

# **Automated Irrigation and Controlling System**

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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## APPROVAL

This Project/internship titled **Automated Irrigation and Controlling System**, submitted by Mahmudul Hasan Moon and Rejuyan Hossain Shawon. ID No: 181-1510548 and 182-15-11688 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 13/9/2022

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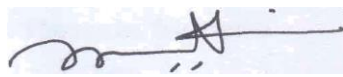


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We hereby declare that, this project has been done by us under the supervision of **Mr.Md. Aynul Hasan Nahid, Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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## **ABSTRACT**

The world population is increasing in day by day, with projected idea it could be population of 9 billion people by 2050. As a result we need more food for survive and agriculture land will decrease. Annual cereal production 2996.142289 million tons almost 3 billion tons. In future, we need 60 percent more food to feed a world population of 9.3 billions (FAO information). The modern technology in agriculture it will help to farming and better farming and sort out our problem in easy way. Make agriculture easy for us. This project is created with help of embedded system that can help irrigation to our land whenever it need water in easy step without more effort. It has automatic control system, which help if rains there is no need of water in the land that time it will automatically switched off the pump. A low cost rain sensor is used to detect rain and water sensor used to sense the water level in the field. The goal of this project increase the farming, make it easier, and gets more benefit. The entire system of this project give a new hope to our country agriculture with automated irrigation system at low cost and less effort.

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# CHAPTER 1

## Introduction

### 1.1 Overview

Now a days Bangladesh is well-known country for its rivers and agriculture. Agriculture is the main source of food and other resources for our peoples, it is regarded as the backbone of our existence. It is shameful for our country's economic development. It is so critical to the country's economic success. Unfortunately, our most of the farmers use old method for farming. Most of the irrigation system are operated by manually in our country. As addition to farming crops, the irrigation system must be considered. For crops to produce healthily, appropriate irrigation must be applied often. Agriculture is a sector where talent is highly valued and in demand. Young people were not interested in working in agriculture and did not perceive many prospects as the reason for the decline in the labor force. Bangladesh is a country with a lot of rain.

### 1.2 Background and Present State

In Bangladesh, agricultural pump sets and connectors with an average capacity of 5HP are erected every year, according to a survey. A significant portion of our annual electricity usage is in the agricultural sector. Because of power cuts, a huge problem in our nation, farmers often struggle to access water to their fields at the appropriate time. Another significant issue in our nation is the distribution of power. 2 Scheduling irrigation is one of the two most common issues with irrigation systems. Planning irrigation depend on two question answer one is 'when I should start irrigation into my land' another question is 'How long I should keep irrigation to my land by pump' and most of time its very difficult to answer accurately. Some times it we start irrigation very early and also pump overwater and waste water and decay our crops. This system will help to reduce misuse of water and money. Even our over water pump will damage our crops with various disease. This system will provide enough water in when there is need of water. And when enough water is pumped it will automatically could stop pumping. When our crops are healthy it will get good price in market also and being beneficial for farmers. In our country farmers spend most of the time of day in the land for irrigation. Sometime It could be whole day. That's why they can not spend time with

their family or cant use that time in other way. Our country farmers don't get their valid price of crops that's why it will be so costly to hire people for irrigation. That's why people are losing their faith in agriculture. Using this system our farmers can remotely operate irrigation system and could use this time to done other work of them, could spend time with family, earn some extra money.

### **1.3 Statement of the Project**

The goal of development this project make easy and autonomou irrigation system with the help water sensor. The Autonomous irrigation system structure are controlled by a smart microcontroller. Which you can call as a mini computer. Water sensor give the data of water level in the real time to the microcontroller. When the water level is down from our needed level then microcontroller turn on the water pump that is mounted on it with the output pin. The microcontroller also control solenoid valve to ensure that it is consistently pump water to agriculture land. A mobile app system provide the entire User Interface (UI) that user can control whole system with the tap on screen. It is easy to use and save time, water, and effort. Which are so much valuable for us.

### **1.4 Summery**

The lack of water is major problem for farmers in these days. Many of our river getting dry in day by day. This embedded project will help farmer to irrigation his land with help of water sensor. The water sensor and rain sensor will collect the physical world data, convert into machine understandable language, and send it over to microcontroller, and microcontroller did as we program on perspective of that data. The water sensor and rain sensor collect data continuously. A mobile app we can easily control this whole system with simple User Interface (UI).

### **1.5 Objectives**

The main goal of project is develop a automatic irrigation system that is save human time, money, effort, and reduce misuse of water. We do not need to hire any people for

pumping water. Solar panel is an way which can help us to save energy and reduce electricity cost. This smart irrigation system depend on water sensor, which transmit the data that land need water, or not. In current situation people in Bangladesh not interested in farming, because the earnings from agriculture to less. It will be alternative for our country labor shortage. By use, enough water it will save water and crops get healthy and our electricity cost get decrease. Our target is create system that could pump water automatically and controlled over a smart device with some simple steps. Using various sensor, we get the real world data, for this cause we do not need check land physically. The whole system can be controlled over by a smart phone easily. There is a microcontroller, which control all other nodes. This automated irrigation system is practical and need for our country situation. It cost are not so much.

This system will develop the way of irrigation water in our land and make it effective. Wi-Fi module used for real time controlling over a smart phone, you can command through your device. This project is very suitable for our country farmers and also cost-effective. It is so simple and well design system, we can develop more as per further need. There is no need any man duty for this system. You can roaming with this project controlling system in your pocket through smart phone.

## **CHAPTER 2**

### **Literature Review**

#### **2.1 Overview**

Many kind of researchs has been occurred to see how irrigation might be made more systematic. The water source are natural, and waste of water, it could be dangerous for our existence. That's why many researcher try to approach new modern way of irrigation to save water. The researcher used so many technologies to developed this kind of system. But the main purpose of this of project is reduce misuse of water, correct use of water, save time, save money, save human effort and fulfill the lack of labor and proper irrigation. The proposed system is designed with the water sensor. When water level is down in land it will notify user through mobile application name Blynk. If there is rain, that's mean no need of water that time automatically switched off the motor.

#### **2.2 Related Available Application**

There are so many application of automated irrigation system. ZigBee is one of them. ZigBee can be used for monitor the condition of a long stretch bridge after taking into account. The problem of currently use method of irrigation is wire and cable for communication, such as high communications installation cost, sensor power supply so on. ZigBee can cover short-ranges communication.

#### **2.3 Proposed System**

Automated Irrigations and Controlling System is n automated irrigation system that collect water level, rain data and transmit raw data to microcontroller ATmega8. Water level are observed by water sensor, its collect the water level and response this data to as voltage on analog way to microcontroller. The rain sensor also collect rain data and send it to microcontroller in analog state. Microcontroller convert that data to digital and send it relay module and other parts too like as user app cloud, for user display. Those sensor are consistently collect data and send it to microcontroller, microcontroller converts in digital data type and send it to mobile application server cloud. The motor take action by relay module, which is connected with microcontroller. When water level



go down and water sensor response that data. The Android application is designed with simple few option and easier. This application provide motor state, water level, rain information. The farmers can also design this free open resources app with some step if they really want it. For communication between app and our system there is need of a higher level communication system, such as a Wi-Fi module. The data of land state condition will be transmit to mobile application through this module. Your application can connect to his cloud server with IP address and get update about your land. This project will help our country farmer make easy irrigation save time, effort, money, electricity, water also. In our project, we have used mechanical parts, electrical parts and software components for program.

