DEPARTMENT OF TECHNICAL EDUCATION

SRI JAYACHAMARAJENDRA (Govt.) POLYTECHNIC

Sheshadri Road, K R Circle, Bangalore-560001

Department of Computer Science & Engineering

A PROJECT REPORT ON

"SMALiv-e"

Submitted by

Deepa Rani.B (102CS15008)

Mahalakshmi.M (102CS15023)

Sushmitha.A.T (102CS15056)

Yogeshwari.J (102CS15063)

In Fulfillment Of Requirements For The Award Of

DIPLOMA IN COMPUTER SCIENCE AND ENGINEERING

Year of submission: April 2017-18

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UNDER THE GUIDANCE OF:

Haritha.S.M.

Head Of Department

Dept. of Computer Science & Engg.

DEPARTMENT OF TECHNICAL EDUCATION

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CERTIFICATE

Certified that this project report entitled "**SMALiv-e**" which is submitted by **Ms. Deepa Rani.B, Ms. Mahalakshmi.M, Ms. Sushmitha.A.T, Ms. Yogeshwari.J,** with Reg. Nos. **102CS15008, 102CS15023, 102CS15056, 102CS15063,** bonafide students of **S J (Govt.) Polytechnic** in partial fulfilment for the award of **Diploma in Computer Science Engineering** during the year **2017-18** is the record of students own work carried out under my guidance. It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report and one copy of it being deposited in the polytechnic library.

The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said diploma.

Smt. Haritha S M
Guide
Head of Department

Sri. Srinivasmurthy
Principal

Name and signature Examiner

1 _____

2 _____

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BENGALURU-560 001

SRI JAYACHAMARAJENDRA (Govt.) POLYTECHNIC

Sheshadri Road, K R Circle, Bangalore-560001

Department of Computer Science & Engineering

BONAFIDE CERTIFICATE

Certified that this project report **"SMALiv-e"** is the bonafide work of "**Sushmitha A T, Deepa Rani B, Mahalakshmi M, Yogeshwari J** ", **bearing Register No.s "102CS15056, 102CS15008, 102CS15023, 102CS15063"** of this institution who carried out the project work under my supervision.

SIGNATURE

Smt. Haritha S M
Guide & Head of Department
Dept. of Computer Science & Engg.
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First we have to say that, we feel very happy to be a part of **Sri Jayachamarajendra (Govt.) Polytechnic, Bangalore** and also to the **Department of Computer Science Engineering**, which has given us an opportunity to acquire technical knowledge from the past three years.

We thank our Principal **Sri. Srinivasmurthy** for his sincere help in providing us an excellence atmosphere in this institute.

We express heartfelt thanks to my respectable and beloved HOD **Smt. Haritha S M** Head of the Department of Computer Science and Engg, Sri Jayachamarajendra (Govt.) Polytechnic, Bangalore for her encouragement and the help extended from time to time.

We also thank the Janmoh Technologies Pvt. Ltd. and their team members for their support in providing required information in our project progress time to time.

Finally, we would like to thanks to my friends who supported in successful completion of the project.

Thanking You,

Deepa Rani.B

Mahalakshmi.M

Sushmitha.A.T

Yogeshwari .J

ABSTRACT

Automation of farm activities can transform agricultural domain from being manual and static to intelligent and dynamic leading to higher production with lesser human supervision. We have proposed IOT based Smart agriculture with automatic feeding system which monitors and maintains the desired soil moisture content via automatic watering and also automatic feeding to the livestock. This System uses soil moisture sensors which measure the exact moisture level in soil. This value enables the system to use appropriate quantity of water which avoids over/under irrigation. IOT is used to keep the farmers updated about the status of agricultural field. Information from the sensors is regularly updated on a mobile using GSM or ESP-Wi-Fi module through which a farmer can check whether the water pump is on/off.

CHAPTER 1

INTRODUCTION

- India is an **agriculture** based country and it is a source of livelihood of majority Indians and has great impact on the economy of the country.
- **Feeding** is the most important factor in successful farming. An animal will only perform at its potential if it is fed well.
- In the real world, many farmers face problem in monitoring their farms. The farmers have more difficulties to monitor all the farms at the same time. Hence the project is developed to monitor the farms in the field using the concept of IoT (Internet of things).
- **The Internet of Things (IOT)** is inter-networking of physical devices. This system has ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

- This project uses **Soil moisture sensors** which are placed on the fields to detect the water quantity present in land or sand and **IR sensor** is used to identify the animals and human entry in the field. **Temperature sensor** sense the heat in the atmosphere, according to the climate, the switch will be automatically ON/OFF motor.
- The project uses **Arduino** micro controller which is controller to process the information and send the processed information to Android phone using **GSM** module.
- The aim of the implementation is to demonstrate that the automatic irrigation can be used to reduce wastage of water.

CHAPTER 2

OBJECTIVE OF THE PROJECT

- To minimize or to reduce the manual intervention in the farming land.
- To save the water from being wasted by unplanned usage of water.
- To give much needed rest to the farmers, as they don't have to go and turn the pump on/off manually.
- To detect the moisture content in sand and to manage the water motor automatically.
- To make agricultural field smarter by using Android phones.
- To improve management of irrigation system.
- To reduce the stress of farmer and to save time.
- To help the farmer to know his field status in his home or he may be residing in any part of the world.
- To modernize agriculture technology by programming components and to build the necessary component for the system.
- To optimize water use for agricultural crops.
- To proposes an automatic irrigation system for the agricultural lands.
- To save farmers effort, water and time.

CHAPTER 3

TOOLS /ENVIRONMENT USED

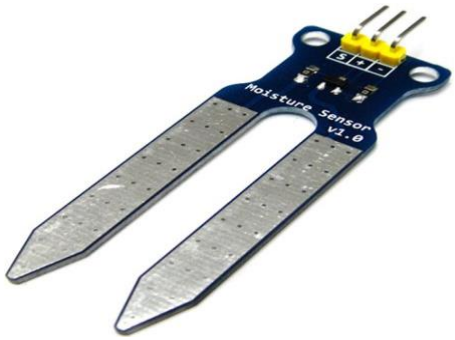
3.1 HARDWARE USED

➢ 3.1.1 ARDUINO UNO

The Arduino Uno is a microcontroller board. It has 14 digital input/output pins. The Arduino Uno can be programmed with the Arduino software. The Arduino Uno can be programmed with the **Arduino IDE.**

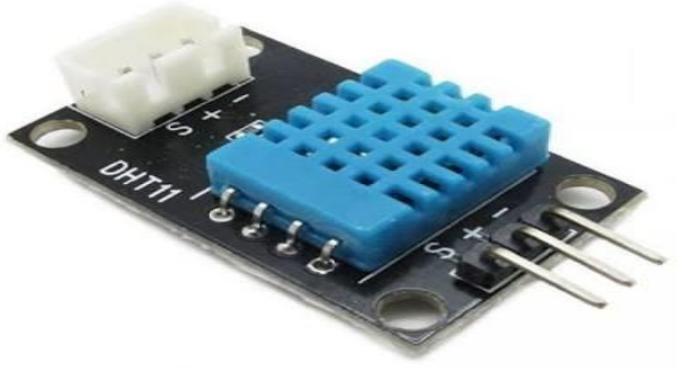
➢ 3.1.2 SOIL MOISTURE SENSOR

Soil moisture sensors measure the volumetric water content in soil. Soil moisture sensor uses the capacitance to measure the water content of soil. It is easy to use this sensor.



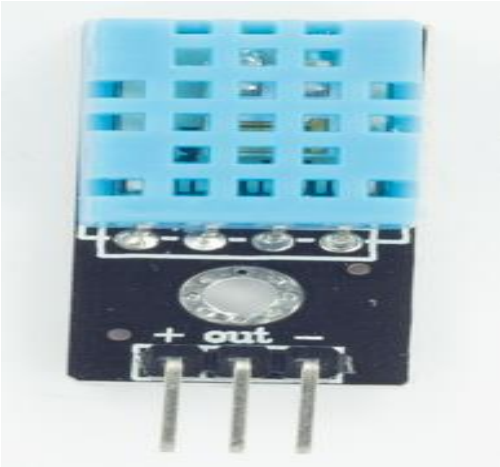
➢ 3.1.3 TEMPERATURE SENSOR

A temperature sensor is a device, typically, a thermocouple or RTD that provides for temperature measurement through an electrical signal. A thermocouple (T/C) is made from two dissimilar metals that generate electrical voltage in direct proportion to changes in temperature.



