Chapter 1

COMPANY PROFILE

Name of the company : Sumukha InfoTech

About the company

Started on 08/08/2018, Sumukha InfoTech's vision is to contribute to the society in a bigger way.

Education isn't just about going to school / college and securing high marks. It's something beyond marks and competition.

"Education is what remains after one has forgotten what he had learnt in his schooling."

– Albert Einstein.

It's about application of your knowledge / idea that actually matters, and not just having idea!

Here at Sumukha we just don't tell you, we demonstrate you how things work. The videos are shot real time while we build our applications. We bring to you the latest and the best in the industry, so that YOU as an individual can perform better in the areas of application development.

Vision: Help improve the quality of life's of people through our software products and through our social service activities.

Mission: To deliver quality product and services and to build trust and good relation with clients and society.

Values: Stick on to our ethics of being transparent and to provide maximum value to our clients.

Entrepreneurship:

The vision of the founders is to enable people stand on their own and work towards their vision of making this world a better place for everyone from their skills. This could be accomplished by our individual skills and the freedom to follow our heart.

We at Sumukha have a community of energetic, enthusiastic people who would love to make a difference. Who would love to work out of passion. A day at work is

satisfying, if we made something that would matter and not just which would bring us profit.

Our Works:

We are a team constantly learning and contributing to the software development world. Our real time projects have been running successfully and getting good feedback from clients.

Our interest and expertise in computer networks and distributed computing as a whole has made us come up with sophisticated and highly useful.

Chapter 2

INTRODUCTION

IoT

Internet of Things (IoT) is the networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions amongst each other or with respect to the external environment. In the upcoming years, IoT-based technology will offer advanced levels of services and practically change the way people lead their daily lives. Advancements in medicine, power, gene therapies, agriculture, smart cities, and smart homes are just a very few of the categorical examples where IoT is strongly established.

Web Technologies

Web technology refers to the means by which computers communicate with each other using markup languages and multimedia packages. It gives us a way to interact with hosted information, like websites. Web technology involves the use of Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), Hypertext Pre-processor (PHP), JavaScript (JS), Bootstrap.

HTML: HTML stands for Hypertext Markup Language. It is used to design the front-end portion of web pages using a markup language. HTML is the combination of Hypertext and Markup language. Hypertext defines the link between the web pages. The markup language is used to define the text documentation within the tag which defines the structure of web pages.

CSS: Cascading Style Sheets fondly referred to as CSS is a simply designed language intended to simplify the process of making web pages presentable. CSS allows you to apply styles to web pages. More importantly, CSS enables you to do this independent of the HTML that makes up each web page.

JS: JavaScript is a famous scripting language used to create magic on the sites to make the site interactive for the user. It is used to enhancing the functionality of a website to running cool games and web-based software.

Machine Learning

Machine learning (ML) is a type of artificial intelligence (AI) that allows software applications to become more accurate at predicting outcomes without being explicitly

programmed to do so. Machine learning algorithms use historical data as input to predict new output values.

2.1 Objectives of the Internship

1. To have student hands-on experience on building IoT prototypes
2. To understand the role of programs in getting work done by electronic devices.
3. Give a practical touch to the things learnt theoretically in class rooms.
4. Understanding the sensors, programming them to real time application, exploring the new trends and various tools

2.2 Problem Statement

1. RFID based Attendance monitoring system.
2. IoT based Smart Irrigation using esp32.

Chapter 3

TASK PERFORMED

3.1 Topics learnt during Internship

Following are the topics being discussed with interns during their internship period.

3.1.1. Introduction to IoT

3.1.2. Applications of IoT

3.1.3. Installation of Arduino IDE

3.1.4. Exploring Arduino UNO Board

3.1.5. Basics of C programming

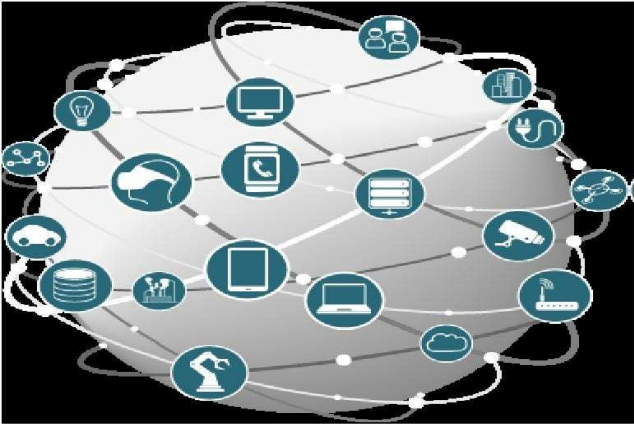3.1.6. Introduction to Sensors

3.1.7. Simple project using Arduino UNO Board and Sensors

3.1.8. Introduction to HTML,CSS and PHP

3.1.9. Introduction to DBMS and MYSQL

3.1.10. Introduction to machine learning

3.1.11. Simple program of crop estimation using ML

3.1.1 Introduction to IoT

Internet of Things (IOT) is a new era of computing technology. The vast network of devices connected to the Internet like smart phones and tablets and almost anything with a sensor on it like cars, machines in production plants, jet engines, oil drills, wearable devices, and more. Now these devices can talk with each other means it can collect and exchange data.