## 2.4 Mechanical Components

### 2.4.1 Project Board:

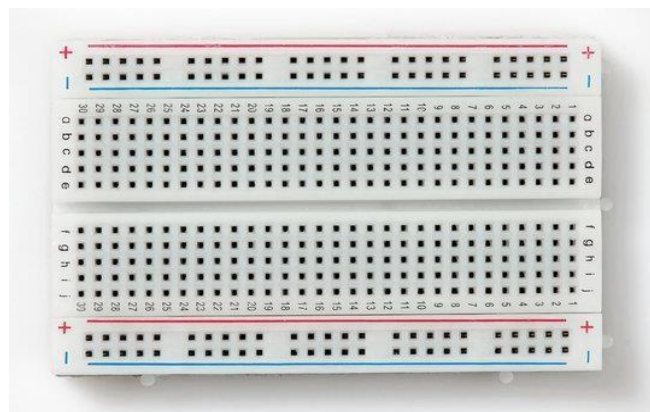


Figure 2.1 Project Board

A breadboard is an connector between many electrical components. In breadboard there is so many holes. There is mainly two types of hole, one is for power source positive and negative, another one is for electrical components. We can put electrical components connection into holes for making a circuit. The middle holes are vertically equally connected and power source hole are connected horizontal wise.

### 2.4.2 Solenoid Valve:

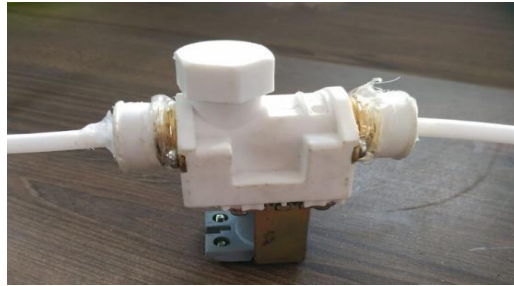


Figure 2.2: solenoid valve

A solenoid valve is an electro-mechanical valve that help flow water. Its used to control sway flow of water. It controls reverse or forward flow with the help of electromagnetic filed.

### 2.4.3 Water Pump:

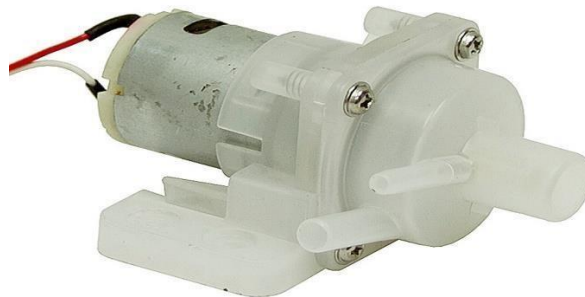


Figure 2.3: Water Pump

A water pump is a device which supply water with air pressure created by electromagnetic field. Water flow high area to down area it's a natural law of water flow. When water under the land or in well it does not flow to land automatically. Because water cannot flow down area to high area. That's why we need some out force. That force will help water to climb up to land, that's way we used a DC 5v Mini Submersible water pump. That's create air pressure and help water to climb up. This submersible water pump could be run on 2.5 voltage to 6 voltage. The outside diameter of the waters outflow is

7.5mm, while the inside diameter 4.5mm. The water intently is 5mm in. It can pump to 120 liters of water each hour.

## 2.5 Electrical Components

### 2.5.1 Microcontroller:

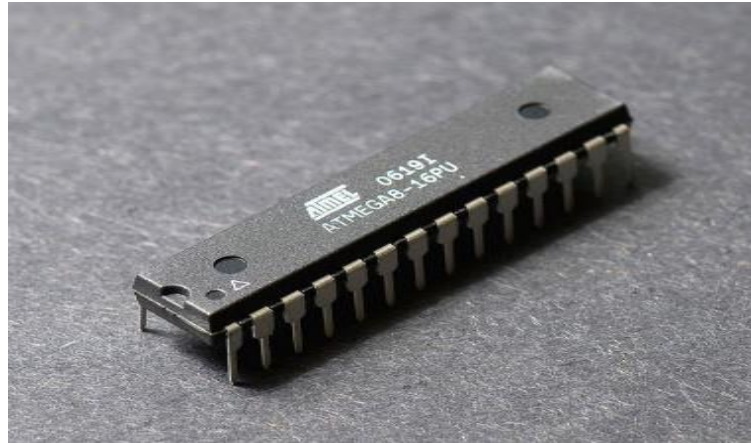


Figure 2.4 Microcontroller

A microcontroller is an integrated circuit. You can call it as a mini computer. We have used ATmega8 microcontroller to power our project. This microcontroller controls the other components of an electronic system, with programmable instruction. You can program your code through extreme burner to it. This microcontroller is a low power 8bit and based on AVR RISC architecture. This is main part of this project from here all function are work.

### 2.5.1.1 Central Processing Unit:

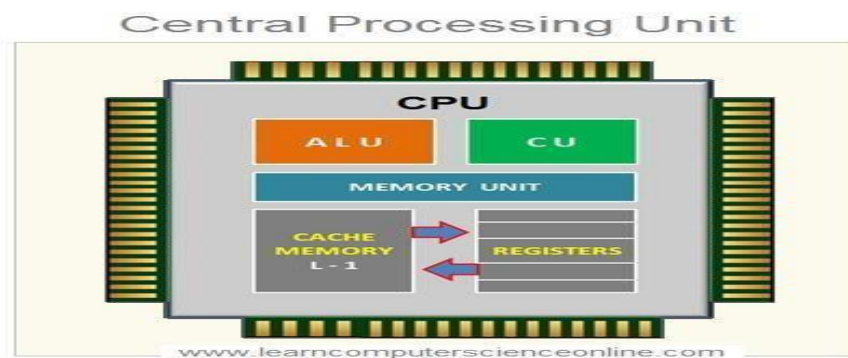


Figure 2.5 CPU

CPU is a one kind central processor, main processor or just a processor who take primary part of electronics device. In this (CPU) are, ALU, CU, Memory Unit and registers. This kind of CPU used in our microcontroller. This CPU help microcontroller to control all the other part of electronics.

### 2.5.1.2 Memory:

We know about what is data. Data is collection of fact, action, instruction, analyze. This is data but we need memory to store that thing. Where those data could be stored, that is called memory. In CPU, there is 2 types of memory. Primary memory (RAM or ROM) and secondary memory like hard drive, drive etc. Without memories, we cannot do anything functional with machine.

### 2.5.1.3 I/O Peripherals:

I/O is Input and Output. With microcontroller, there is so many kind of data. Sometime it is like input, it could from sensor or from user or other kind of resources. Output also same like input, it is a feedback, on the basis of your input or with input. In this project, we have used sensors as input and pump as output. In short you can sensor input the data to microcontroller and microcontroller give output or feedback as through pump.

#### 2.5.1.4 ADC:



Figure 2.6 ADC

ADC is a converter, which convert an analog to a digital signal. In this project sensor give analog raw data but our other component are functioned by digital data. This is the reason we have use ADC (Analog to Digital Converter). With ADC help we convert sensor data and send it to other components and the can understand the instruction.

#### 2.5.1.5 DAC:

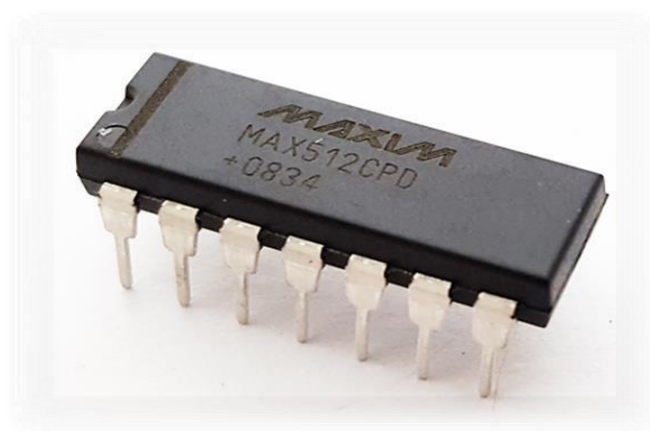


Figure 2.7 DAC

DAC is a converter, which convert an digital to a analog signal. In this project when we transmit a digital signal from Blynk application server. Receiver receive that signal but could not send to sensors. Then we have to converts this signal into analog signal. This is the reason we have use DAC (Analog to Digital Converter).

