1. INTRODUCTION

In this digital world we need every possible thing around us to be automatic which reduces human effort .There are increasing electronic circuits that make todays life easier and simple. Nowadays , energy crisis and water crisis are the big problems faced by everyone. So, there is a need to conserve energy and water. The aim of this is to make solar based prototype to irrigate the field automatically. Imagine how helpful it will be when you are busy in doing your next task and your field is being irrigated automatically at low cost. No worries about under irrigation as well as over irrigation , no worries about the wastage of water as well as expensive electricity , no worries about your busy schedule. This is what Automatic irrigation about and there is no end to its practical application. 'AUTOMATIC PLANT IRRIGATION SYSTEM USING ARDUINO UNO' as the name specifies that it irrigates the field when the moisture value of soil is below the reference value and it will automatically turn off when the moisture value in soil exceeds that reference value The main aim of this project was to provide water to the plants or gardening automatically using Arduino UNO. We can automatically watering the plants when we are going on vacation or don't we have to bother my neighbors, Sometimes the neighbors do too much of watering and the plants end up dying anyway. As similation is that the artificial application of water to the land or soil It is used to assist in the growing of agricultural crops maintenance of landscapes, and re vegetation of disturbed soils in dry areas and during periods of inadequate rainfall. Several sprinklers have pipe thread inlets on the lowest of them that permits a fitting and also the pipe to be connected to them. The sprinklers are usually used in the top of the head flush with the ground surface As the method of dripping will reduce huge water losses it became a popular method by reducing the labor cost and increasing the yields. When the components are activated, all the components will read and gives the output signal to the controller, and the information will be displayed to the user (farmer). The sensor readings are analog in nature so the ADC pin in the controller will convert the analog signals into digital format. The full concept of the water irrigation system is like traditional techniques of sprinkler or surface irrigation requires half of water sources. Even more specific amounts of water can be supplied for plants. The main objective of this project is to save water and reduce or minimize labour work in the agriculture lands. Continuously Monitoring the status of sensors provide

signal for taking necessary action to implementing the process and get the output of soil moisture sensor & provide water according to the need or required of crop.

1.1 Problem Statement

Nowadays, despite being an agricultural country, the number of people who die of hunger is still quite high. Access to food seems to be difficult, as price and quantity of food is still beyond the capability of the lower middle class and lower class. Irrigation induced Crop failure is a major cause of crop loss every year, and in the age of water crises, this has been elevated to great levels. In order to keep up with increasing demand, farmers are required to increase crop efficiency, by rapidly advancing technologies. In order to handle Irrigation issues, this system has been devised and implemented. Usually, farmers need large scale manpower to irrigate large lands simultaneously. However Automatic Plant Irrigation System (APIS) is an automatic system that facilitates automated irrigation of lands simultaneously, upon need.

1.2 Motivation

The motivation for this project came from the countries where economy is based on agriculture and the climatic conditions lead to lack of rains & scarcity of water. Our country mostly depends on agriculture. The farmers working in the farm lands are solely dependent on the rains and bore wells for irrigation of the land. Even if the farm land has a water-pump, manual intervention by farmers is required to turn the pump on/off whenever needed. The project aim is to detect the dryness in soil using sensors and provide water to the plants appropriately. This project helps to maintain the plants quite easily. In this project we are detecting soil moisture and need for Irrigation.

1.3 Objectives

The Aim of our project is to minimize this manual intervention by the farmer. Automated Irrigation system will serve the following purposes:

1) As there is no un-planned usage of water, a lot of water is saved from being wasted.

2) The irrigation is done only when there is not enough moisture in the soil and the sensors decide when the pump should be turned on/off. This saves a lot time for the

farmers. This also gives much needed rest to the farmers, as they don’t have to go and turn the pump on/off manually.

2. Literature Survey:

Archana and Priya (2016) proposed a paper in which the humidity and soil moisture sensors are placed in the root zone of the plant. Based on the sensed values the microcontroller is used to control the supply of water to the field. This system doesn't intimate the farmer about the field status.

SonaliD.Gainwar and Dinesh V. Rojatkar (2015) proposed a paper in which soil parameters such as pH, humidity, moisture and temperature are measured for getting high yield from soil. This system is fully automated which turns the motor pump ON/OFF as per the level of moisture in the soil. The current field status is not intimated to the farmer.

V. R. Balaji and M. Sudha (2016) proposed a paper in which the system derives power from sunlight though photovoltaic cells .This system doesn't depend on electricity. The soil moisture sensor has been used and based on the sensed values PIC microcontroller is used to ON/OFF the motor pump. Weather forecasting is not included in this system.