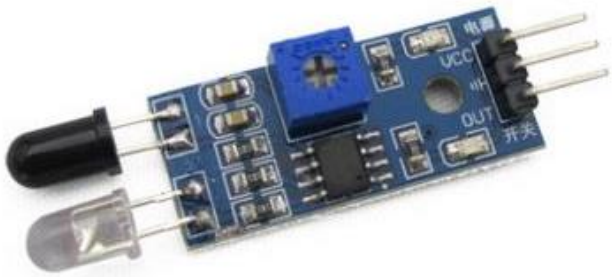
➢ 3.1.4 HUMITIDY SENSOR

A **humidity sensor** senses, measures and regularly reports the relative humidity in the air. It measures both moisture and air temperature and express relative humidity as a percentage of the ratio of moisture in the air to the maximum amount that can be held in the air at the current temperature.



➢ 3.1.5 IR SENSOR

An IR sensor senses certain characteristic of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

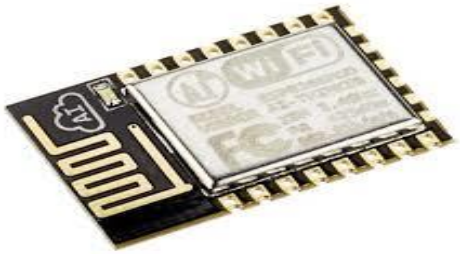


➢ 3.1.6 WATER PUMP

A pump is for rising or circulating Water Pump is a mechanical device that moves fluid or gas by pressure or suction.

➢ 3.1.7 Wi-Fi MODULE

A Wi-Fi module is a component that provides wireless connectivity with the system; or in some cases, the. Bluetooth may be an accessory or peripheral.



➢ 3.1.8 GSM MODULE

A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator-demodulator) is a critical part here. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification.

➢ 3.1.9 POWER SUPPLY

It is used to run the system, can use a power supply circuit with transformer and regulator, or simply a 12V battery.

➢ 3.1.10 RELAY

A relay is an electronic component used for controlling mechanical switching operations through an electronic signal. It can be used for controlling high voltage devices with a small amount of voltage. Both AC and DC components can be controlled by a relay.

➢ 3.1.11 ANDROID DEVICE

Android device means a mobile with android operating System. It is used to run the application and to view the status of the agricultural land on the app.

➢ 3.1.12 SERVO MOTOR

Servo motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback

➢ 3.1.13 TRANSFORMER

Transformer is a static electrical device that transfers electrical energy between two or more circuits through electromagnetic induction.

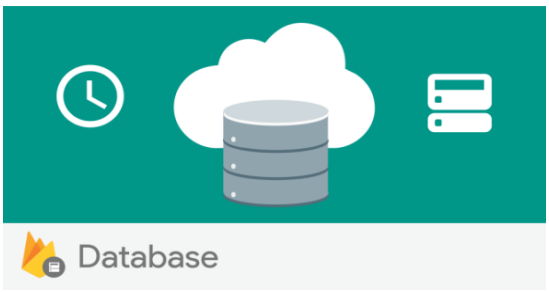
3.2 SOFTWARE USED

➢ 3.2.1 ARDUINO SOFTWARE

Arduino Software (**IDE**) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board.

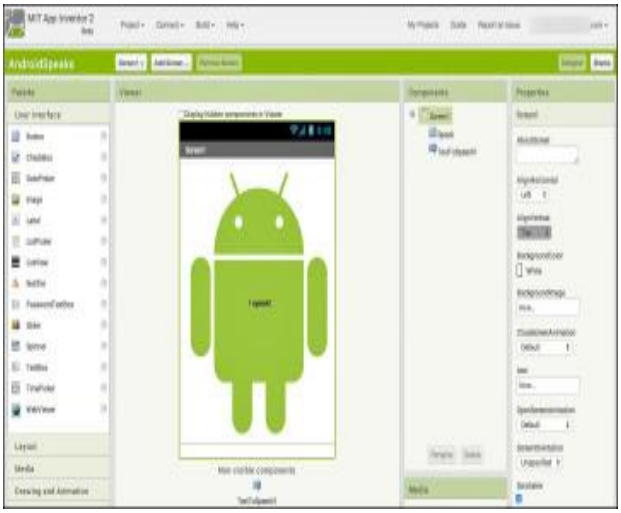
➢ 3.2.2 FIREBASE DATABASE

Firebase is a mobile and web application development platform developed by Firebase, Inc. in 2011, then acquired by Google in 2014.Firebase provides a real time database and backend as a service. The service provides application developers an API that allows application data to be synchronized across clients and stored on Firebase's cloud. The database is also accessible through a REST API and bindings for several JavaScript frameworks such as AngularJS , React, Ember.js and Backbone.js.



➢ 3.2.3 MIT APP INVENTOR TOOL

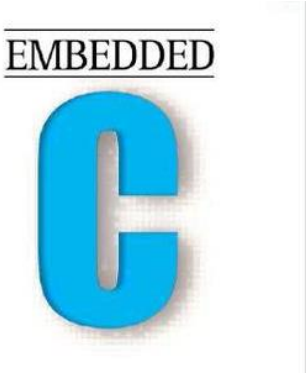
MIT App Inventor is an intuitive, visual programming environment that allows everyone , even children to build fully functional apps for smart phones and tablets. MIT App Inventor is also supported with the Firebase Database extension. This allows people to store data on Google's firebase. It allows creating software applications for the Android operating system (OS).



3.3 LANGUAGES USED

3.3.1 EMBEDDED C

It is the most popular embedded software language in the world. Most embedded software is written in Embedded C. It is very similar to C.



CHAPTER-4

ANALYSIS DOCUMENT

4.1 SRS DOCUMENT

A software requirement specification (SRS) gives the complete description of the behaviour of the system developed by this project. This includes specification of functional and non-functional requirements of the application, and user requirements for the project.

4.1.1 EXISTING SYSTEM

- In the present era one of the greatest problems faced by the world is water scarcity and agriculture being a demanding occupation consumes plenty of water. Therefore a system is required that uses water judiciously.
- Irrigation of plants is usually a very time- consuming activity, to be done in a reasonable amount of time; it requires a large amount of human resources. Traditionally all the steps were executed by humans. Nowadays some systems use technology to reduce the number or workers or the time required to water the plants.
- To feed more than necessary would be wasteful and uneconomical and could lead to health problems in the livestock. Also, dispensing the feed to livestock is also a pain area which can be addressed.
- During manual irrigation, the water requirement of plants/crops is not monitored. Even when the soil is moist enough, water is still provided. This water is not absorbed by the plants and thus is wasted. Hence a system is to monitor the water requirements of the plant is needed.

4.1.2 PROPOSED SYSTEM

- The main objective of the existing system is to minimize the manual intervention by the farmer in irrigation activity and feeding the livestock and to save the water from being wasted by unplanned usage of water which is which is proposed now.
- This proposed work is made to help the farmers and to reduce manual intervention by the farmer and also manpower. By this work, the wastage of water and the consumption of power by motor can be reduced so that they are conserved for the future use.
- It is relatively simple to install and it is safest system & no manpower is required.
- It reduces soil erosion and nutrient leaching. The smart feeder constantly monitors livestock feeding habits, enabling users to utilize predictive analytics to control the yields from your livestock.
- The system helps to farmer or gardener to work when irrigation is taking place, as only the area between the plants are wet.