### 2.5.1.6 Serial Port:

A connector for both input and output is a serial port. It enables communication between both the microcontroller and other external devices. It keeps the microcontroller and other devices in communication. Parallel ports and USBs are equivalent, however they share data in differing respects. In this experiment, we used an ATmega8 microcontroller. It comprises of a RISC Bios settings 8-bit AVR microprocessor with a 28-pin PDIP interface. The 8-bit microcontroller's program memory is 8K Flash, along with 1K and 512 bytes of RAM and EEPROM.

### 2.5.2 NodeMCU:

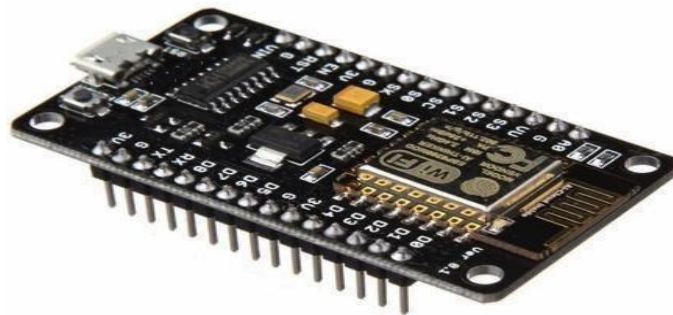


Figure 2.8 NodeMCU

NodeMCU is a cheap cost-open-source module for IoT platforms. NodeMCU can be design as per user need and prototype board designs are available. The name of NodeMCU is two part. One terms is ‘node’ another one is ‘MCU’ (micro controller unit). NodeMCU is used to design our project function. We have programed NodeMCU with the help of Arduino IDE and upload into NodeMCU. This is the main key for wireless communication between user device and system.

### 2.5.3 Transistor:



Figure 2.9 Transistor

A transistor is an electrical device, its used to control the balance of current flow and voltage flow consistency. Its work like as an electrical gate when current pass through it, it give us a constant value of voltage. There some time drop and high value in current flow. It causes damage in electrical components. For constantly pass current and save electrical components this transistor used. It based on three main terminal: emitter, base, collector. This project, we have use C1815 Transistor. C1815 transistor commonly use in worldwide and it so reliable.

### 2.5.4 Transformer:

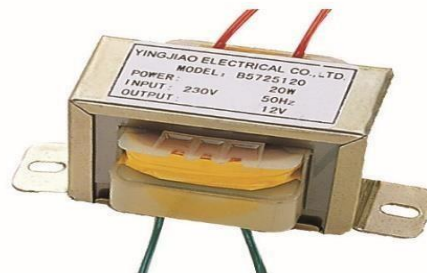


Figure 2.10 Transformer

A transformer is an electrical device that change electric energy 1 type to another type. Here we supply AC current it changed to DC current by transformer in neutral manner. It mostly generally use for set up voltage and current flow between circuits and power source. These can be utilized either "forward" or "backward." In this project, we use a 220v ac to 12v and 6v step-down transformer. The 1000mA power amount for the 12v

transformer is 600mA for the 6v transformer. This is why we get 12v or 6v voltage current supply all the time and can run our project.

### **2.5.5 Capacitor:**



Figure 2.11 Capacitor

A capacitor is a electrical material device that store electric charge during run time. Which create a potential difference between electricity and component. It is used to run device smoothly. The positive charges builds up on one plate in a side, while the negative charge build on the other side. Several capacitor, such as a 22uF 50V, 470uF 25v aluminum electrolytic capacitor used in project.

### **2.5.6 Rectifier:**



Figure 2.12 Rectifier

A rectifier is a electrical device that convert (AC) to (DC). Which flow in one direction only, this device do not give us the backward current flow, which only flow current in one channel. Our circuit design for less than 1A, so we used a rectifier in this project for power supply in circuit.

### **2.5.7 IC:**

A chip that could be act like as oscillator, microprocessor, timer, amplifier, is known as integrated circuit. Integrated circuit is a compact silicon wafer.



### 2.5.7.1 Regulator IC:

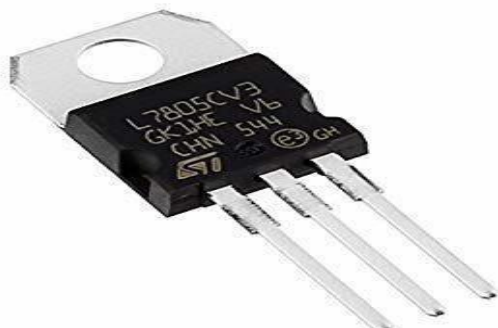


Figure 2.13 Regulator- IC

The output voltage of voltage regulator IC is always be same means constant. It constantly flow same fixed voltage current. There is no drop, decreasing and increasing voltage in output voltage. This IC used to control the unregulated voltage flow in this project.

### 2.5.7.2 Encoder IC & Decoder IC:



Figure 2.14 Encoder IC & Decoder IC

The HT 12D, 12E Encoder IC are a set of CMOS LSI installed in this project for remote control data transmit. They encode and decode 12 bits of data in 12 bits. Those IC are available on pair. For properly data transmit encode and decode we have to use this IC in pair.

### 2.5.8 LED:

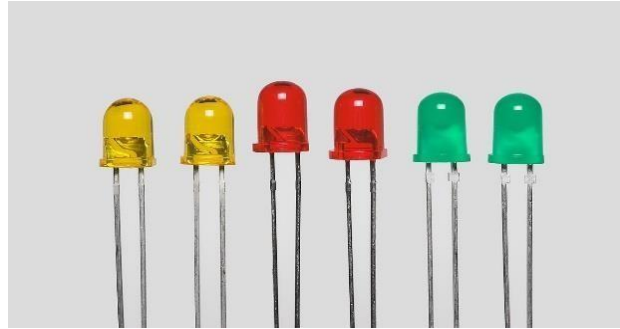


Figure 2.15 LED

When current goes through a light-emitting diode, it emits light which glows. Photons are created when electrons pass through this diode. When an electron in a semiconductor recombines with an electron hole, energy is released.

### 2.5.9 Resistor:



Figure 2.16 Resistor

Resistors are electronic components that obstruct the flow of current. They have fixed resistance. When the input voltage is greater than the resistance voltage, it allows current to flow. It will flow a minimum constant voltage. When the input voltage is less than the resistor's minimum constant voltage, it cannot pass the current. Resistors are usually used to supply minimum voltage to active components like op-amps, microcontrollers, etc.

### 2.5.10 LCD Display:



Figure 2.17 LCD Display

A flat-panel screen called a liquid-crystal display (LCD) produces light using polarizing filters. It uses a backlight and reflective instead of producing light directly to generate monotone images and liquid crystals. They employ liquid crystals to create a different image.

### 2.5.11 Radio Module:

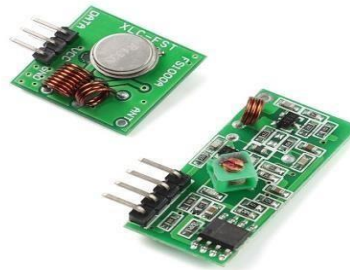


Figure 2.18 Radio Module

Radio module used to transfer data through air. In this project, we have used 433-Radio Module. In this model pair, we have one sender, which send data and one receiver that receive data from air. With those radio models, we can control our model from away with the air no need of any cable to do that.