G.Parameswaran and K.Sivaprasath (2016) proposed a smart drip irrigation system using IOT in which humidity, temperature and pH sensors are used. Irrigation status is updated to the server or local host using personal computer The farmer can't access about the field condition without internet [4].

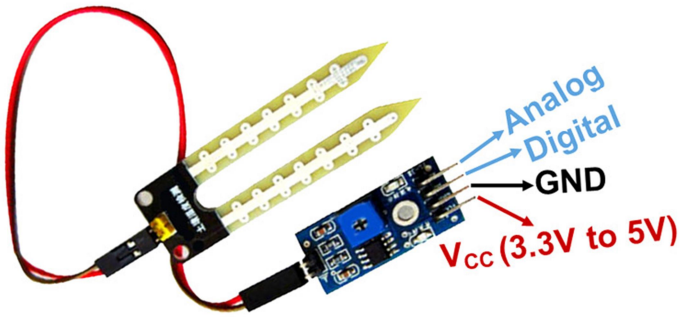
S.Reshma and B.A.Sarath (2016) proposed an IOT based automatic irrigation system using wireless sensor networks in which various sensors are used to measure the soil parameters. This system provides a web interface to the user to monitor and control the system remotely. Weather monitoring is not done in this system.

Joaquin Gutierrez (2013) proposed a gateway unit which handles sensor information, triggers actuators, and transmits data to web application. It is powered by photovoltaic panels and has duplex communication link based on cellular internet interface that allows for data inspection and irrigation scheduling to be programmed through web page.

3.MATERIALS AND METHODOLOGY:

3.1 Working Of Moisture Sensor:

The Soil Moisture Sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil. The sensor averages the water content over the entire length of the sensor. There is a 2 cm zone of influence with respect to the flat surface of the sensor, but it has little or no sensitivity at the extreme edges. The figure above shows the electromagnetic field lines along a cross-section of



the sensor, illustrating the 2 cm zone of influence.

Figure 1:moisture sensor

CIRCUITRY CONNECTIONS

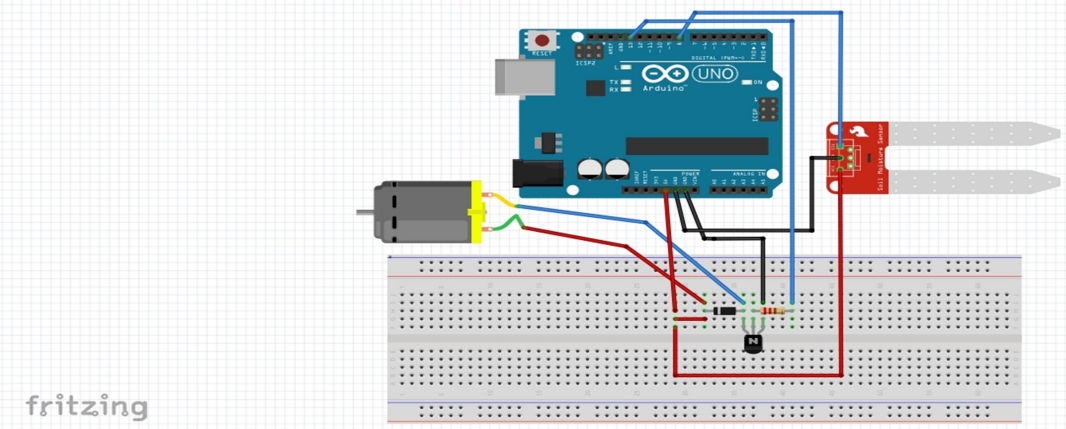
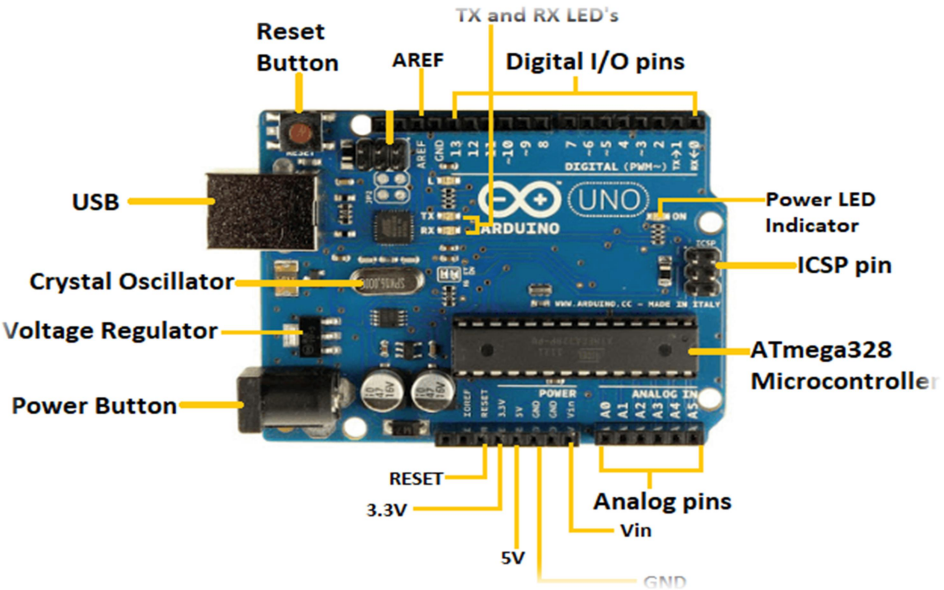