4.1.3 USER REQUIREMENTS

- User must have 4G mobile with high speed internet connection.
- In case of no internet connection, user can insert the SIM card into the SIM slot of GSM module so that the field status will be sent to the specified user phone number.
- User should switch on the power supply.
- User should set the mobile hotspot name as ESP-WIFI and password as password.
- After the settings User should on the hotspot, and then the Wi-Fi module of the project will be automatically connected.
- Check the water level in the water tank.

4.1.4 FUNCTIONAL REQUIREMENTS

The functional requirements will describe the features and functionality of the system. Functional requirements record the operation that must be done.

4.1.5 NON FUNCTIONAL REQUIREMENTS

The non-functional requirements define how the system will do certain operation. Non-functional requirements are usually called as “quality attributes”. The system should also meet the non-functional requirements along with the functional requirements.

Non-functional requirements for this project are:

- Security is the feature of the system which ensures that system must be protected from the unintentional or malignant harm.
- User-friendly the graphical user interface (GUI)
- Usability determines how difficult it is to learn and use the system.
- Availability It means for how long the system is available for its users and for how long the system will be operational.
- Reliability determines how often the software fails. The measurement is expressed in Mean Time Between Failures (MTBF). The system is completely tested for robustness before the deployment. The module developed thus maintains data consistency.

4.1.6 EXTERNAL INTERFACE REQUIREMENT

4.1.6.1 HARDWARE INTERFACE

Hardware interface is a physical binding which connects the people and technology. The system will collaborate with the hardware resources. It disciplines the design which shapes the connection between user and the technology.

4.1.6.2 SOFTWARE INTERFACE

All the versions of the android phone will support the application. It will have an interaction with the care-taker and/or nurse. Access to the entire user is prohibited and allowing access to only care-taker and/or nurse is provided. Software interfaces provide access to the resources such as memory, storage, CPU etc. of the system.

4.1.7 SYSTEM REQUIREMENTS

The two major kinds of system requirements are hardware and software requirements.

4.1.7.1 HARDWARE REQUIREMENTS

- Arduino Uno
- Soil moisture sensor
- Temperature sensor
- Humidity sensor
- IR sensor
- Water pump
- Wi-Fi module
- GSM module
- Power supply

- Relay
- Android device
- Transformer

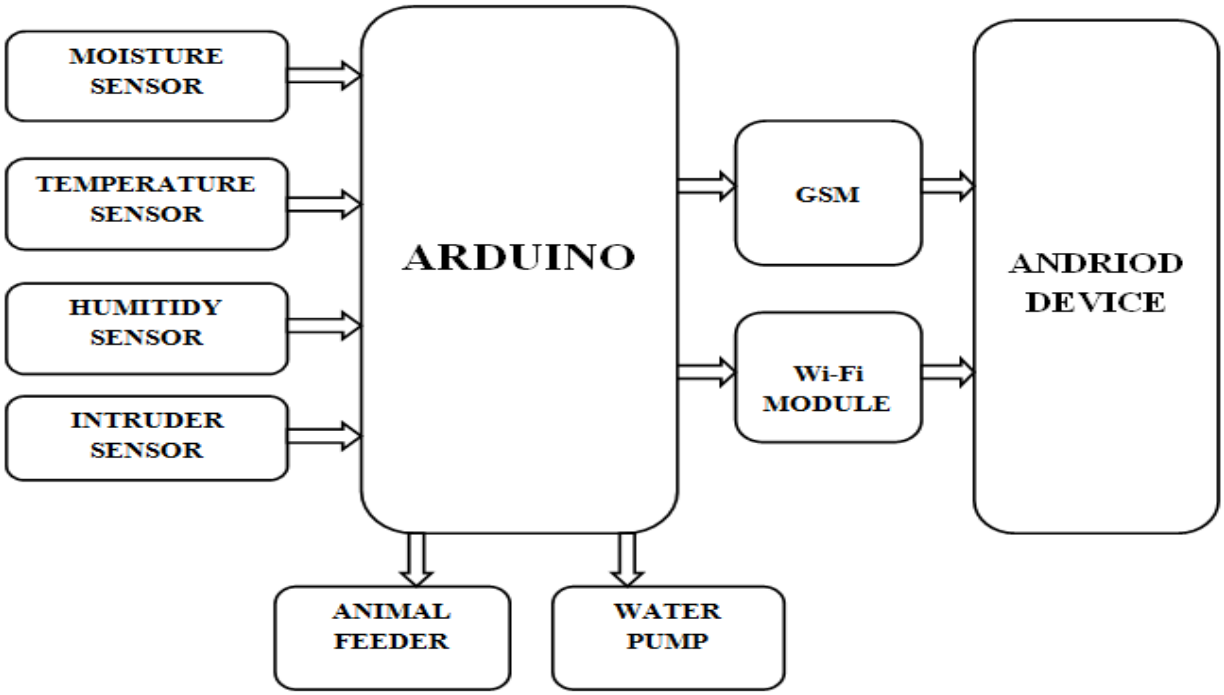
4.1.7.2 SOFTWARE REQUIREMENTS:

- Arduino software
- Firebase database
- MIT app inventor tool

4.2 BLOCK DIAGRAM

☞ In our project the adopted methodology is **Block Diagram** which shows how we implement the IOT based Smart agriculture and livestock feeding mechanism.

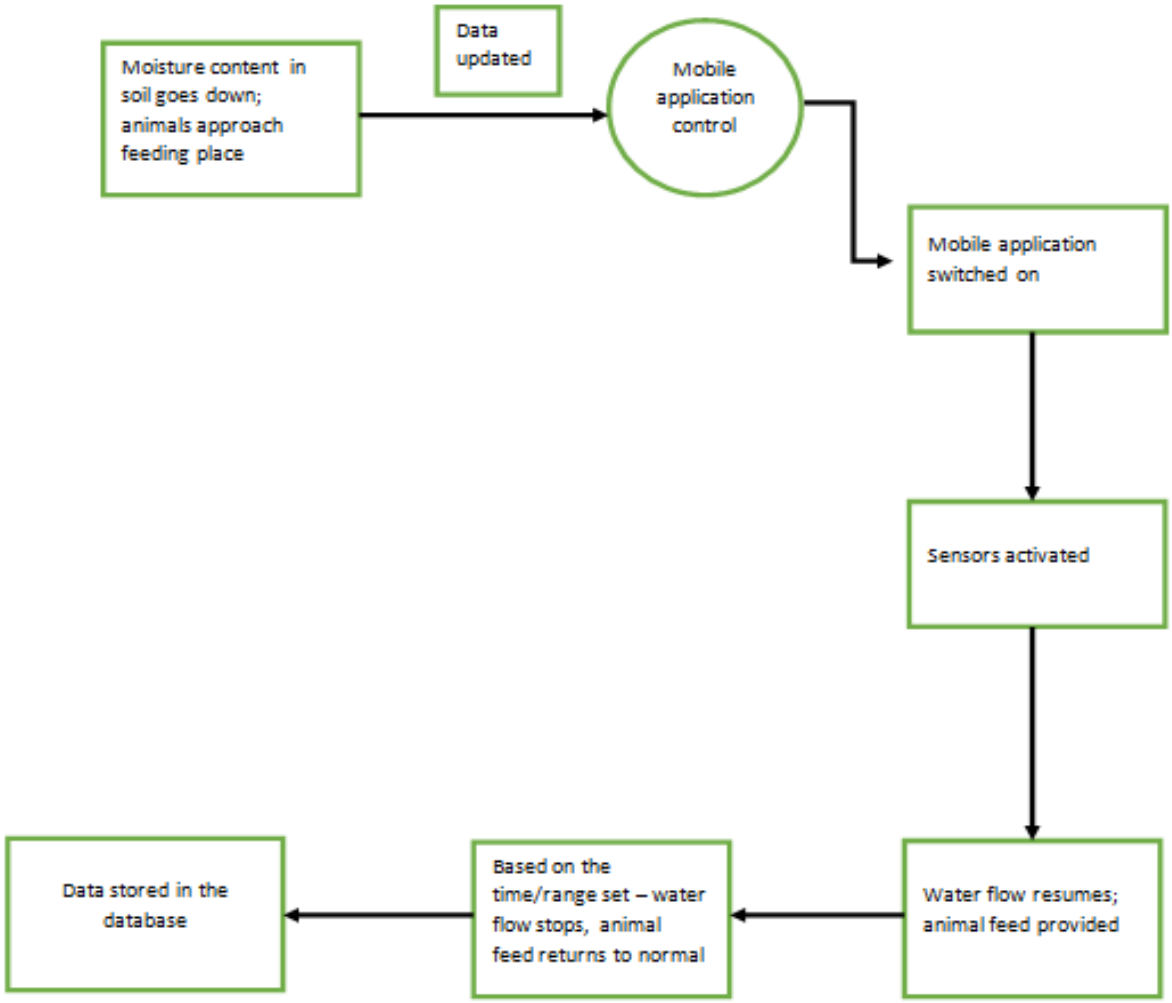
☞ A **block diagram** is a diagram of a system in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks.