### 2.5.12 Solar Panel:

RoboDoc



Figure 2.19 Solar Panel

Its solar collector collect the sunrays and transform them into electricity. A solar panel is a collections of solar cells that use the photovoltaic effect way to create electricity. The most important part of install solar panel to set in such a place that, where it can get more sunrays and this solar panel will save a lot money and electricity with the nature help.

### 2.5.13 Relay Module:



Figure 2.20 Relay Module

A relay module is an electrical switch that can control current flow. It will turn off or on automatically on the base of our instruction. We do not need use this switch manually it do it automatically. With relay module you can decide which channel should flow current in which situation.

### 2.5.14 Battery:



Figure 2.21 Battery

A battery is a rechargeable battery that may be used over again. In this project, we have use total four batteries of 6volt. That battery also connected with the solar panel to store solar power when sunray appeared. Those battery supply power to our sensor and sender module.

### 2.5.15 Rain sensor:



Figure 2.22 Rain Sensor

A rain sensor can detect the rain. We have use a rain sensor in our project to detect rain in physical world. We connected rain sensor to our microcontroller. When rain appeared there is no need of water irrigation to the land that time rain sensor collect data about rain and send it to microcontroller. That time microcontroller turns motor off.

## 2.5.16 Water Sensor:

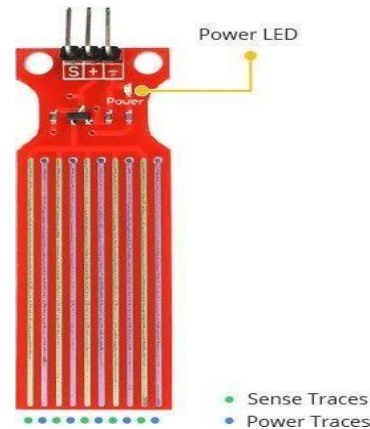


Figure 2.23 Water Sensor

On sensor five, there are ten open-eyed tin traces with multiple power wires each. These traces were linked together so that there is one perceptual trace for every two power traces. These traces are typically not attached while submerged in water; instead, the water acts as a bridge. When water touches those traces it can sense the water and send data to microcontroller.

## 2.6 Software Components:

1. Arduino IDE
2. Bascom AVR
3. Extreme Burner
4. BLYNK APP

### 2.6.1 Arduino IDE

Arduino IDE is a compiler that help to program or write instruction to many various electric components like Arduino UNO R3, UNO etc. There is so many variants of Arduino IDE for windows, mac-OS, Linux and kali operating system. This (IDE) is developed by C and C++. It is also a cross platform software. In this Arduino IDE we write code, run those code, find bug and can debug those bug. After successfully compile code, it upload them to NodeMCU Wi-Fi module. After upload into NodeMCU its work in real life as per our program. In this code we have connect this module to a

Wi-Fi. We have already programmed wifi name and password. That's why in real life it could be connected with that select Wi-Fi system with the password. After connecting it can transmit data over the WiFi. It can send sensor data to our Blynk app cloud server. It could receive our instruction through receiver module, already I have mentioned about that things. This is how its run my project. All the radio communication are depend on this NodeMCU module.

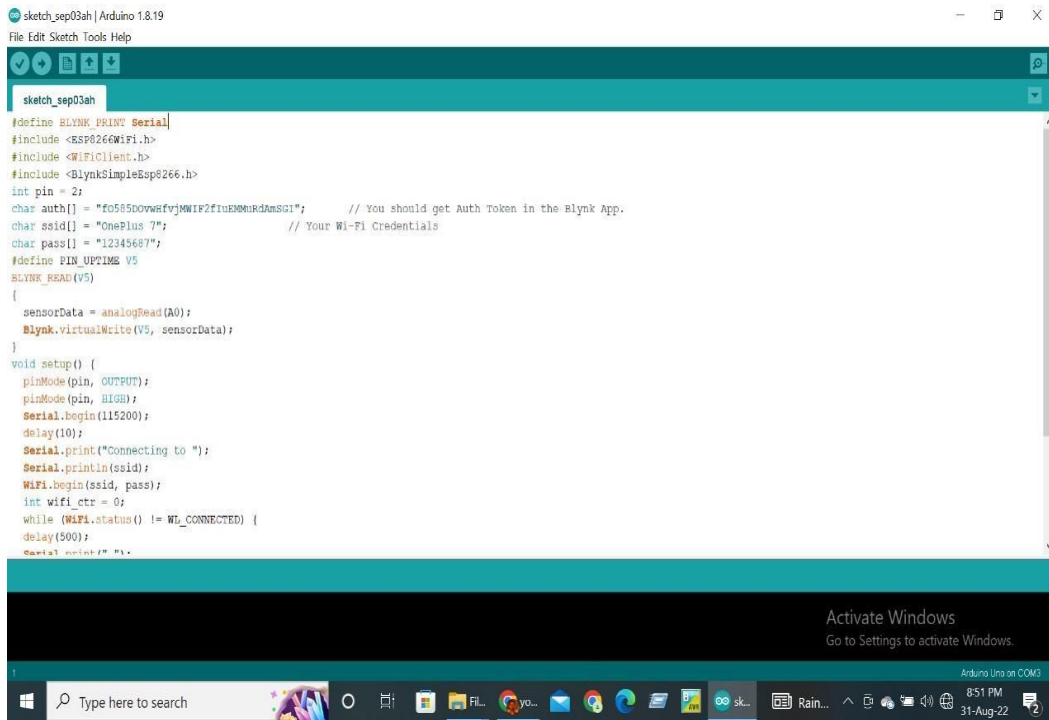


Figure 2.24 Arduino IDE GUI

This software is use for program code the Node MCU Wi-Fi modules and upload the program. Without this Arduino IDE we cant not compile our code. If during compile we get some bugs, we can fixed those bugs in this IDE. After that we can easily upload those code to this NodeMCU and our system communication system will work.

## 2.6.2 Bascom AVR

One of the most popular Basic generators for AVR microcontrollers is Bascom AVR. With a large library of methods for dealing with peripheral modules built into the microcontroller (such as an AC converter, simple setup and I/O port line control, conversion is achieved support, and EEPROM memory support), Bascom programming has become incredibly simple and straightforward to use. The most frequently used chips in microprocessor systems, such as character and graphical LCD displays, systems with SPI, I2C, UART, and 1-Wire interfaces (software and hardware), PC keyboards, and matrix keyboards, profit from the Bascom AVR's library of functions. One of the developed features of the W3100A system worthy of mention is the TCP/IP stack. This project makes use of the Bascom AVR.

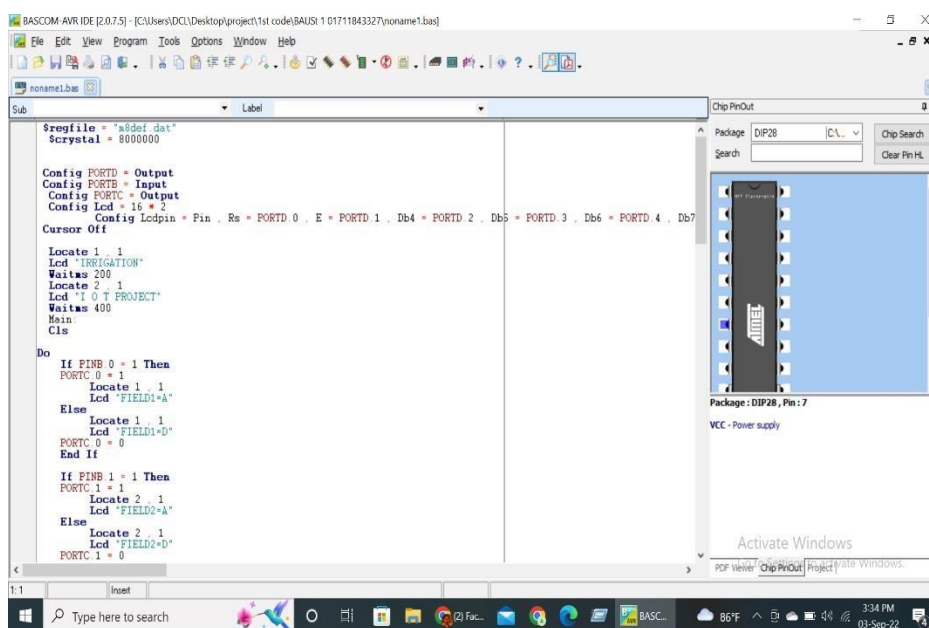


Figure 2.25 Bascom AVR GUI

## 2.6.3 Extreme Burner

Extreme Burner is a commonly use front-end GUI (Graphical User Interface) for the AVR dude program compiler, which is used to program ATmega8 AVR microcontrollers (MCU). There is other kind of front-end AVR library like as Khazama