Figure 3.1: Internet of Things

3.1.2 Applications of IoT

- Smart home
- Wearables
- Smart city
- Smart grids
- Industrial internet
- Connected health

3.1.3 Installation of Arduino IDE

Figure 3.2: Snapshot of Arduino IDE

In this project this IDE is used to write, test and deploy C code to hardware circuit , program written using this IDE are called as sketch, each sketch is written in C or C++, this ide allows to communicate with the circuit boards connected to USB port of the development computer.

The sketch can be compiled and loaded to device connected to the pc, if code has any errors they get displayed for user's reference.

3.1.4 Exploring Arduino UNO Board
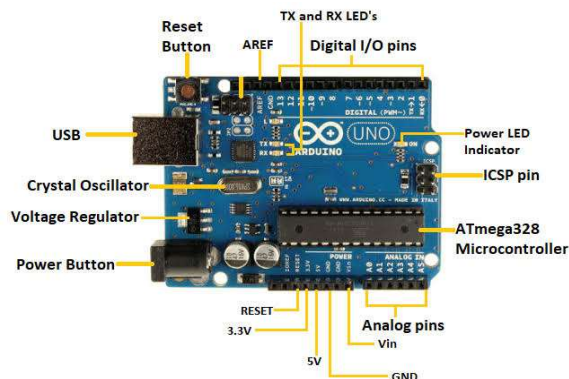
Figure 3.3: Arduino UNO Board

Arduino UNO is a single board computer. Arduino is an open source physical computing platform based on a simple input/output (I/O) board. The type of the Arduino board used in this paper is ATMega328P Arduino Uno Microcontroller having 2KB static RAM, 32KB flash memory, 8 bit CPU, 6 Analogy I/O pins and 14 Digital I/O pins . The language used to program the Arduino microcontroller is C/C++. Programs are created in the Arduino development environment that compiling and linking source code and downloaded to the Arduino board where it start running

3.1.5 Basics of C programming

We have C programming language to communicate with the hardware as it finds handy to do the task. The language has fallowing characteristics

- High-level language
- Structured
- Modular approach
- Best suited for communication with hardware.

In c each program includes one more functions' hence it is called procedural programming language. A function can be defined with the fallowing syntax.

<return type><function name>(parameters)

{

     Body of the function.

}

Here return type indicates the type of value being returned by the function, function name can be any valid identifier. Body of the function includes one or more statements.

Example:-

```
intiseven( intnum )
{
    if ( num%2 == 0 )
    return (1);
    else
    return (0);
}
```

3.1.7 Introduction to Sensor
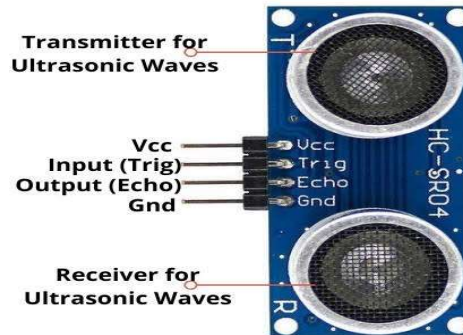
Ultrasonic sensor

Figure 3.4: Ultrasonic Sensor

Ultrasonic sensors can measure the distance to a wide range of objects regardless of shape, color or surface texture. They are also able to measure an approaching or receding object.
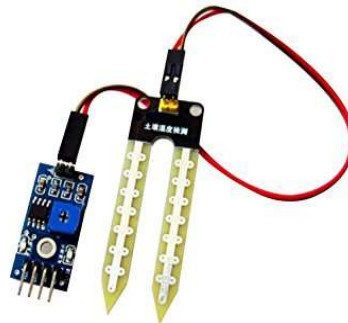
Soil Moisture sensor

Figure 3.5: Soil Moisture sensor

Soil moisture sensors measure the volumetric water content in soil.[1] Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

DHT11 sensor
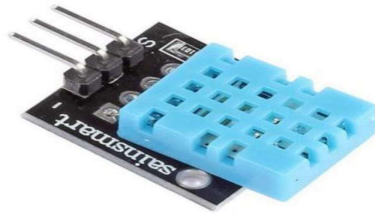
Figure 3.6: DHT11 sensor

DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-electiveness.

3.1.8 Simple Project using Arduino UNO board and Sensors
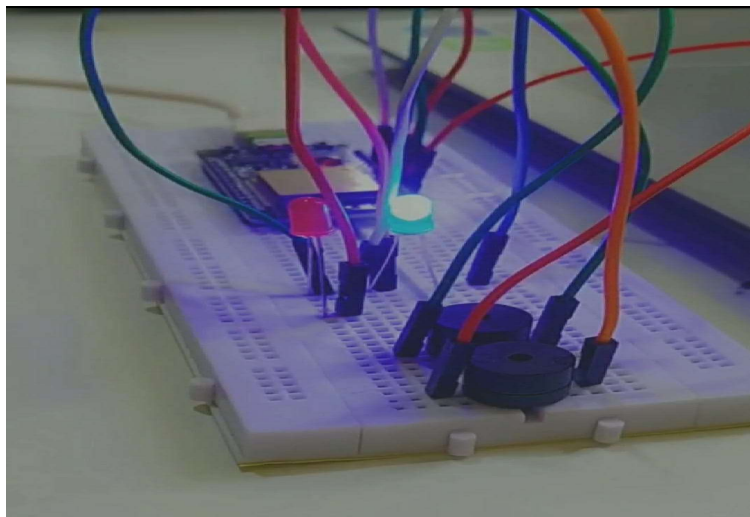
Figure 3.7: Controlling LED and Buzzer using Arduino UNO board

In this simple project we used Arduino UNO , LED and buzzer . The Arduino UNO is programmed to activate both LED and buzzer alternatively.