4.3 DATA FLOW DIAGRAM

A data flow diagram (DFD) is a graphical representation of the "flow" of data through information systems.DFD's can also be used for the visualization of data processing (structured design)

1. Moisture content in soil is less; animals approach the feeding place
2. Mobile application updated
3. Sensors activated based on response
4. Information stored in the database

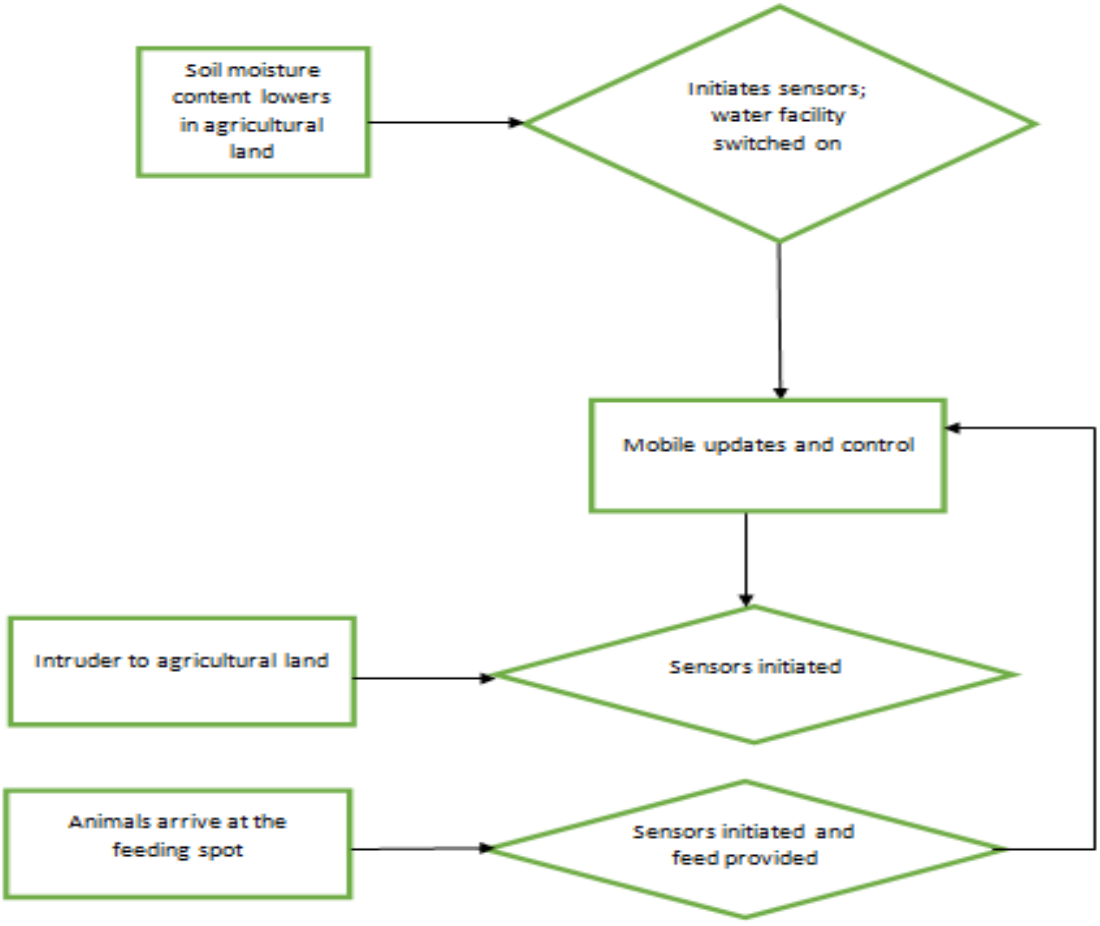


4.4 ENTITY-RELATIONSHIP DIAGRAM

- Entity-relationship model is a conceptual model of data
- In an ER model, there are three different types of objects:
  - An entity exists in the real world; for example: an employee called Smith, or a project with number 1234.
  - A relationship shows how two entities relate to each other
  - Both entities and relationships can have attributes. Anything that is useful to know about an entity or a relationship is an attribute.

- **Entities:**

1. Farmer 2.Sensors 3.Watering facility
4. Agricultural land 5. Mobile device 6.Domesticated animals

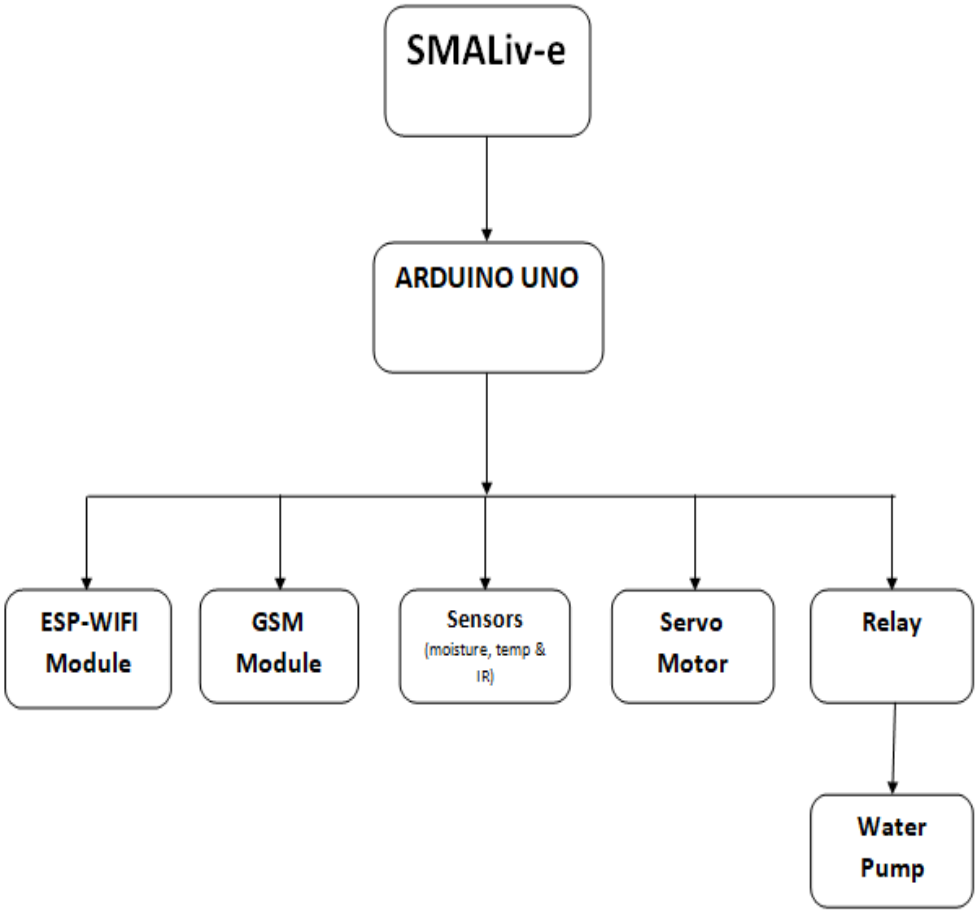


CHAPTER 5

DESIGN DOCUMENT

5.1 MODULE DESIGN

Modular design, or "modularity in design", is a design approach that subdivides a system into smaller parts called modules.