programmer and Bit Burner AVR programmer, among others. We have used Extreme Burner for our AVR practice and it goes perfectly with the Atmega8 microcontroller. When first time install this software in my pc. It was very difficult get main version. I don't know it was giving me error with some file. That's why it make difficult to connect my microcontroller. This is practicable to a lack of knowledge of Extreme Burner's entrusted yeidable. After all, why would we learn another GUI once you've been used to one that can read your AVR flash memory, EEPROM, and FUSES? This why we have worked with this front-end GUI (Graphical User Interface).

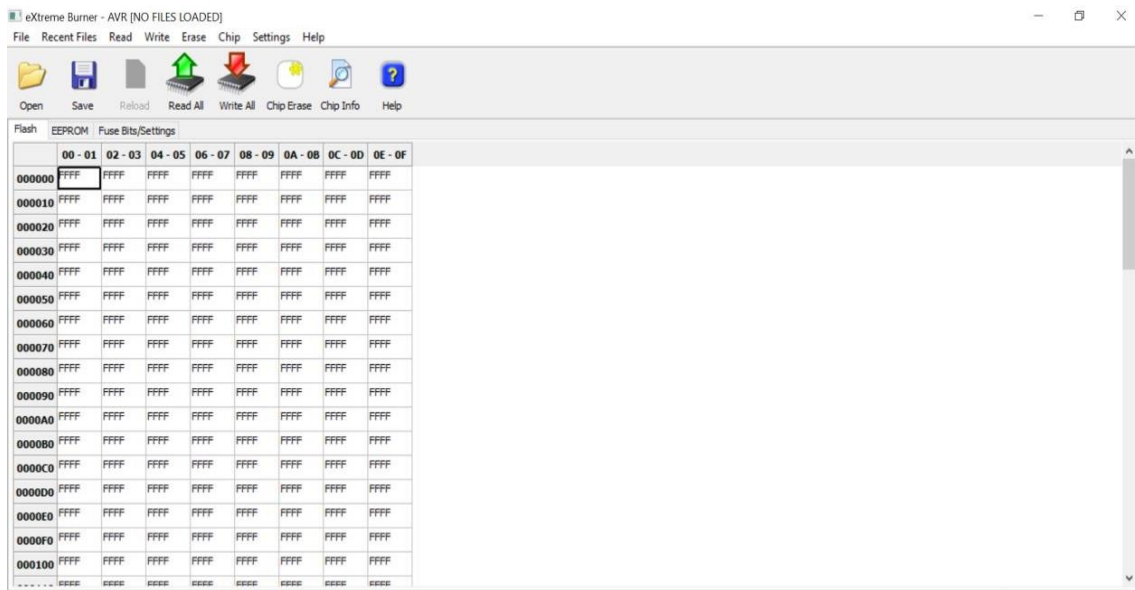


Figure 2.26 Extreme Burner GUI

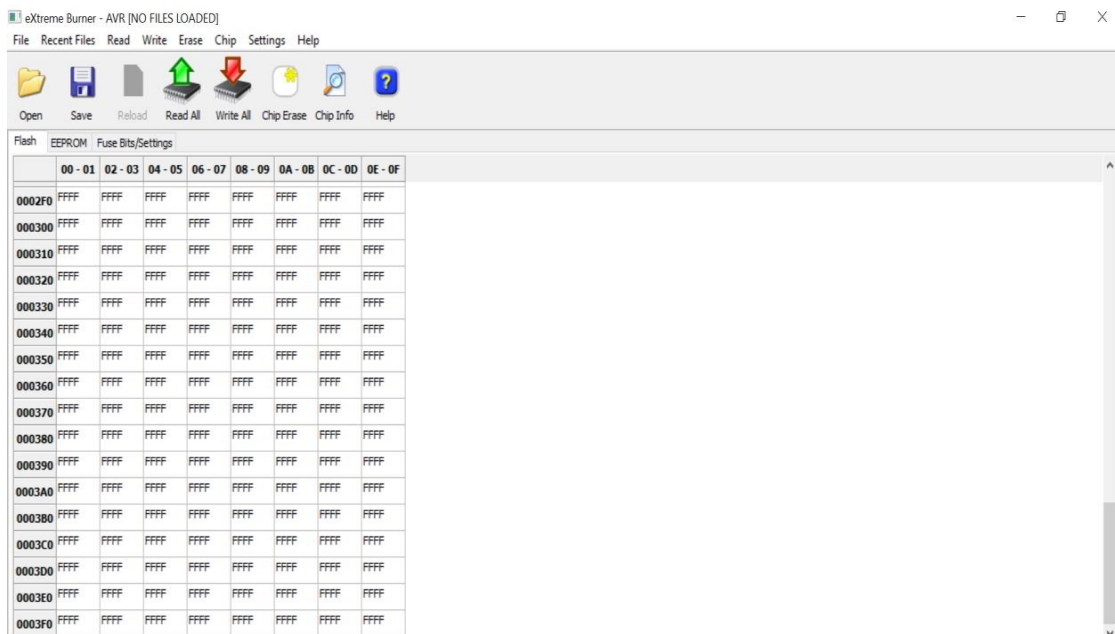


Figure 2.27 Extreme Burner GUI

## 2.6.4 BLYNK

Blynk is application for Iot based embedded project. This mobile application support android version. With this Blynk mobile application, we can remotely operate devices, display sensor data, conduct many kind of function and visualize our data in mobile display.

Blynk App - by mixing our widgets, we have created a simple and easy attractive interface for our projects.

Blynk –This application server is the responsible for all the communication between user and our system. We have use Blynk server to control our project. NodeMCU is connected with this Blynk app cloud server. When we instruct something in this mobile application. Those instructions goes to our project via NodeMCU. It's was free and open-source, but nowadays it has become payable, and it can operate on a Raspberry Pi.

Blynk- Libraries connects to the cloud server and execute all incoming and outgoing instruction on our project.

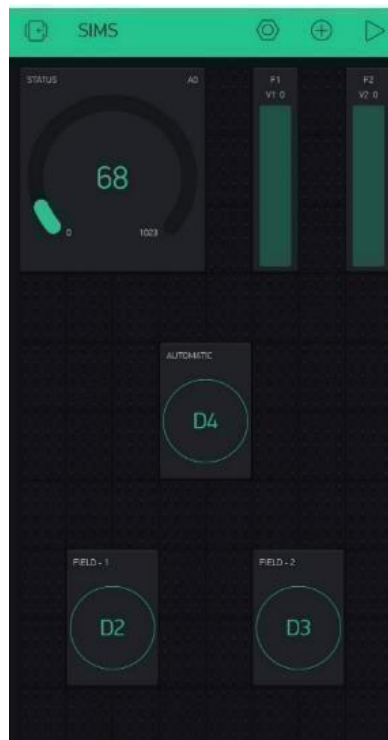


Figure 2.27 Blynk App GUI

## **2.7 Summary**

The Bangladesh farmer will be very helpful from this system. In this system there are available a water pump which automatically control the water flow that utilizes a water sensor. Our system decreases water waste and save water. Our goal is to create an automatic wireless control irrigation system that can automatically control and we can operate manual control. This project will save water, time and money.