3.1.9 Introduction to HTML, CSS and PHP

HTML, CSS, and PHP are acronyms for different coding languages used for displaying webpages on the internet. Each has a different purpose and function and they work together to deliver beautiful websites with updated content to your web browser.

HTML stands for Hyper Text Markup Language, CSS for Cascading Style Sheets, and PHP for PHP Hypertext Pre-processor.

HTML is the flesh and bones of a website, defining its structure. CSS is the clothing, allowing designers to make site-wide changes more easily while PHP assembles each piece of the website and prepares it for your viewing pleasure.

Figure 3.8: Web Technologies

3.1.10 Introduction to DBMS and MYSQL

A database management system (DBMS) refers to the technology for creating and managing databases. DBMS is a software tool to organize (create, retrieve, update, and manage) data in a database.

Database: Database is a collection of inter-related data which helps in efficient retrieval, insertion and deletion of data from database and organizes the data in the form of tables, views, schemas, reports etc. For Example, university database organizes the data about students, faculty, and admin staff etc. which helps in efficient retrieval, insertion and deletion of data from it.

MySQL Database

MySQL is a fast, easy-to-use RDBMS being used for many small and big businesses. MySQL is developed, marketed and supported by MySQL AB, which is a Swedish company. MySQL is becoming so popular because of many good reasons −

- MySQL is released under an open-source license. So you have nothing to pay to use it.
- MySQL is a very powerful program in its own right. It handles a large subset of the functionality of the most expensive and powerful database packages.
- MySQL uses a standard form of the well-known SQL data language.
- MySQL works on many operating systems and with many languages including PHP, PERL, C, C++, JAVA, etc.
- MySQL works very quickly and works well even with large data sets.
- MySQL is very friendly to PHP, the most appreciated language for web development.
- MySQL supports large databases, up to 50 million rows or more in a table. The default file size limit for a table is 4GB, but you can increase this (if your operating system can handle it) to a theoretical limit of 8 million terabytes (TB).

3.1.11 Introduction to Machine Learning

Machine learning (ML) is the study of computer algorithms that can improve automatically through experience and by the use of data. It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as training data, in order to make predictions or decisions without being explicitly programmed to do so. Machine learning algorithms are used in a wide variety of applications, such as in medicine, email filtering, speech recognition, and computer vision, where it is difficult or unfeasible to develop conventional algorithms to perform the needed tasks.

A subset of machine learning is closely related to computational statistics, which focuses on making predictions using computers; but not all machine learning is statistical learning. The study of mathematical optimization delivers methods, theory and application domains to the field of machine learning. Data mining is a related field of study, focusing on exploratory data analysis through unsupervised learning. Some implementations of machine learning use data and neural networks in a way that mimics the working of a

biological brain. In its application across business problems, machine learning is also referred to as predictive analytics.
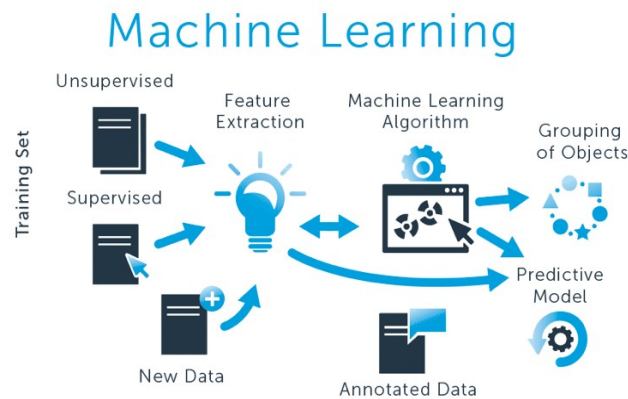

Figure 3.9: Machine Learning

3.1.12 Simple program of crop estimation using ML

Program using KNN algorithm – K Nearest Neighbour Algorithm

```php
<?php
    include_once('db.php');
    $temp= $_REQUEST['temp'];
    $hum= $_REQUEST['hum'];
    $sql="create or replace view model as select temp,hum,sqrt( pow(abs(temp-$temp),2)+pow(abs(hum-$hum),2)) as dist,label from rep";
    $res=execute( $sql );
    echo "<h1>view called model got created</h1>";
    $sql="create or replace view matrix as select * from model order by dist limit 3";
    $res=execute( $sql );
    echo "<h1>view called matrix got created</h1>";
    $sql="create or replace view voting as select label,count(label) as cnt from matrix group by label";
    $res=execute( $sql );
    echo "<h1>view called Voting got created</h1>";
    $sql="select count(*) as votecount from voting";
    $res=execute( $sql );
    $row=$res->fetch_object();
    $total_count=$row->votecount;
```

```php
$k=3;
if( $k==$total_count )   // case 1
{
            echo "Case 1:hence concide distance";
            $sql="select * from matrix where dist=( select min(dist) from matrix)";
            $res=execute( $sql );
            $row=$res->fetch_object();
            echo "<h1>Recomended crop is : $row->label</h1>";
}
else   //case 2
{
        echo "Case 2: hence concider voting";
        $sql="select * from voting where cnt=(select max(cnt) from voting)";
        $res=execute( $sql );
            $row=$res->fetch_object();
            echo "<h1>Recomended crop is : $row->label</h1>";
}
?>
```

RESULT:

Crops to be cultivated for the given temperature and humidity :

- Jowar.
- Maize.
- Groundnut.