Figure 2:circuit diagram

Components Required :

1. Arduino UNO
2. Moisture sensor
3. Water pump
4. Battery
5. Transistor
6. Diode
7. Resistor
8. PCB Board
9. Connecting wires



1.Arduino UNO[Microcontroller]:

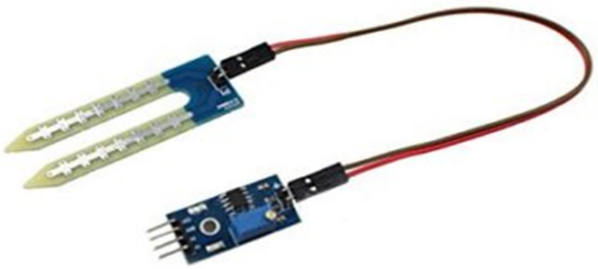
Figure 3: Arduino UNO

- Power Pin (Vin, 3.3V, 5V, GND): These pins are power pins
- Vin is the input voltage of the board, and it is used when an external power source is used from 7V to 12V.
- 5V is the regulated power supply voltage of the nano board and it is used to give the supply to the board as well as components.
- 3.3V is the minimum voltage which is generated from the voltage regulator on the board.
- GND is the ground pin of the board
- RST Pin(Reset): This pin is used to reset the microcontroller
- Analog Pins (A0-A7): These pins are used to calculate the analog voltage of the board within the range of 0V to 5V
- I/O Pins (Digital Pins from D0 – D13): These pins are used as an input otherwise output pins. 0V & 5V
- Serial Pins (Tx, Rx): These pins are used to transmit & receive TTL serial data.
- External Interrupts (2, 3): These pins are used to activate an interrupt.

- PWM (3, 5, 6, 9, 11): These pins are used to provide 8-bit of PWM output.

2.Moisture sensor:

Soil moisture sensors measure the humidity of water content in soil. Since the direct hydrometric measuring of free soil wetness needs removing, drying, and coefficient of a sample, soil wetness sensors live the meter water content indirectly by victimization another property of the soil, like electrical phenomenon, non conductor constant, or interaction with neutrons, as a proxy for the



wetness content.

Figure 4: Moisture Sensor

3.Water Pump:

The pump is employed to by artificial water for a selected task. It are often electronically controlled by interfacing it to a microcontroller. It are often triggered ON/OFF by causing signals pro renata. the method of by artificial means activity water is understood as pumping. There are many sorts of water pumps used. This project employs the employment of a little pump that is connected to a H-Bridge. The pumping of water could be a basic and sensible technique, much more sensible than scooping it up with one's hands or lifting it in a very hand-held bucket. This is true whether or not the water is drawn from a contemporary supply, affected to a required location, purified, or used for irrigation, washing, or waste product treatment, or for evacuating water from associate undesirable location. notwithstanding the result, the energy needed to pump water is an especially exigent part of. All alternative processes rely or profit

either from water descending from the next elevation or some pressurised utility..

Figure 5: Water Pump

4. 9V Battery:

9V batteries are one of the "big 5" or highly in-demand batteries because of the many applications or devices it can power up. Each 9-volt battery is literally described as a rectangular prism cell having rounded edges and polarized snap connector at its top. It has product dimensions of approximately 46.40 mm to 48.50 mm in height; 25.0 mm to 26.50 mm approximate length and the width ranging from 15.0 mm to 17.50 mm. It is first used in transistor radios. This is the reason why some manufacturers still refer to nine-volt batteries as transistor batteries.