In SMALiv-e project the main module is Arduino Uno and the sub modules are

- ESP-WIFI module
- GSM module
- Sensors (Soil moisture, temperature & IR sensors)

- Servo Motor module
- Relay
- Water Pump

5.2 DATABASE CONFIGURATION

We have used **FIREBASE** database which is freely available for everyone.

- To use this database firstly we have create a firebase account using one existing Gmail account.
- Add Host Name to Arduino Sketch

  Click on Database now you will see the host name show in image

  Copy that host name and past in Arduino code given below at line

  #define FIREBASE_HOST "project004-81c1c.firebaseio.com"
- Then to connect Arduino to database

  Go to **Setting>Project Setting>Service Accounts>Database Secretes**.

  Copy and paste Database Secrets at the line in code

  #define FIREBASE_AUTH

  "eFOAHcgm78aENHgCiJ4DpdhzIaAn4XXvPzrHyEv7"
- For Internet connection

  Add Router or Hotspot Name and Password

  Change line with your Wi-Fi router or Hotspot name and password

  #define WIFI_SSID "ESP-WIFI"

  #define WIFI_PASSWORD "password"
- After all the above settings are done add the program code to WIFI Module and Arduino code to Arduino. Then restart them.

CHAPTER 6

PROGRAM CODE

For coding we have used **Embedded C**: It is a language used for programming the Arduino UNO and also ESP-WI-FI module using Arduino IDE software.

6.1 PROGRAM CODE FOR ARDUINO UNO

```
#include <DHT.h>
DHT dht(A0,DHT11);
int x=0;
void setup()
{
        //put your setup code here, to run once:
        Serial.begin(9600);
        pinMode(A1,INPUT);
        pinMode(3,OUTPUT);
        pinMode(2,INPUT);
dht.begin();
}

charstr[10]="<";
int temp=0,mois=0,humi=0,a=0,alert=0,motor=0;

void loop()
{
```

```
// put your main code here, to run repeatedly:
temp=dht.readTemperature();
humi=dht.readHumidity();
mois=analogRead(A1);
mois=map(mois,0,1023,1,100);
mois=100-mois;
alert=digitalRead(2);
if(mois<=50)
{
        digitalWrite(3,1);
        motor=1;
}
else
 {
        digitalWrite(3,0);
        motor=0;
  }
str[1]=(temp/10)+'0';
str[2]=(temp%10)+'0';
str[3]=(humi/10)+'0';
str[4]=(humi%10)+'0';
str[5]=(mois/10)+'0';
str[6]=(mois%10)+'0';
str[7]=alert+'0';
str[8]=motor+'0';
str[9]='\0';
for(x=0;x<9;x++)
```

```
        {
                Serial.write(str[x]);
        }
        x=0;
        delay(5000);
}
```

6.2 PROGRAM CODE FOR ESP-MODULE

```
#include <ESP8266WiFi.h>
#include <FirebaseArduino.h>
#include <Servo.h>
#include <String.h> // to convert char to *char with Arduino
Servo myservo;

// Set these to run example.
#define FIREBASE_HOST "project004-81c1c.firebaseio.com"
#define FIREBASE_AUTH
"eFOAHcgm78aENHgCiJ4DpdhzIaAn4XXvPzrHyEv7"
#define WIFI_SSID "ESP-WIFI"
#define WIFI_PASSWORD "password"

voidsendSMS(char *number,char *content)
{
        charatcmgs[]="AT+CMGS=";
        charnumcommand[50];
        charcr[] = "\r";
```

```
        strcpy(numcommand,atcmgs);
        strcat(numcommand,number);
        strcat(numcommand,cr);

        Serial.print("\r");
        delay(1000);
        Serial.print("AT+CSCS=\"GSM\"\r"); // set GSM charset
        delay(1000);
        Serial.print("AT+CMGF=1\r");  // set SMS mode to text
        delay(1000);
        Serial.print(numcommand);
        delay(1000);
        Serial.print(content);   //The text of the message to be sent
        delay(1000);
        Serial.write(0x1A);  // command for send sms, code for CTRL-Z
        delay(1000);
  }
char x=0,y=0,val=1,pos=0,f[3],alert[2],mstatus[2],temp[5],mois[5],humi[5],str[10];
char phonenumber[] = "\"7019222189\""; // phone number the sms will be send.
charsmscontent[] = "Motor ON.";

void setup()
{
        Serial.begin(9600);
        myservo.attach(D6);
        //  pinMode(D0,INPUT);
```

```
        //  pinMode(D1,INPUT);
        //  pinMode(D2,INPUT);
        pinMode(D4,OUTPUT);
        // connect to wifi.
        WiFi.begin(WIFI_SSID, WIFI_PASSWORD);
        Serial.print("connecting");
        while (WiFi.status() != WL_CONNECTED)
        {
                Serial.print(".");
                delay(500);
        }
        Serial.println();
        Serial.print("connected: ");
        digitalWrite(D4,0);
        Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH);
        Firebase.set("temperature",0);
        Firebase.set("humidity",0);
        Firebase.set("moisture",0);
        Firebase.set("intruder",0);
        Firebase.set("motor",0);
        Firebase.set("feed",0);
        sendSMS(phonenumber, "module ready...");
}
voidfirebasereconnect()
{
        Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH);
}
```

```
void loop()
{
	// set value
	// handle error
	if (Firebase.failed())
	{
		firebasereconnect();
		return;
	}
	if(Serial.available())
	{
		if(Serial.read()=='<')
		{
			for(y=0;y<8;y++)
			{
				str[y]=Serial.read();
			}
			str[y]='\0';
			for(x=0;x<8;x++)
			{
				if(x==0)
					temp[0]=str[x];
				if(x==1)
					temp[1]=str[x];
				if(x==2)
					humi[0]=str[x];
```

```
                    if(x==3)
                        humi[1]=str[x];
                    if(x==4)
                        mois[0]=str[x];
                    if(x==5)
                        mois[1]=str[x];
                   if(x==6)
                        alert[0]=str[x];
                    if(x==7)
                        mstatus[0]=str[x];
                }
                temp[2]=humi[2]=mois[2]=alert[1]=mstatus[1]='\0';
}
Serial.println("----------");
Serial.println(temp);Serial.println(humi);
Serial.println(mois);Serial.println(alert);
Serial.println(mstatus);
Firebase.set("temperature",temp);
Firebase.set("humidity",humi);
  Firebase.set("moisture",mois);
Firebase.set("intruder",alert);
Firebase.set("motor",mstatus);
  if(mstatus[0]=='1' &&val==1)
  {
                sendSMS(phonenumber, smscontent);
                val=0;
}
```

```
  Firebase.getString("feed").toCharArray(f,sizeof(f));
int f1 = atoi(f);
if(f1==1)
{
        Serial.println("feed");
        for(pos=0;pos<=180;pos+=1)
        {
                myservo.write(pos);
                delay(15);
        }
        Firebase.set("feed","0");
        delay(5000);
        for(pos=180;pos>=0;pos-=1)
        {
                myservo.write(pos);
                delay(15);
         }
        f1=0;
        }
}
}
```

CHAPTER 7

TESTING

7.1 INTRODUCTION

Testing is the process which is used to identify the correctness, completeness, security, and quality of developed computer software. A technical investigation, performed on behalf of stakeholders, which is intended to reveal quality-related information about the product with respect to the context in which it is intended to operate.

7.2 TESTING OBJECTIVE

The main objective of testing is to uncover a host of errors, systematically and with minimum effort and time.

7.3 LEVELS OF TESTING

In order to uncover the errors present in different phases we have the concept of levels OS testing. The basic levels of testing are:

- Client Needs Acceptance Testing
- Requirements System Testing
- Design Integration Testing
- Code Unit Testing

A series of testing for the proposed system before the system is ready for the user Acceptance testing

7.3.1 UNIT TESTING

The purpose of unit testing is to uncover errors in the smallest software unit the routine. Each routine will be tested individually using black box oriented tests. The programmer of each module will be design a set of test cases for that module and ensure that module is fully tested. Important or complex routines will also be tested by at least one other person.