3.2 RFID based Attendance monitoring system.

Introduction:

Most of the institutional authorities are troubled with the cumbersome method of maintaining manual attendance of their employees or clients. The manual process of signing on a paper is prolonged and insecure. An efficient attendance monitoring system needs to be enforced at such places. Radio Frequency Identification (RFID) based attendance system provides us with a solution that caters to issues like proxy attendance. This paper describes the design of an RFID based attendance monitoring system which uniquely identifies each employee/student based on their RFID tag which is attached to their ID card. This makes the mechanism of recording the attendance effortless, quicker and protected as compared to conventional method. This system is designed to be used at different educational institutions, corporate offices, government offices etc. The proposed system consists of both hardware and software components based on IoT Technology. The hardware component consists of RC522 RFID card reader and RFID tags/cards. The software component consists of the Web-based GUI for viewing the employee's or student's attendance, which is hosted on a web server and which stores the data in a database server. The employees or students just need to place their RFID card or tag on the reader and their attendance will be recorded for the day. Also, the attendance recorded will be more accurate as the system is synced with a real-time clock.
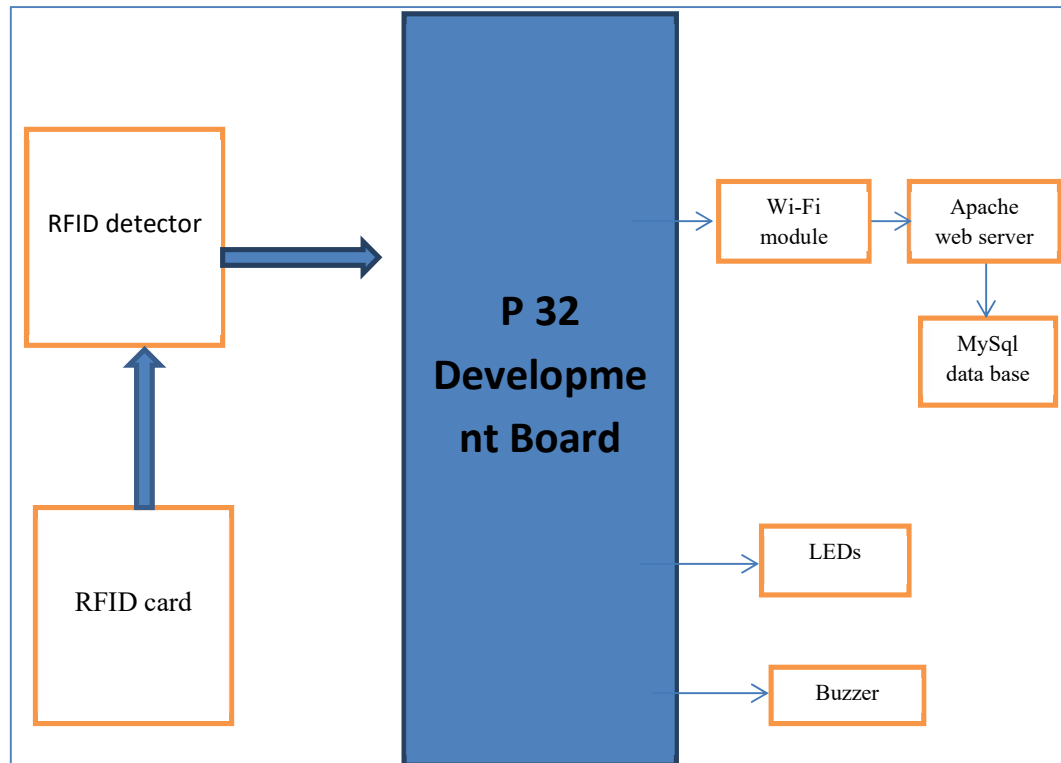
System Design of RFID Model

Figure 3.10: Architecture diagram of RFID Attendance System

Methodology

RFID Reader and Tag

Figure 3.11: RFID Reader and Tag

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID tag consists of a tiny radio transponder; a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse

from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to inventory goods. There are two types. Passive tags are powered by energy from the RFID reader's interrogating radio waves. Active tags are powered by a battery and thus can be read at a greater range from the RFID reader; up to hundreds of meters. Unlike a barcode, the tag doesn't need to be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method of automatic identification and data capture (AIDC).

RFID tags are used in many industries. For example, an RFID tag attached to an automobile during production can be used to track its progress through the assembly line; RFID-tagged pharmaceuticals can be tracked through warehouses; and implanting RFID microchips in livestock and pets enables positive identification of animals.