This system will operate real-time field status. One central system used to control other system and nodes. The automated irrigation system is practical and low cost effective in maximizing water resources by decrease water wasting for agriculture productivity. Our project is automated that is mean our system can process automatically and we use Wi-Fi radio module to create a real-time irrigation system and control our project manually remote control through mobile application.

## CHAPTER 3

### System Design

#### 3.1 Overview

The Block Diagram Automated Irrigation and Controlling System is based on Water sensor and Rain sensor controlled through Microcontroller, User can give instruction through their smart phone and microcontroller take action on the basis of user instruction.

#### 3.2 Block Diagram

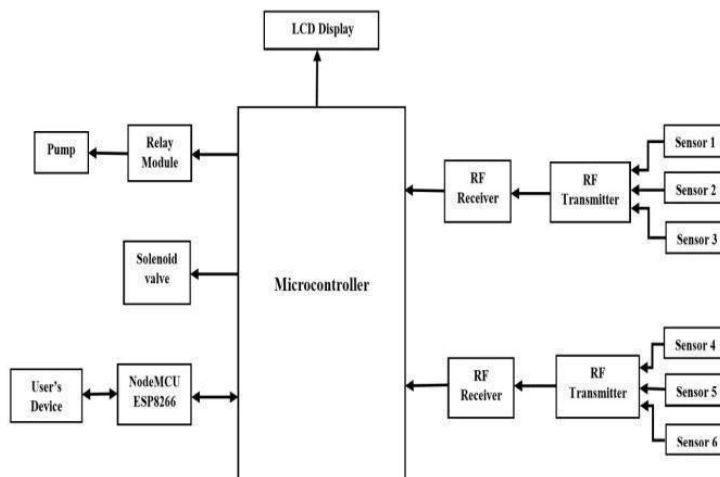


Figure 2.24: Block Diagram of Smart Irrigation Monitoring System

This project handled by an Atmega8 Microcontroller, which is a mini computer and work as brain for this system. Water sensor and Rain sensor are connected with the microcontroller input ports. The water pump and solenoid valve is connected with microcontroller as output actuator. The controller control water pump when water sensor and rain sensor give the physical world data. When water sensor give that water level is down of land then you can start pump water. Opposite case when water level is fine then you should stop the water pump. Rain sensor will stop your water pump during rain. Because you don't need water pump when there is rain. That time water pump will be automatically stop. There is a LED display. You can understand the state of pump through LED display. This whole project divided in two part by electricity supply. You

can supply water by solar panel power. A solar panel installed near to pump, which absorbed energy from light of sun. It will save huge electricity and become beneficial for us. Decrease the cost of pumping through electricity. The battery will be charger through solar panel power using control main circuit. The water pump set in the well, take electricity from the batteries, which store power from solar panel, via converter circuit. Then water pump start pumping on above ground. The project controlled by smart phone application named Blynk. This Blynk application used for Iot project remote monitoring, controlling and tracking of the sensors. Blynk app give you easy simple step GUI( Graphical User Interface) with those you can interact with system. The flow chasrt of Automated Irrigation and Controlling System is shown in Fig 3.1. It begin with user initialize from Blynk Application and the system main controller being turned on. The water sensor and Rain sensor will collect all data. Set point values and compared with the pre-programed value. When condition is fulfill like water level is down, that's mean there need water. That terminate the water pump for irrigation. The collected data send to user by Wi-Fi-module. First this data send land to microcontroller, then it will transfer to mobile application Blynk, Then will shown in app monitor that's the way it will come to user. User can manually control this whole project by using their smart phone and can carry it where ever he want to go. This Automated Irrigation and Controlling system will save water, money, time, effort, electricity and make farmers life easier.

## **CHAPTER 4**

### **Working Procedure**

#### **4.1 Overview**

The Automated Irrigation-System and Controlling functioned manually and autonomous to handle the irrigation system or control the agriculture land by gathering information through sensors. In below have description about how Automated Irrigation and Controlling System work.

#### **4.2 Control Mechanism**

AnIoT-based automated irrigation and controlling system function also included with rain sensor. When the rain appear the rain sensor will give that information to microcontroller, We have already pre-programed our microcontroller as when its get the rain appears information it will stop the water pump. There is smart phone application called as Blynk. You control your project I mean you can off or on your pump. You get water level information through water sensor in land. When you need to switch on your pump, you just open your app turned motor on. This have application have very simple Graphical User Interface(GUI). Anybody can understand easily and control it in simple way. You can supply water in your land when there is demand of water. This Blynk application also include Operating system, middleware. And key apps sources are handled. The Android SDK provides you all the tools and APIs (Application Programming Interface). Mobile become an important and irremovable part in our daily life, and fulfill our daily wide range of need. This application use GPRS feature of a mobile and through this its control our Automated Irrigation and Controlling project. The microcontroller can extend the life of system with reduce the use of electricity by using solar panel power by battery. Our project is based on IoT, Automatic Irrigation and Controlling System effective for our country people and situation. It will save water, effort, time, money, electricity by using simple a mobile app its make more easily.

#### **4.3 Automatic Control**

An ATmega8 microcontrollers is used to program a autonomous plant water pumping system. That use sensor data to run the motor. The moto driver module to dispose

interrupt signals to the motor. The Water sensor and Rain sensor is connected with Node MCU. When water level go down that water sensor catch that change and give that signal to microcontroller, we have already programed as when water level go down turn on the motor on Node MCU. So when water level go down and sensor give signal to microcontroller its turn on the motors. As a result, the way can be used to automate an existting plants water pumping system. This project system circuit have a Microcontroller ATmega8 boards, Water sensor, Rain Sensor, a 5v motor pumps, a Moto driver HT12C(IC1) IC to run the water pump. The microcontroller board can be runed by 12 v electricity power supply, a plugin, a solar panel. 12v power supply need for run this project.

#### **4.4 Manual Control**

Agriculture is one of oldest practice in human civilization. Old method of agriculture farming are not efficient for current situation of world. In old time the waste a lot of water by irrigation. This also cause for many various fungal disease of crops, plants. Its also harmful for our land also. Because water is valuable thing, and nature gift, so we should not misuse of this. This is why Automated Irrigation and Controlling System will be best solution. In this world 70 percent water use for irrigation. Day by day people are increasing in our world. The agriculture land are decreasing and demand of food are increasing. So agriculture is a matter of worry. This is why we have to farming in efficient way. To fulfill this food demand our irrigation system will be very useful for saving water, time, effort, money, electricity. Water emergencies to the crop are noticed through water sensor in the automated system, then user could manually turn on the moto for irrigation. When user think water need for his land he could easily set pump motor on by using mobile. When he wants to get motor off just switched off in the Blynk application, it will be turned off.

