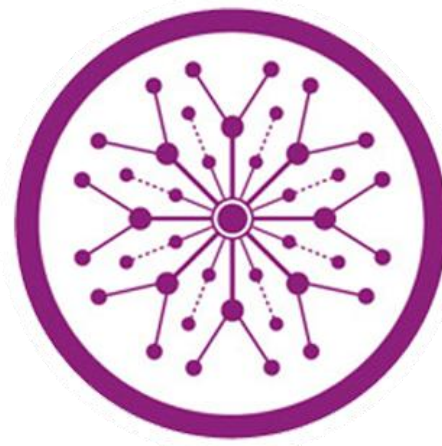


Agriculture Tech Solutions

**Final Year Project
Session 2018-2022**

A project submitted in partial fulfillment of the degree of

BS in Computer Science



Department of Computer Science
Faculty of Computer Science & Information Technology
The Superior University, Lahore

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*The candidates confirm that the work submitted is their own and appropriate credit has been given where reference has been made to work of others

Plagiarism Free Certificate

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Project Report

Agriculture Tech Solutions

Change Record

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APPROVAL

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PROJECT MANAGER

Comments: _____

Date: _____

Signature: _____

HEAD OF THE DEPARTMENT

Comments: _____

Date: _____

Signature: _____

Dedication

This work is devoted to my beloved country Pakistan. Agriculture is taken into account the backbone of Pakistan's economy. Agriculture tech solutions are very helpful to attain the goals. we will perform all the work that any farmer did within the fields with the assistance of smart mobile application using IOT (Internet of Things).

This work is dedicated to our family, our dearest teachers and our class fellows. We dedicate this project to our families whose untiring support and assistance have made possible the fruition of our efforts and our teachers who teach us to be honest and to do hard work to achieve a goal in our life, to our friends and classmates for their cooperation while conducting the study. And the most off all to our great creator our Almighty God the author of knowledge and wisdom who made this possible.



Acknowledgements

I would like to express my special thanks of gratitude to my supervisor and project manager “**Dr. Irfan ud Din**” who gave us the golden opportunity to do this wonderful project on the topic “**Agriculture Tech Solutions**”, which also helped us to do a lot of work according to coding framework and to documentation standards, we came to know about so many new things that we are really thanks to them.

Secondly, we would also like to thank our great parents and friends who helped us a lot in finalizing this project within the limited time frame.



Executive Summary

Agriculture is taken under consideration the rear bone of Pakistan economy, which relies heavily on the foremost crops. Agriculture constitutes the country largest sector of our economy. Majority of the population, either directly or indirectly, captivated to the present sector.

It feeds whole rural and concrete population.

Hence, a system is required to utilize water efficiently in agriculture. the fashionable drip irrigation system lessens a sensible amount of water usage compared to the traditional methods. There no must supply the overflow water to the plants. Only provide needed amount of water to plants consistent with plants need. It helps us, to not waste great deal of water resource on commonplace with none reason.

Become smart, use the smart and valuable methods and provides your one hundred pc using less sources. it's also valuable for Pakistan now or also for future time. Because other countries also using Smart Technology in there daily bases routine in many fields like Agriculture, Farming etc.

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Chapter 1

Introduction

Chapter 1: Introduction

Introduction

Agriculture is taken into account Pakistan's financial system backbone, our economic system depends on major crops, heavily. Our economy, greatest quarter is agriculture. Our population relies upon on agriculture sector, because meals is that the want of life. It feeds the whole rural and concrete population. Realize its importance. Pakistan's primary herbal assets are arable land and water. Punjab is that the most agricultural province in Pakistan. The financial significance of these crops has also expanded in current years thanks to the chronic upward shove in expenses of quintessential commodities like pulses, onions, potatoes, peppers and tomatoes.

1.1. Background

Farmers use traditional farming management techniques that end in loss of inputs and decreased yields thanks to mistaken type and quantity of fertilizer inside the discipline which relies upon on soil evaluation and plant production. And steady with the outcomes of the soil analysis, the approach of identifying the form of fertilizer takes an prolonged time.