Since RFID tags can be attached to cash, clothing, and possessions, or implanted in animals and people, the possibility of reading personally-linked information without consent has raised serious privacy concerns. These concerns resulted in standard specifications development addressing privacy and security issues. ISO/IEC 18000 and ISO/IEC 29167 use on-chip cryptography methods for untraceability, tag and reader authentication, and over-the-air privacy. ISO/IEC 20248 specifies a digital signature data structure for RFID and barcodes providing data, source and read method authenticity. This work is done within ISO/IEC JTC 1/SC 31 Automatic identification and data capture techniques. Tags can also be used in shops to expedite checkout, and to prevent theft by customers and employees.

ESP32 KIT

This kit fetches the information form sensors and converts the analog data to digital; these data get processed using C language and uploaded to server using Wi-Fi configured network.

Breadboard

This device helps to connect various components and form circuit without soldering, it has grid of interconnected sockets with which we can connect various components required for project.

Wi-Fi network

Data collected from sensors needs to be uploaded to remote server; it is done using a Wi-Fi network, it is required to mention ssid and password in the code to establish communication.

Webserver

The apache HTTP server is **web server** which we used to run our project and this server provides the built in MySQL there is no need of using command prompt. Apache web server we need to install then only we can execute the project. Apache web server provides local host to run our project. Apache web server is web server which provides web applications. Apache plays an important role in our project execution. It is the most important and most popular server which provides World Wide Web growth. It works for millions of web sites.

Apache web server is mainly handled by Apache Foundation. Apache web server provides service to number of working system including UNIX, LINUX, and Microsoft Windows. Apache server is very good server which provides very good service to our chosen platforms and apache is well comfortable with PHP language and works well with PHP language and even server side scripting language is used in this to perform and develop the project.

Apache supports the different features to perform the operation and even apache server is also supported by some graphical user interface and Apache server also implements the security and digital certificates security.

Database

It is accessible for all wide used computing platforms. MySQL software package and documentation n are often downloaded from http://www.mysql.org. Some UNIX system distributions, like the one from Red Hat, embrace MySQL. Once you've got with success logged into MySQL, it's able to receive command. If the MySQL, info to be accessed already exists however its name wasn't enclosed once work into they use command are often accustomed concentrate on the info of interest.

If a replacement info is to be created, the info itself should be created initial so the tables that may create the tables. the opposite MySQL commands that are required here-

INSERT, SELECT, Drop, Update and Delete- are all the implementations- of the matching SQL -commands. There are several -tools accessible to assist in info administrations example MYSQL administrator may be a program that performs configuring`, monitoring`, beginning and stopping`, a My-SQL server, organization user and associations, playing backups`, and a number of other body tasks.

Server-side Scripting (PHP)

PHP stands for Hypertext Pre-processor. It is a programming language used for create active web pages. Program written in PHP must be saved with file extension .PHP in the root directory of the web server, to execute PHP programs we need a web server called "Apache Web Server". User communicates with dynamic web page so that they get the customized information. MySQL access the data generated by using a dynamic web pages.HTML can also combine/embed PHP tags .PHP language is a user friendly and coding of PHP language is easy compare to other language. PHP is close to Perl and JavaScript; PHP arrays are different from other language and are then introduced by a description of PHP's function and their parameter passing mechanisms. PHP is at the present urbanized, disseminated, and supported as an open-source product. A PHP processor is now resident on most web servers. It is a server-side scripting language. PHP is of course used for kind managing and information entrée. Information entrée has be a first-rate focus of PHP development as a result, it's driver support for fifteen totally special information system. PHP supports the general electronic message protocol POP3 and IMAP. It conjointly prop the spread object architecture COM and CORBA. Once a browser request associate degree XHTML document that has PHP script, the net server that gives the document includes PHP script by the extension. once the PHP processor finds XHTML code it input data, it merely copies it to the computer file
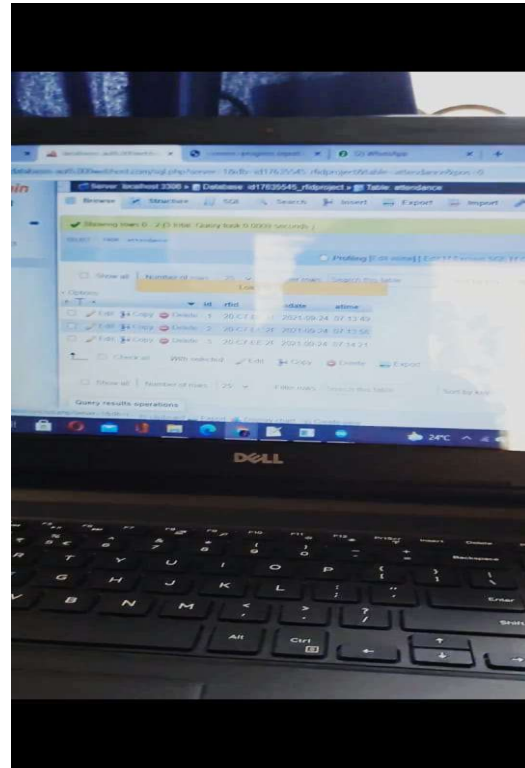
PHP is typically strictly taken, as is that the case by JavaScript. Fresh PHP implementation`s do some recompilation, a minimum of on advanced script, that will increase the speed of understanding. there's an oversized assortment of functions for making and manipulate PHP's array. PHP supports each procedural and object-oriented programming.