#### **4.5 Communication**

The microcontroller we used in this project called ATmega8, this is key and this microcontroller controls important equipment, all the sensor data and activity. The microcontroller are connected with water sensor, rain sensor. Those sensors collect the real world data and send it to ATmega8 microcontroller. The microcontroller receives

the all data from sensors and send it to appropriate result, Then it comes to relay module it control water pump based on our pre-programed instruction with comparing water sensor and rain sensor data state. The water level is determine by water sensor in analog value, which expressed through in voltages. After then the output voltage compared an ideal voltage. Then pump is switched and land irrigated by water pump. If the ideal voltage value is larger than represented value from water sensor, that time relay switched on the motor. Its mean water level is down so need water, that's why pump start. If the water sensor voltage value is larger than our ideal value that's mean there no need of water, that time relay module does not operate the water motor and pump get turned off. The water sensor send an analog signal to microcontroller, which interpret to a digital signal. Then that signal shifted to relay module circuit by microcontroller ATmega8, which completed the program. Relay module decide through that signal, whether the motor switched on or switched off. When the rain is appeared, the rain sensor give a signal through voltage to the microcontroller. Then microcontroller convert those signal into digital value, either True (0) or False (1). Then it send over to relay module circuit, then based on rain sensor data it's decide that motor turned on or off. If the rain sensor data is on that is mean no need to pump water, then it will turned off the motor. If the rain sensor data is false that is, mean no need to take any action. Relay module is an electrical switch with brain, it can decide based on condition. When the relay module switched open that means the pump will be turned on. If the relay module switched close then the motor will be turned off with power supply. Even all connection and circuit are working properly if relay module switched off the motor will be turned off that time too.



## 4.6 Estimated Cost

<b>No. of Equipment's</b>	<b>Name of Equipment's</b>	<b>Amount (Tk)</b>
1	Project Board	220
2	Breadboard	120
3	Solenoid Valve	3000
4	Water Pump	930
5	Electrical Components	5050
6	Micro Controllers	150
7	Solar	720
8	Others	4270
Total		14460

Table 4.6.1: Estimated Cost

## CHAPTER 5

### Result and Application

#### 5.1 Result

Smart automated Irrigations and controlling systems demo shown here for better understanding this project.

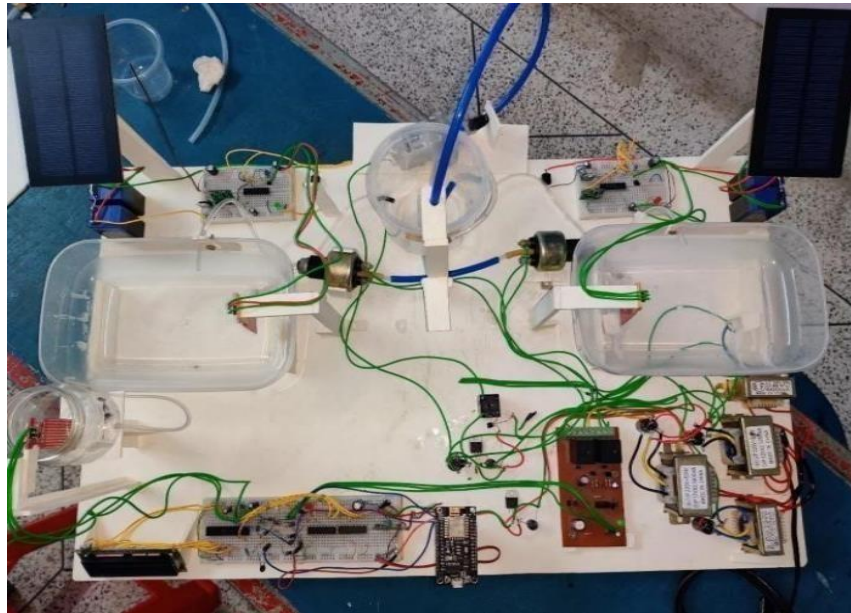


Figure 5.1 Project-Picture

The water sensors are placed in agriculture land for getting the real data about land water level. The Node MCU take the analog signal of water level sensor as well as from rain sensor.



Figure 5.2 Operation Time

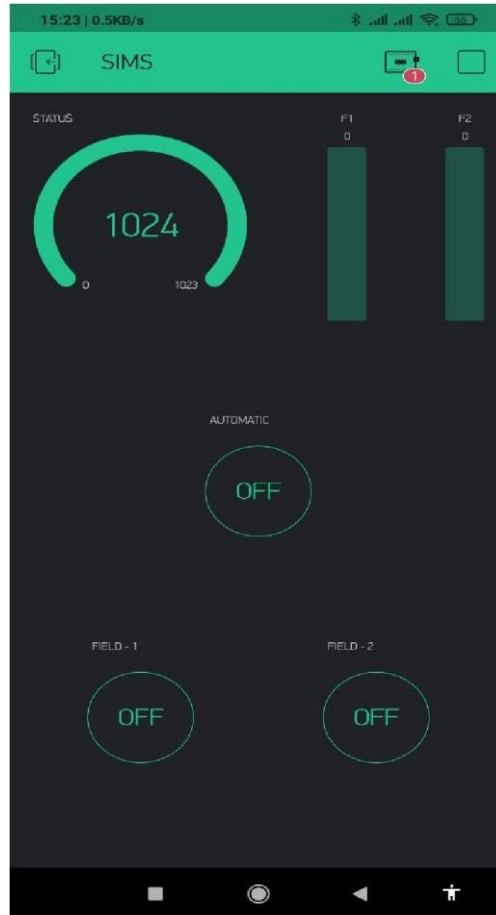


Figure 5.3 Control System in User Device

## 5.2 Application

For automatically water irrigation in agriculture land with manual control system, this system developed. If we irrigation on right time with right amount of water, it will give us good and healthy crops and more crops also. In future, we have to do work with modern irrigation system and it will save money, effort, time. It can also developed in future as per our need like as we get state about crops, fertilizer, weather report etc.

## 5.3 Advantages

- 1) Less hardware: equipment is used in this project, which will consume less energy and make this system more efficient. This is because we use sensor and control over radio module instead of structure system of wired sensor.

- 2) Cost Efficient: This project system is developed with less expensive model or equipment as per our need and suitable. You can control over smart device and can save electricity through solar panel. This is why this project cost is cheap and survive for a long time.
- 3) Power consumption: For a long time using over electricity system, power consumption is a most important part. In this project, we used battery for power of wireless sensor and nodes. We also used solar panel to power supply in this part. Which make this project very efficient in electricity use. With solar panel system, we save a lot of electricity with this project, which make it very useful.

#### **5.4 Disadvantages:**

In this project we have used many components which made by plastic or covered by plastic, we know that plastic have a limited life, it could be degrade when it will come close sun ultra violet rays, hot, arid region. We have used some mechanical parts also in this project, so it could be like other electric parts decoy in day-by-day use and lose some efficiency.

## **CHAPTER 6**

### **Impact on Society, Environment and Sustainability**

#### **6.1 Impact on Society:**

Agriculture was the foundation of society, and despite the fact that humanity has changed significantly, agriculture is still highly significant. Its significance may be more obvious in some nations, but in actuality, agriculture plays a significant role in every nation on earth.

Agriculture is the source among several basic materials, including cotton, sugar, timber, and palm oil. In ways that many people aren't even conscious of, these minerals are crucial to important industries including the production of medications, diesel fuel, plastic, and more. In fact, because raw resources are crucial to manufacture, a nation's economic health heavily depends on how many raw materials it has on hand. Agriculture-related raw resources make up a sizable portion of global trade.

Countries with large quantities of those goods export them and trade for goods they lack. A country's trade flow may be disrupted if its agriculture fails for some reason, causing prices to rise. Speaking about trade, agricultural exports continue to provide the majority of the country's income for industrialized nations. Even if modern nations are less reliant on agriculture than they formerly were, their economies would undoubtedly suffer if exports abruptly ceased. Even if you don't own a farm longhorn, agriculture still impact your family.