7.3.2 INTEGRATION TESTING

This section describes the integration strategy and procedures for the system. It gives the order in which modules will be developed and how they will be integrated. It also describes the specific tests that will be performed on integrated sets of information. Integrated testing of unit tested modules is necessary to ensure that:

- Modules interface correctly with each other.
- One module does not have inadvertent, undesirable effects on another module.
- Sub modules (routines) combine to produce the desired functions of the major modules.
- Interfaces to, and use of global data structure are consistent.

7.3.3 SYSTEM TESTING

Testing the whole system i.e. verifying and validating the whole source code to check if the system is a whole is executing the code is called system testing. The proposed system undergoes it under all conditions to be called a successful system.

7.4 TEST CASES

7.4.1 UNIT TESTING

Test Case 1	
Title	Animal feed equipment
Description	Devices and sensors for animal feed
Test steps	The hardware equipment is able to work consistently and able to receive and transmit the data
Expected result	Must receive and transmit data
Actual result	Successful receipt and Transmitting data by the hardware

Test Case 2	
Title	Irrigation equipment
Description	Devices and sensor for irrigation equipment testing
Test steps	The hardware equipment is able to work consistently and able to receive and transmit the data
Expected result	Must receive and transmit data
Actual result	Successful receipt and Transmitting data by the hardware

Test Case 3	
Title	Mobile application
Description	Mobile application
Test steps	Mobile app is receiving the real time data and is triggering alert
Expected result	Must receive and transmit data
Actual result	Successful receipt and Transmitting data by mobile application

Test Case 4	
Title	Database application
Description	Database application
Test steps	Database application is storing the required information.
Expected result	Must receive and transmit data
Actual result	Successful receipt and Transmitting data by database

7.4.1 INTEGRATION TESTING

Test Case 1	
Title	Animal feed equipment with API, DB and app
Description	Integration of animal feed equipment with API, DB and app
Test steps	Using mobile application, the animal feed is provided
Expected result	When command given in mobile app ,the feeding should work
Actual result	Same as the expected result

Test Case 2	
Title	Irrigation equipment with API DB and app
Description	Integration of irrigation equipment with API, DB and app
Test steps	Sensors share info. to the app
Expected result	Sensor must transmit info.to app
Actual result	Transition of data is done successfully

Test Case 3	
Title	Controlling hardware by app
Description	Application controls the hardware
Test steps	1. App. On/off 2. watering the field; 3. animal feed delivery
Expected result	Hardware must work as per the control of application
Actual result	Same as expected result

7.4.3 SYSTEM TESTING

Test Case 1	
Title	Overall functioning
Description	Both irrigation system and animal feed system work in tandem
Test Steps	1. Water the soil while the range dips. 2. Alert message should show in the app when livestock entered into the shed. 3. Feeding should work when feed button in app is given.
Expected Result	Both irrigation and animal feed system should work
Actual Result	Irrigation and animal feeding system worked successfully

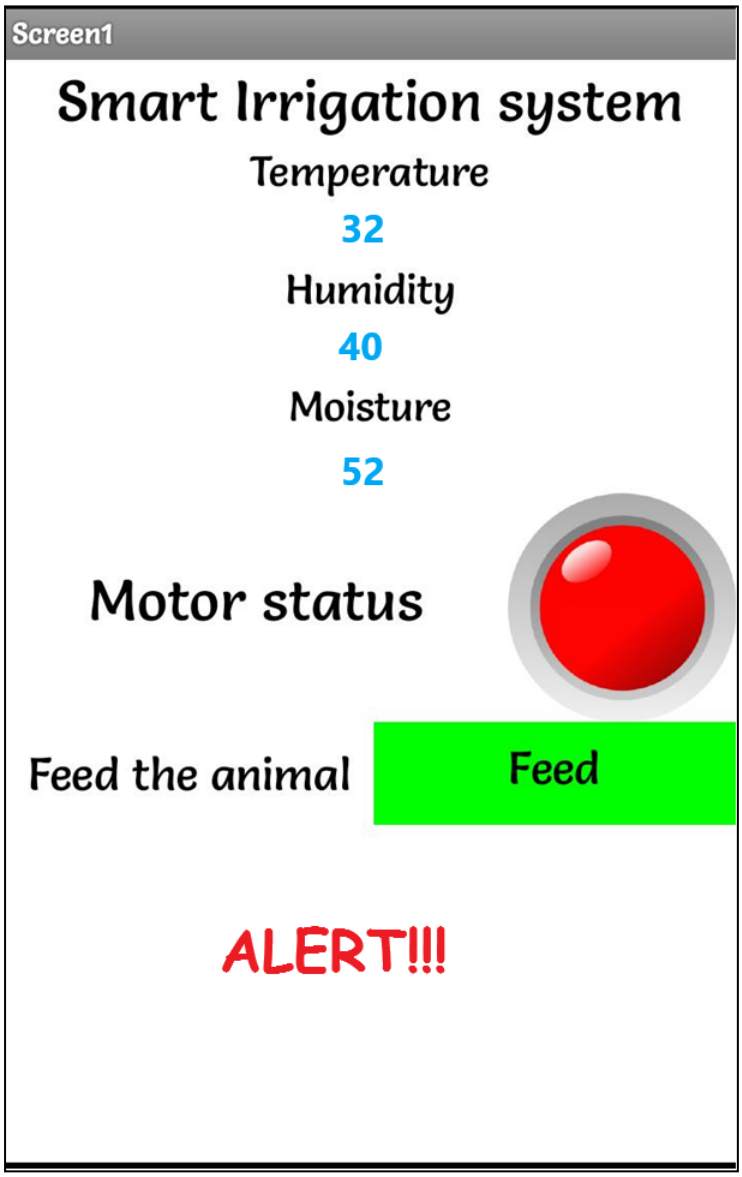
Test Case 2	
Title	Security
Description	User login and password
Test Steps	1. Authorization with username and password to login the app. 2. Log off and move out of the app.
Expected Result	User login
Actual Result	User login successfully

Test Case 3	
Title	Database info.
Description	Retrieve data from the database
Test Steps	1. Login to database. 2. Retrieve the data and store it folder
Expected Result	Data must retrieved from database
Actual Result	Data is retrieved from database successfully

CHAPTER 8

PROJECT SNAPSHOTS

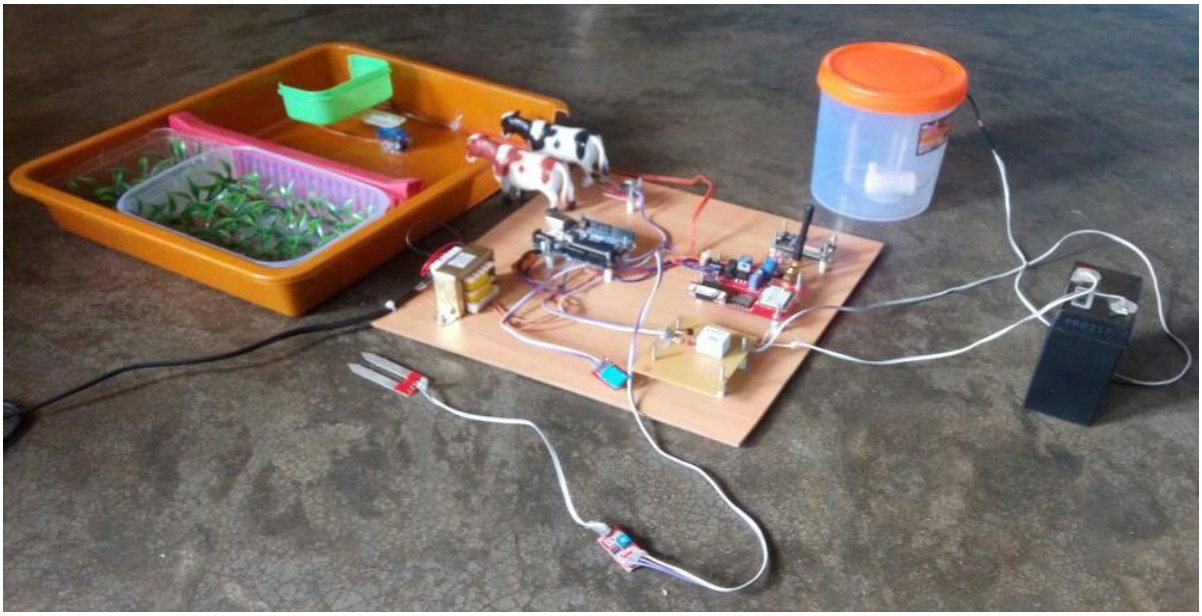
8.1MOBILE APPLICATION SNAPSHOT (OUTPUT SCREEN)