RESULTS:

RFID based Attendance Monitoring System
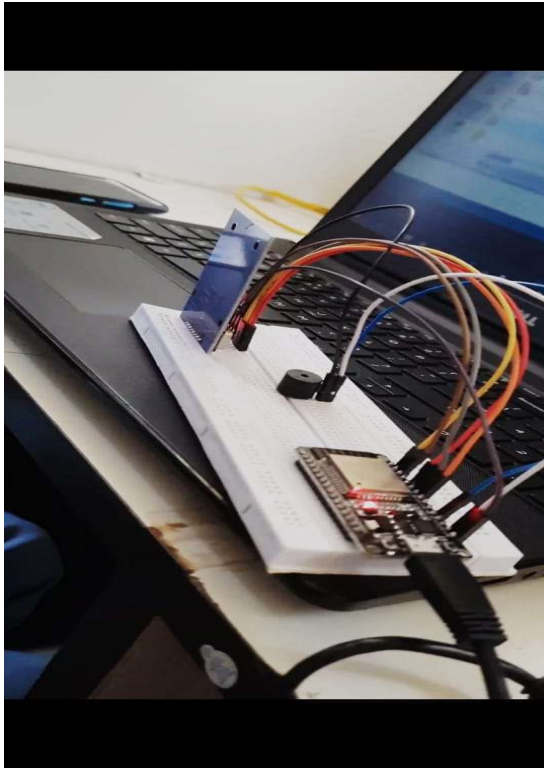
Figure 3.12: Circuit connection of Attendance recording   **Figure 3.13: Attendance recording**

In conclusion, the objective to build an RFID based attendance system was successfully achieved. In terms of performance and efficiency, this project has provided a convenient method of attendance marking compared to the traditional method of attendance system. By using databases, the data is more organized. This system is also a user-friendly system as data manipulation and retrieval can be done via the interface, making it a universal attendance system. Thus, it can be implemented in either an academic institution or in organizations.

3.3 IoT based Smart Irrigation using esp32.

Introduction:

At the Present days, the farmers chosen most of the methods manually, Irrigation is one of them. The land to be irrigate time to time. Sometimes this process absorbs more water. Automatic irrigation system observes the soil moisture content in the soil. It helps to irrigate the plants. Irrigation of plants takes more time and it has to be done in a justifiable time; It have need large amount of human resources. All the steps were carry out effectively by humans manually.

Nowadays, some systems use technology to decrease the time taken to water the plants and it also reduces the number of labours in the field. Water is the main resource which is used enormously. Mass irrigation is the method used to irrigate the plant. This method represents huge loss of water, as the water given exceeds the plant needs. The excess of water and labour is becoming more expensive. The combination of existing methods with Internet of Things and wireless sensor network can develop the agriculture methods efficiently. Concept Internet of Things reads the data from the sensor and these data are analysed and displayed to the users. The main aim of this project is to monitor the agriculture field from any part of world using the concept IoT without human intervention.

Pin configuration of ESP32

Figure 3.14: Pin configuration of ESP32IC
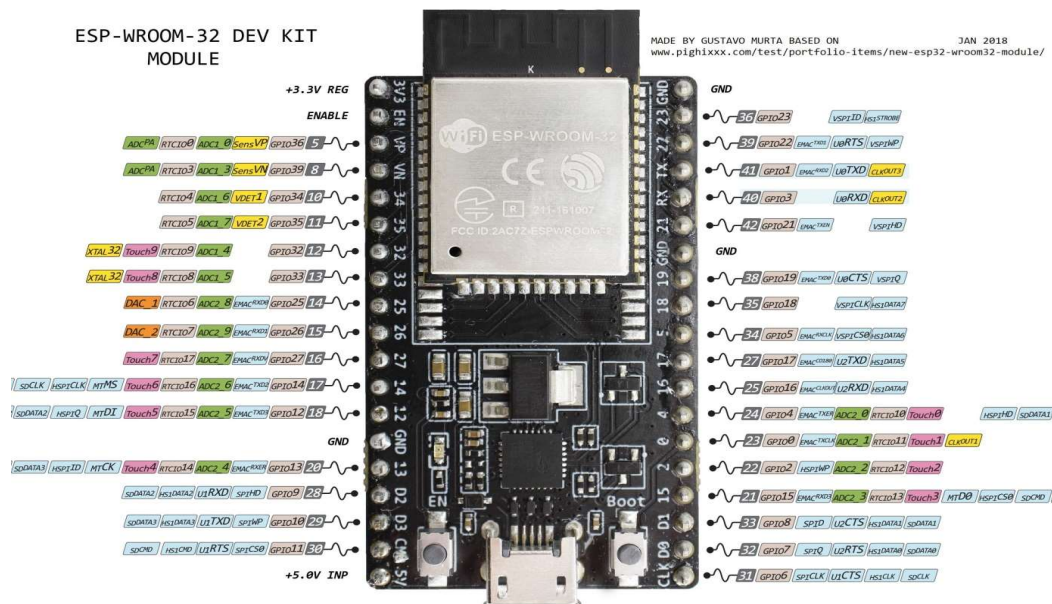
Above figure shows the pin configuration of ESP32 Kit which is used in our project send information read from sensor to database using Wi-Fi.