Figure 6: 9v Battery

5.Transistor:

The common NPN bipolar semiconductor device; bipolar junction transistors (BJT) used for general purpose low-power amplifying or switch applications. It is designed for low to medium current, low amplifying current, low power, medium voltage, and might operate at moderately high speeds. It had been originally created within the TO-18 metal.

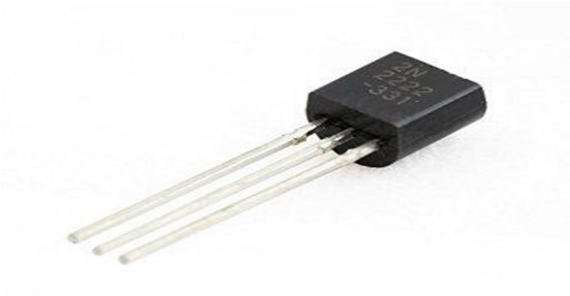


Figure 7: Transistor

6.Diode:

A diode is a semiconductor device that essentially acts as a one-way switch for current. It allows current to flow easily in one direction, but severely restricts current from flowing in the opposite direction. Diodes are also known as rectifiers because they change alternating current (ac) into pulsating direct current (dc). Diodes are rated according to their type, voltage, and current capacity.

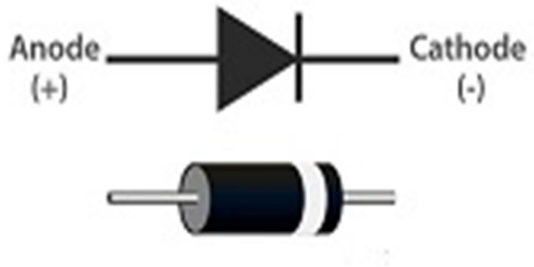


Figure 8: Diode

7.Resistor:

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits. In electronic circuits, resistors are used to limit current flow, to adjust signal levels, bias active elements, and terminate transmission lines among other uses.

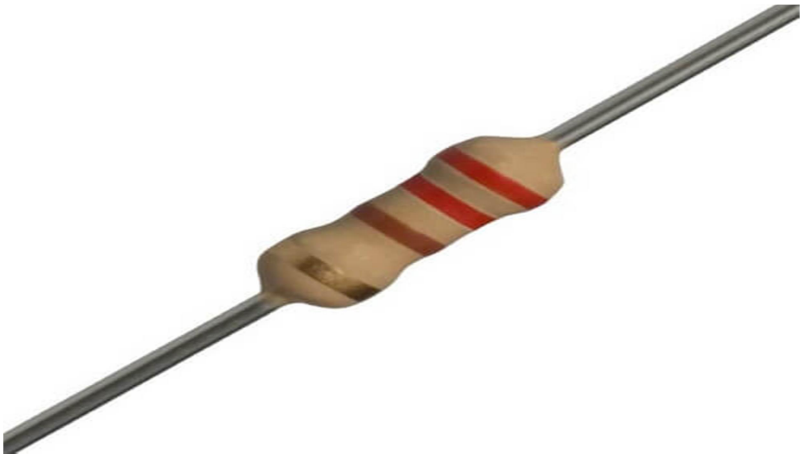


Figure 9: Resistor

8.PCB Board:

A blank PCB is quite simply an empty circuit board free from any of the components that are installed to create a functioning circuit board. A blank circuit board is sometimes known as a 'copper-clad' circuit board, due to the coating of copper the board has around it.

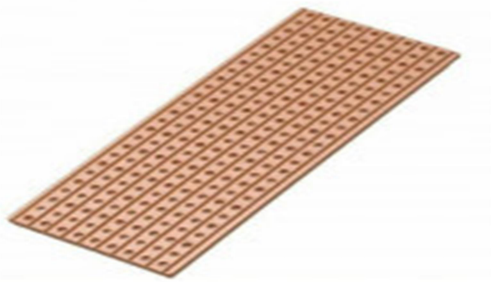


Figure 10: Blank PCB Board

9. Connecting Wires:

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminum.

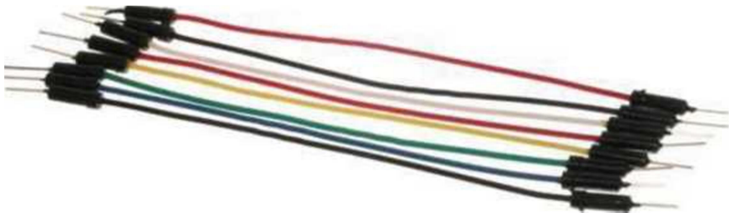


Figure 11: Connecting Wires