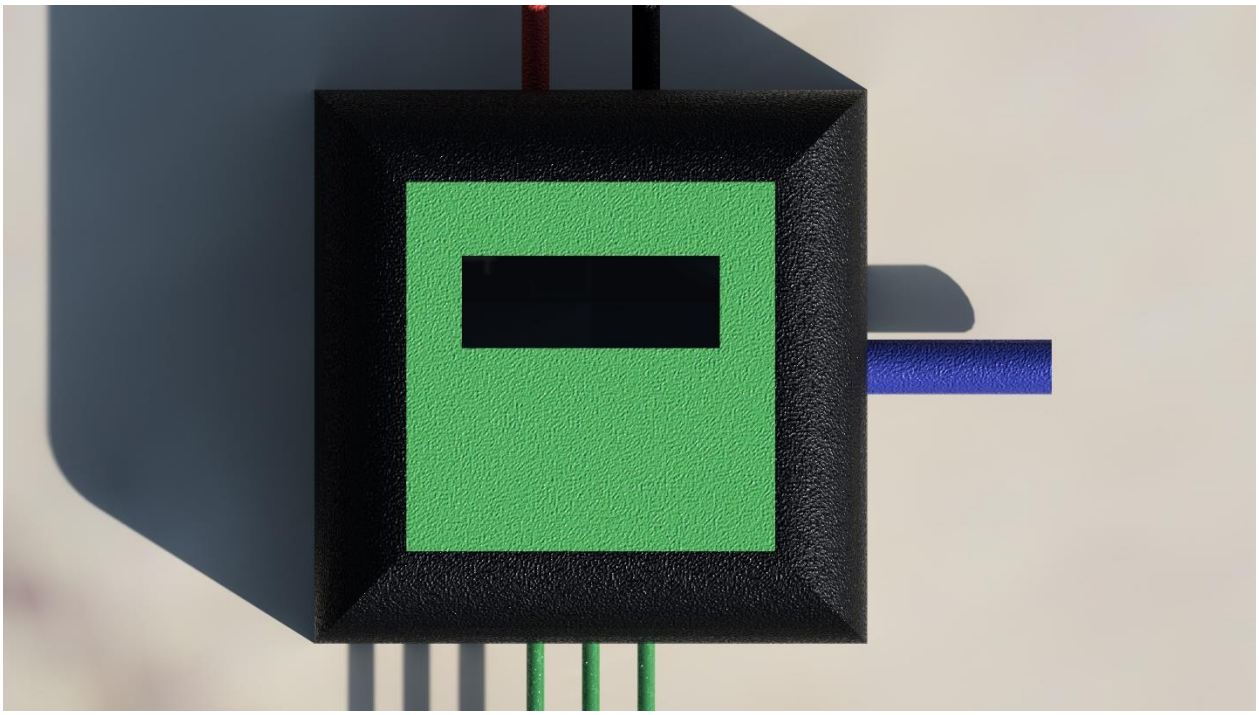
• Also, we Have now removed the rectifier and regulator

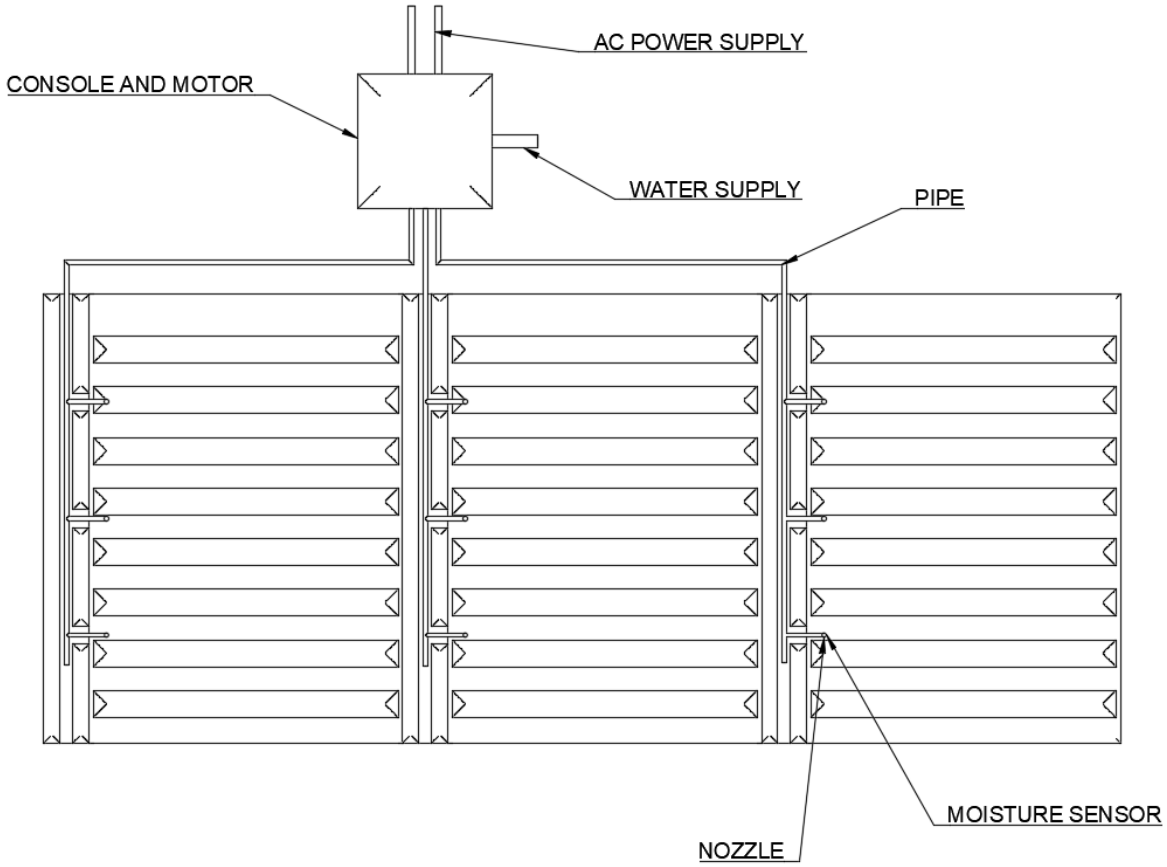
• We have added a speaker/siren attached with a microcontroller in order to prevent malfunction of the control module.

• Also, we have added a LM393 Driver








AC POWER SUPPLY
CONSOLE AND MOTOR
WATER SUPPLY
PIPE
MOISTURE SENSOR
NOZZLE

CONCLUSIONS:

The design proposed in this paper incorporates the usage of Arduino-Boot loader. Arduino board designs use a variety of microprocessors and controllers and also the board is equipped with sets of digital and analog I/O pins which can be interfaced to various expansion boards and other circuits along with inbuilt ADC IC for signal conversion turned as boon to the proposed system. Automation is done using wireless sensor network reduces the delay when compared to a circuit designed using OP-AMP IC and to increase the accuracy of measuring the physical quantities for real time environment. The Bluetooth's connection establishment is very quick, has less interference and data communication is more secure than GSM and cut down the cost of the system. Thus, the design proposed in this paper is low cost, low power consuming, more efficient and secure which helps to reduce the manual work of farmers and this system helps the farmers in a huge way for their agricultural process. The smart irrigation system is feasible and cost effective for optimizing water resources for agricultural production. This irrigation system allows cultivation in places with water scarcity thereby improving sustainability. It proves that use of water can be diminished. The use of solar power in this system is significantly important for organic crops.