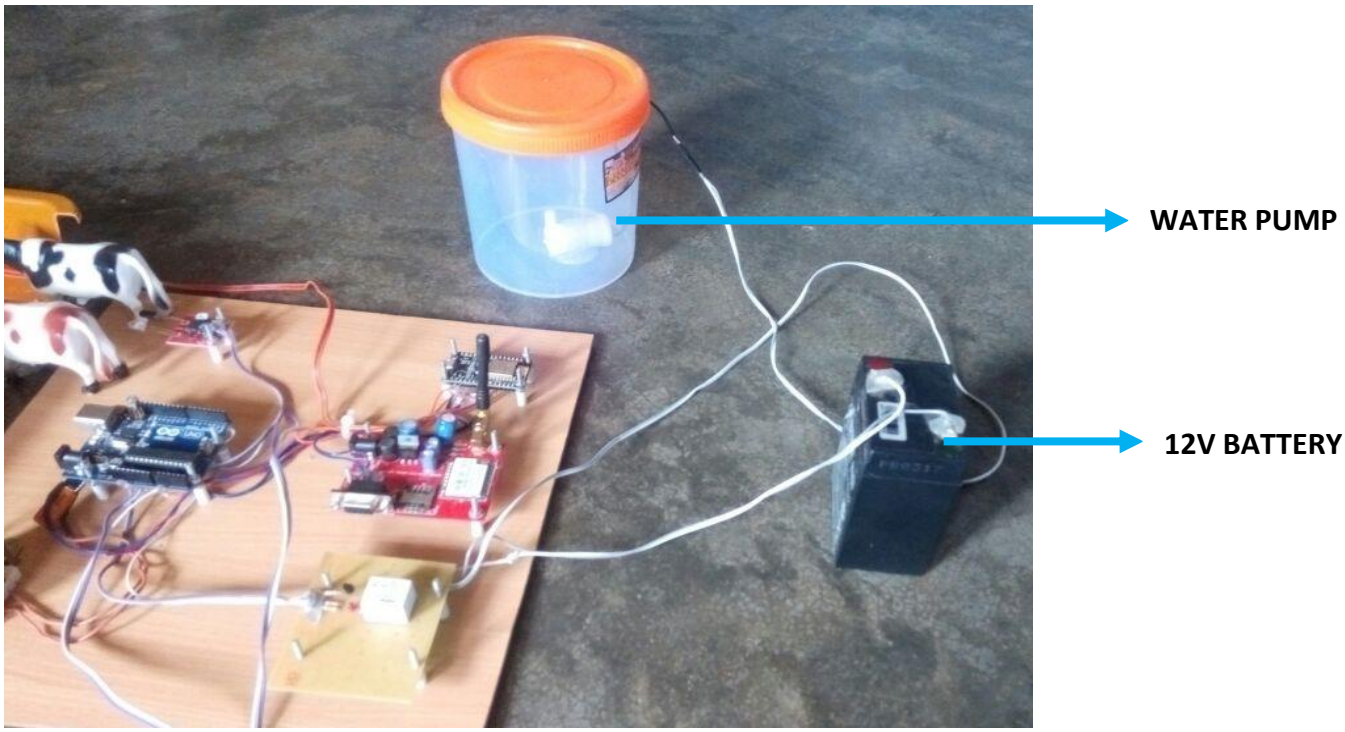


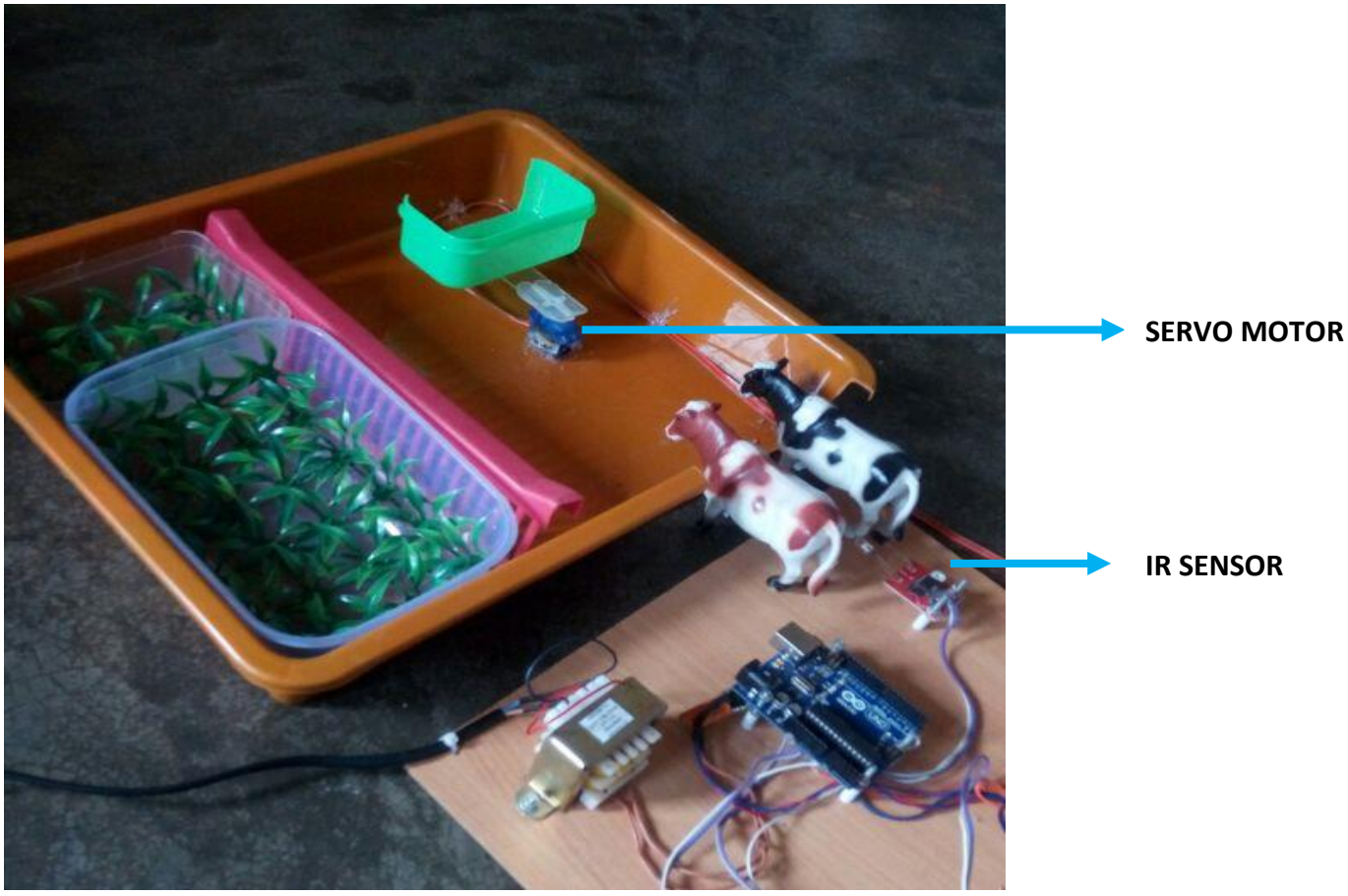
Above screenshot shows temperature and humidity of the atmosphere & moisture level of the soil if the moisture level of the soil if this moisture level below 50 range then the motor will on and then it shows green signal in the motor status and now its show showing red signal because moisture level is above 50 i.e.52 hence motor is