System Design of Smart Irrigation Model

The main aim of the system perspective is to reduce the complexity of the system. Here the system is described as a whole not as an isolated individual system. Hence the relationship between the system and the environment is to be considered. This system perspective study also gives information regarding its behaviour and properties; this may also include the interactions that the proposed system does with the present environment. This part of the report gives information about the system that is proposed and its relationship with the surrounding environment. The main components of this mobile application are as follows
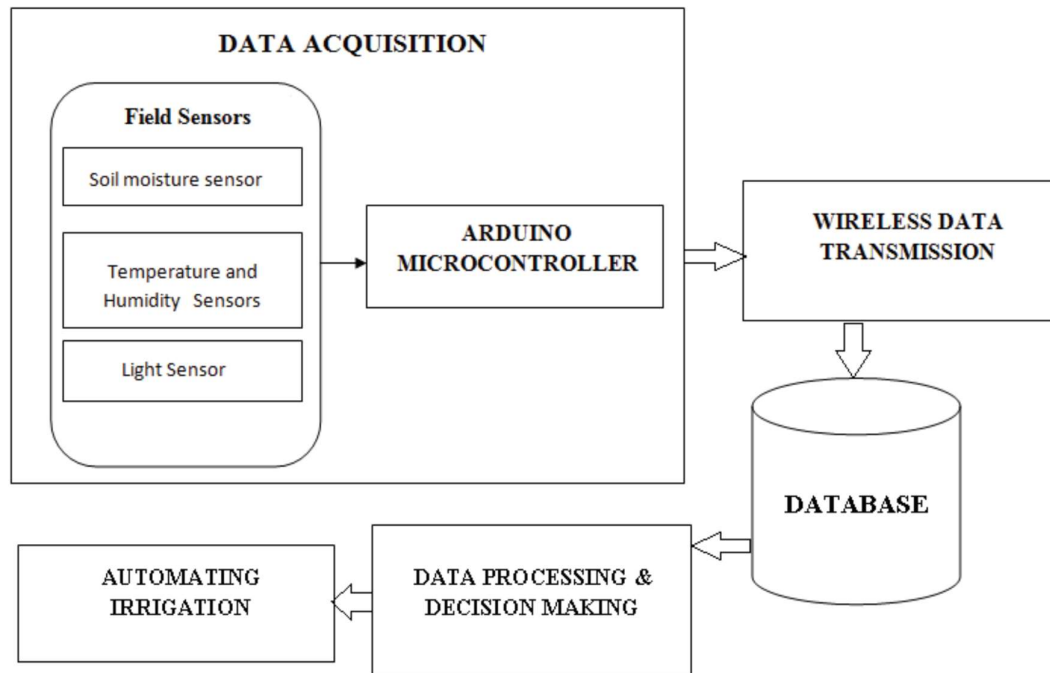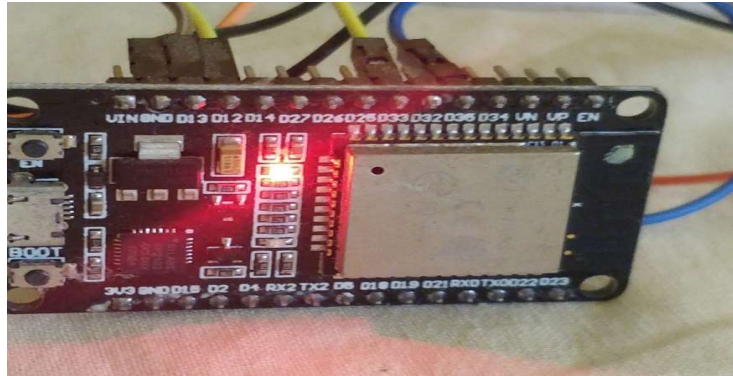
Figure 3.15: Architecture diagram of Smart Irrigation

ESP32 Chip

Figure 3.16: ESP32 Chip

This above Fig 6 describes the Arduino board which is main bridge for connecting with other peripherals. ESP32 is a series of low cost, low power system on a chip microcontrollers with integrated Wi-Fi and dual mode bluetooth.

Water pump

Figure 3.17: Water pump

This above Fig 8 describes the submersible water pump which determines the flow of water.
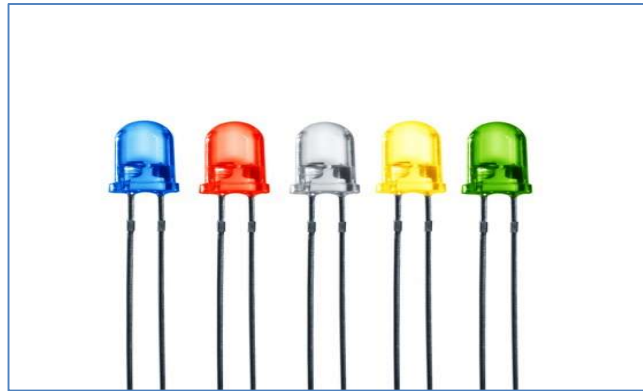
Features:

Voltage Input: 12V DC

Power Consumption: 3W

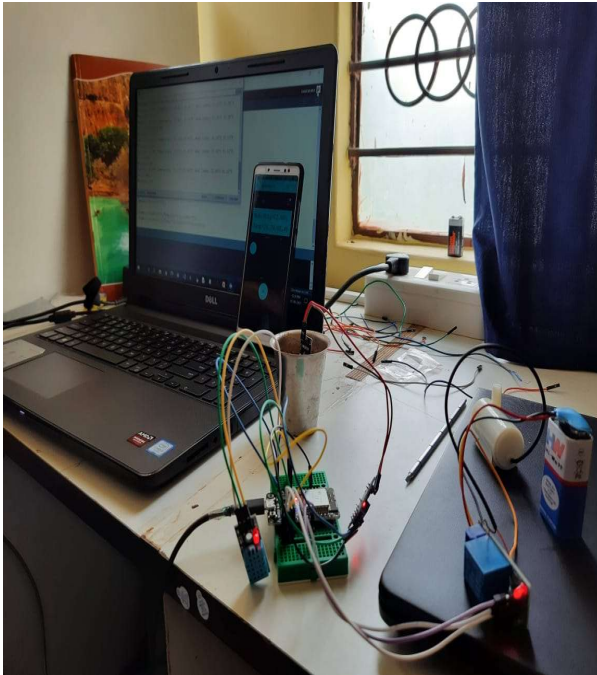Water lift: 40-110cm

Flow rate: 80-120L/H

LEDs

Figure 3.18: LEDs

The above Fig 9 shows the LED's (Light Emitting Diodes) being used in the project, they operate at a voltage range of 1.8 to 3.3v, in this project they are used to indicate the moisture level of soil, red led indicates soil is dry and blue indicates soil is wet.
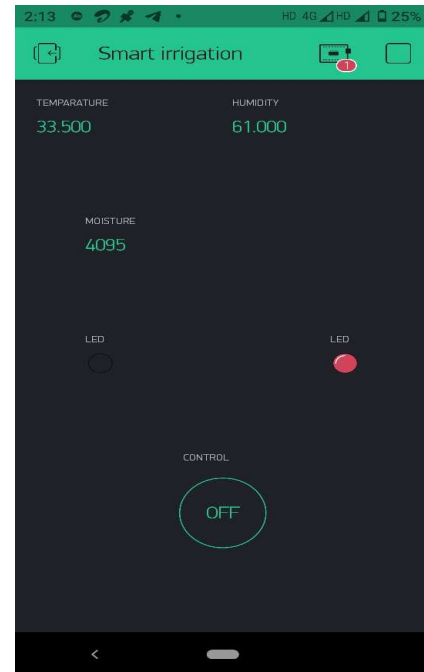
RESULTS:

IoT based Smart Irrigation using esp32

Figure 3.19: Circuit connection of smart irrigation   **Figure 3.20: Blynk Dashboard**

The proposed application is aimed to help framers monitor and control the irrigation irrespective of his location. To achieve this, we have used ESP32 kit, Moisture sensor, Webserver and android application. The system deployed at the fields fetches the soil moisture content using moisture sensor and upload to host server, server using ESP32 kit, all these details are accessible to farmer via android app, he has privilege to turn on or off the motor using buttons provided in the application. I hope this application serves to save water and manage the crops effectively.

Chapter 4

REFLECTION NOTES

1. The Internship has provided the opportunity to connect classroom theory with current industry challenges, and provide exposure to the latest technologies.

2. I gained leadership skills from my supervisor during the internship period which includes managing times, motivating individuals, giving feedback and giving effective guidance.

3. During the period of the internship the interpersonal skills, which are the life skills I use every day to communicate and interact with other people, individually and in groups are good for me.

4. Not only how I communicate with others, but also I got confidence and my ability to listen and understand.

5. I have learnt the willingness to work hard from my supervisor during my internship period. In addition to working hard, it is also important to work smart. This means I acquired the most efficient way to complete tasks and ending ways to save time while completing daily assignments.

Chapter 5

CONCLUSION

This internship was very fruitful for me because I had to cover many different fields. I also learned new concepts and new ways of working.

During this internship period, I acquired practical experience to complement the theoretical content of my study. I have learned the basics of Web Technologies, Arduino IDE software, an overview of embedded c, Industry projects and also learned about the Arduino, ESP32, Interfacing Arduino board and ESP32 board with the communication modules and mini-projects using ESP32 board.

To conclude, this internship was very beneficial to me as I learned a lot, it gave me the experience of working in a real-time environment.

REFERENCES

[1]   Shashank Shukla, Shailee Shah, Pooja Save, "RFID based attendance management system", International journal of electrical and computer engineering, Vol. 3, No.6 Dec 2013.

[2]   Arun Kumb, Pavan Kumar Naik, "Automation of irrigation system using IoT", International journal of engineering and manufacturing science, Vol. 8, No.1, 2018.

[3]   N.G.R.S Kawitkar, "IoT based smart irrigation" ,IEEE, Vol.5, No. 6 ,2016.

[4]   A. A. Anwar, W. Ahmad, M. T. Bhatti, and Z. U. Haq, "The potential of precision surface irrigation in the Indus Basin Irrigation System,," Irrigation science, vol. 34, no. 5, 2016.