Think about feeding your family. Where do that food come from? It does not just magically appear in the greengrocery store. Now think about how you grab your family. Many clothes get made with cotton, and other substance that farmer produce. If it wasn't for agriculture, it would be hard to feed for your family. According to the USA Department of Agriculture, the agriculture, food related industries contributed over \$1 trillion to the country's gross (GDP). This industry also provide above 22 million jobs. Also, the agriculture sector is able to meet supply and demand for food and other products, it helps to keep prices down for the consumer. Alfalfa is a riding crop grown in North America. Because alfalfa is rich in minerals, this plant is often feed to longhorn. For humans, alfalfa can help tend morning sickness, nausea, and kidney stones. Not all farmers raise traditional crops, however. Some of them expand plants that are used for

medicinal purposes. These plants include psyllium, yarrow, elder, sage, and common mallow. Farmers also grow fruits and vegetables, which play a key bit part in healthy diets. Thanks to manufacture of ethanol, agriculture also concussion energy. Ethanol is a corn-derived oil utilized in gasoline. In 2018, 5.55 billion bushels of corn crushed to induce ethanol. According to the (EIA), the United States manufacture over 16 billion gallons of ethanol. One of the most important asset ethanol has to offer is that it's a renewable energy source. These types of energy sources improve public health, decrease global warming emissions, provide jobs, and are better organized than fossil fuels.

Agriculture provides many benefit to communitie. Agriculture create both jobs and economic growth. Communities hold agricultural-based event, such as crop and longhorn judging competition and 4-H exhibit at their countys fair. This also allows those in the community to learn direct where r food come from. The positive influence of agriculture on the community fosters a sense of hard work and togethernes. Unfortunately, In our country everyone left this Agricultural Field. They are getting move into other services like job etc. We are developing our country day by day but in Agricultural Field, we are going behind. However, Agriculture is the backbone of us, of our country of our world. If our agricultural system cannot give enough food to us, what will we eat? How do we survive?

For a society, there is need human being but without food, how people survive? Therefore, there is no need to tell about agricultural important. However, unfortunately we leaving this profession.

This is the cause we have to depend import, which hamper our country financial position. This project help people to get a smart agricultural system, which makes agriculture easy and save our valuable time. We can do other job with agriculture. This project will help to people do agricultural farming in their land. That will help to provide our people demandable food. That will make our county financial position strong. We do not need to depend on other country food. This is the impact of our project on society.

## 6.2 Impact on Environment:

Agriculture directly impact on our Environment by –

1. Resist Degradation of Land
2. Biodiversity

When we do farm in the land it is remain useful and its resist from degradation of land. Its make our land reusable and fresh which is very important to environment. For living with environment, we have to keep balance with environment. Agriculture is an important part of environment.



Figure 6.1 Impact of Environment

Biodiversity is an important part and main part of our environment. We have to admit that. Agriculture is part of biodiversity. If any part of biodiversity is hampered that is, effect other all part of biodiversity. Its breaks the chain that will harmful to life. For living cause, this is important to maintain this biodiversity and take good care of agriculture system that it's don't harm our environment.

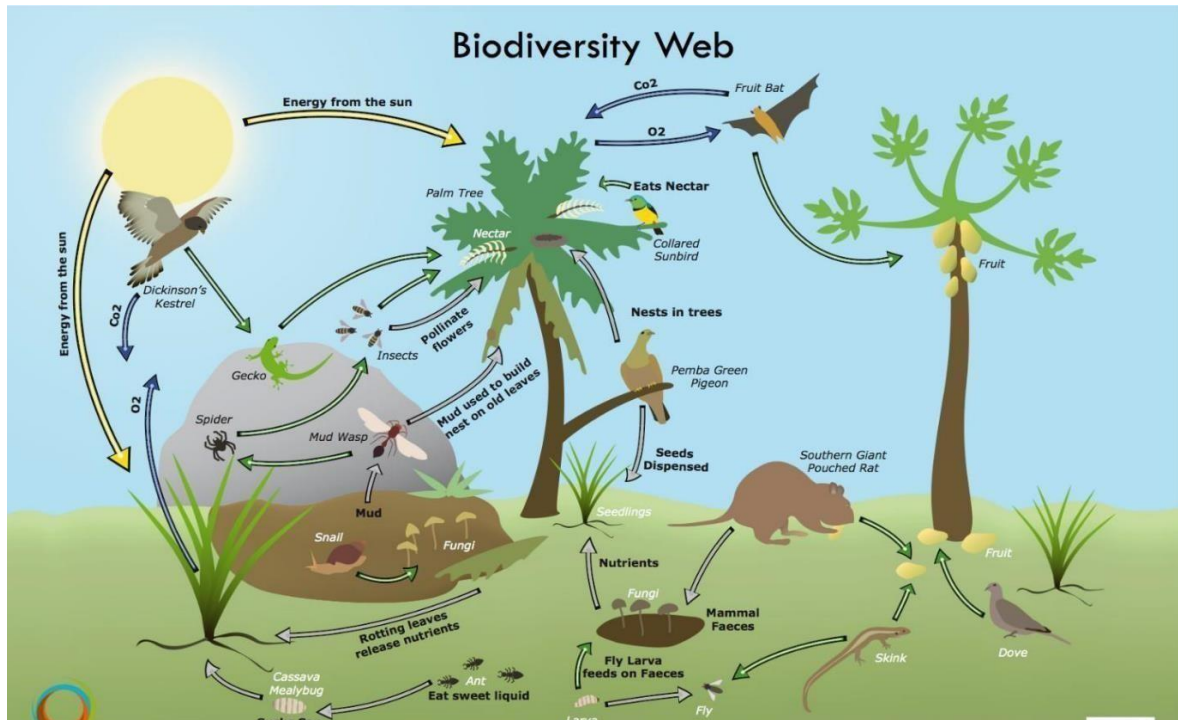


Figure 6.2 Biodiversity web

### 6.3 Ethical Aspects:

Ethical Aspects of Agriculture in our life we cannot say in words. For saying anything, it is important to get alive. For being alive we cannot say in word how much important is agriculture. For saying anything, we need food for energy that directly came from agriculture. The objective of agricultural ethics in one sense, delimited by the scope of agriculture.

### 6.4 Sustainability Plan:

If we want exists in this world that agriculture is needed directly. Still now, there is no alternative of food for living. Therefore, we have to depend on agriculture until there is no alternative of food. Day by day, our world population is increasing that because we losing our farming land. Its effect on our demandable food. Therefore, people are increasing and agriculture decreasing day by day. That make people food demand high and land of agriculture is low. That is why we need a sustainability plan for our agriculture system. We can use bio fertilizer for farming many crops and lease land. It will produce more than before and it will do not harm our environment at all. We have to discover new way new technology, which don't harm the environment and fulfill our demand in less land and less time.



## **CHAPTER 7**

### **Future Work and Conclusion**

#### **7.1 Future Work**

In future, we can developed this system with crops state soil state and many needed addition. In this project, we can use object detection sensor and then collect the image of crops in hand without going to land. Alternatively, we can developed a program, which can tell us automatically the crops condition. Does any disease or insect effect that? We can also get a view of our soil level. Like as when our soil was wet or dry. We can get idea about our soil through comparing those level it could be helpful for us. Those data will help us to know about moisture level of soil. We can also use a system that will collect weather information from our weather office report and can advise to farmer like as today could rain. That time farmer can easily understand that he does not need to pump water. There will some automated system as per our need and some manual.

#### **7.2 Conclusion**

The Automated Irrigation and Controlling system can used for save water, save electricity, for pumping water in our needed time for enough time. This will make sure about our crops healthy state and help us to get a good price. In our point of view, the motor could be turned off or turned on by using relay module, which is electrical programmable switch that will change the current flow per our condition automatically. There is a water sensor, which compare the water level of soil, and we can pump water as much as the land need it and we can do it remotely. There is no need to go to land physically or hire any person to do this thing. It will save our money as well and time. We can also store electricity from light energy by the help of solar panel. This will also help our country to reduce load shedding. By doing irrigation in correct time our crops will be healthy and get a good price in market. This project is important for our county current situation and for better and more crops producing.

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