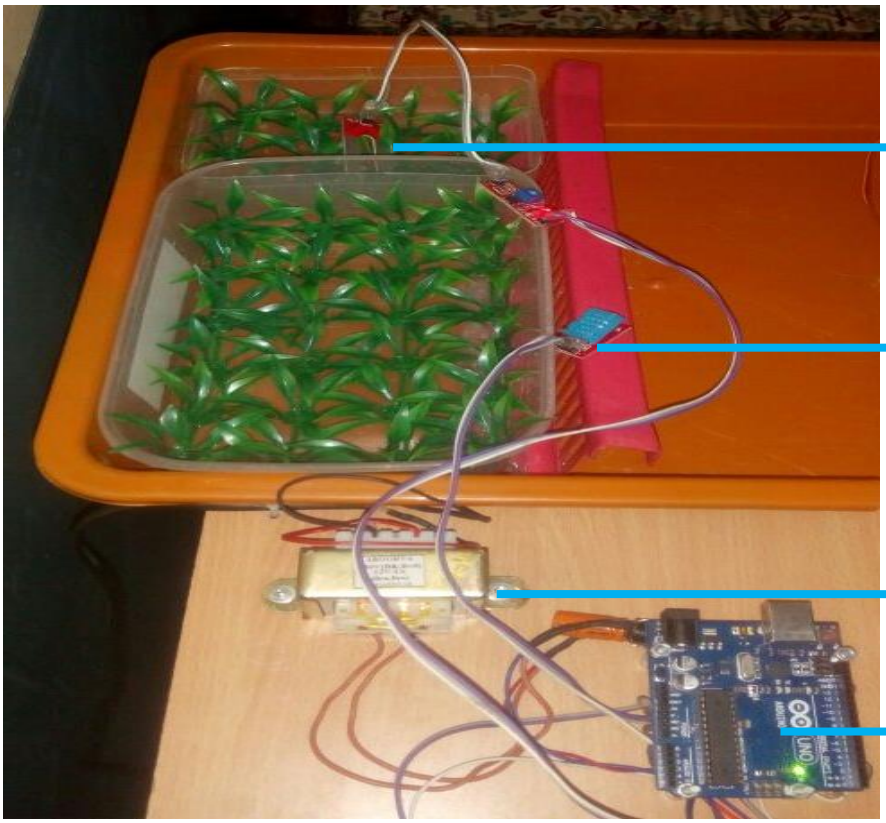
off. It also showing alert message in the screenshot it means that livestock comes to the field then we have to feed them for that we have to click on the feed button shown in the above screenshot.

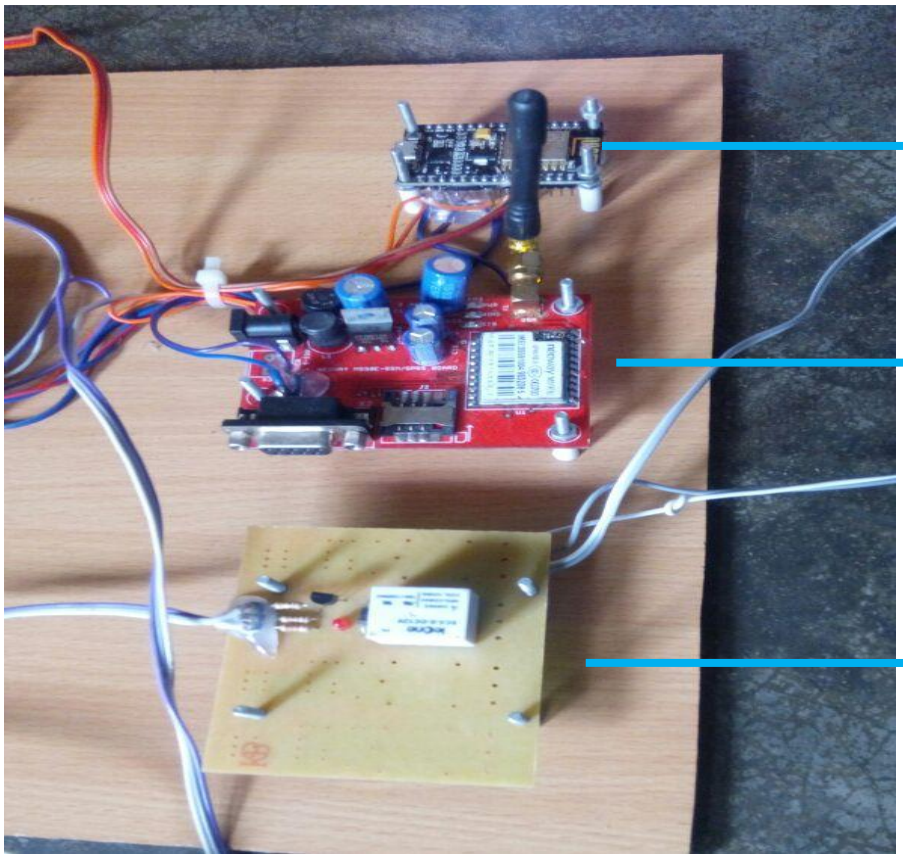
8.2 PROJECT SNAPSHOT




WATER PUMP
12V BATTERY


SERVO MOTOR
IR SENSOR


SOIL MOISTURE SENSOR
TEMPERATURE & HUMIDITY SENSOR
TRANSFORMER
ARDUINO UNO


ESP WI-FIMODULE
GSM MODULE
RELAY CIRCUIT

CHAPTER 9

IMPLEMENTATION OF SECURITY FOR THE SOFTWARE DEVELOPED

Security is a part of software development process that ensures application confidentiality, integrity and availability.

• 9.1 First Security implementation

We have secured the database account with user name and password. So that unauthorized person cannot access our project data.

We have given below username and secret key for database security.

#define FIREBASE_HOST "project004-81c1c.firebaseio.com"

#define FIREBASE_AUTH "eFOAHcgm78aENHgCiJ4DpdhzIaAn4XXvPzrHyEv7"

• 9.2 Second Security implementation

In our project we have secured the internet connection or router by username and password.

Username = “ESP-WIFI”

Password = “password”

CHAPTER 10

LIMITATIONS OF THE PROJECT

- High speed internet connection is required.
- Power supply is required all the time.
- Wired sensors are used. If any sensor's wire is disconnected then that sensor's readings won't display in the application.
- Android mobile is required to run the project application

CHAPTER 11

FUTURE APPLICATIONS OF THE PROJECT

11.1 FUTURE SCOPE OF THE PROJECT

A water meter can be installed to estimate the amount of water used for irrigation and thus giving cost estimation. A solenoid valve can be used for varying the volume of water flow. Furthermore, Wireless sensors can also be used.IOT sensors can be used to track an animal's location, which can be helpful in locating sick animals as well as establishing and optimizing grazing patterns. Connected sensors in livestock wearable's allow farmers to monitor heart rate, blood pressure, respiratory rate, temperature, digestion, and other vitals. Light sensor can also be used to detect light intensity of the environment. Light Dependent Resistor (LDR) is used in which the resistivity decreases with increase in light intensity and vice versa.LDR is used as sensor to turn on and off electric fence or provide artificial lighting for plantation of necessary. Camera can be installed for the purpose of image detection when the movement is detected.

11.1.2 CONCLUSION

The primary applications for this project are for farmers and gardeners who do not have enough time to water their crops/plants and also useful for animal feeders to feed the livestock automatically. It also covers those farmers who are wasteful of water during irrigation. This proposed work is made to help the farmers and make their harvest economical by helping them in security purpose. By this work, the wastage of water and the consumption of power by motor can be reduced so that they are conserved for the future use. However, research indicates that different sensors types perform under all conditions with no negative impact on crop yields with reductions in water use range as high as 70% compared to traditional practices.

CHAPTER 12

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