1.2. Motivations and Challenges

Agriculture needs 85% of the accessible water and this requirement may additionally amplify in future. Therefore, a device is required to use water successfully in agriculture.

1.3. Goals and Objectives

Agriculture is that the spine of Pakistan's monetary and dealing with a cyclones of problems in Pakistan as:

- Lack of recent Agriculture technology
- Poor Financial Position of Farmer
- Limited Cultivable Area
- Water logging and salinity
- Slow Growth of Allied Product
- Low per Hectare Yield
- Inadequate Infrastructure
- Uneconomic Land holdings
- Old method of Production
- Inadequate supply of Agriculture Inputs
- Lack of irrigation Facilities
- Inadequate Agriculture Centre
- Problem of Land Reforms
- Defective Land Reforms
- Subsistence Farming
- Low Cropping intensity
- Improper Crop Rotation
- Various Plant diseases and Natural Calamities

1.4. Literature Review/Existing Solutions

- Agriculture needs 85% of the available freshwater and this requirement can also amplify in future. Therefore, a system is required to use water effectively in agriculture.
- Farmers nevertheless use traditional farming administration techniques which stop in loss of inputs and decreased yields due to the fact of incorrect variety and volume of fertilizers within the area which

depends on soil evaluation and plant production. And in line with the effects of the soil analysis, the method of identifying the kind of fertilizer takes a protracted time.

1.5. Gap Analysis

Provide records to farmers about new strategies and technologies that we will use to develop Pakistan's financial system in our country, our economic system depends on primary crops, heavily. Modern drip irrigation structures substantially reduce water consumption in contrast to general methods.

1.6. Proposed Solution

The modern-day drip irrigation gadget lessens a huge amount of water usage in contrast to the preferred methods. and a few crops need variable quantities of water due to the fact it grows e.g. paddy. This paper proposes an automation of drip irrigation at some stage in which the micro-controller firstly captures soil moisture degree with the help of soil moisture sensor and transmits the information to the smartphone thru IOT module. The micro-controller decides the irrigation and sends the status of the area to the Farmer's transportable.

Designing an automatic watering device supported the net of things (IOT). Water use effectivity (WUE) is achieved and managed with the aid of using moisture sensor when the soil moisture drops beneath 30% is opened and closes when it reaches 70% (preset information in keeping with plant needs). The fertilization manage is that the process of adjusting the manageable of Hydrogen (pH) and soil electrical conductivity (EC) as in preset database and thereby acidity and alkalinity. Additionally thereto, the plant root sector is managed PRN. When the system is applied, it improves water and fertilizer use efficiencies and thus saves effort, money, time, energy, will increase production, and productivity.

1.7. Project Plan

1.7.1. Work Breakdown Structure

Divide the remember in small pieces, resolve the remember and so mix all, in closing the complete device will prepare.

1.7.2. Roles & Responsibility Matrix

Table 1. 1: Roles & Responsibility Matrix

WBS #	WBS Deliverable	Activity #	Activity to Complete the Deliverable	Duration (# of Days)	Responsible Team Member(s) & Role(s)
1	Initiation	1.1	Requirements Gathering	3	M Usama Ishtiaq, M Fahad
2	Planning	2.1	Documentation	3	M Usama Ishtiaq
		2.2	Project Design	2	M Muqet
3	Execution & Control	3.1	Development& Unit Testing	15	M Usama Ishtiaq, M Fahad
		3.2	Testing	2	M Usama Ishtiaq
4	Closeout	4.1	System Documentation	2	M Usama Ishtiaq, M Muqet

Chapter 2

Software Requirement Specifications

Chapter 2: Software Requirement Specifications

2.1. Introduction

2.1.1. Purpose

Agriculture is that the most ordinary pastime over time. Since the begin of it, agriculture has suffered many modifications to boost productivity and excellent of crops. a quantity of the most important massive enhancements are remarked when machines and new equipment like irrigation systems, harvest machines, farmland clearing machines have been introduced inside the primitive agriculture, where these things to do were performed mainly by means of humans and animals. Over time, agriculture has been bothered through weather failures (such as storms or severe temperatures) and by herbal disasters (such as pests and plant diseases). Thus, the following step within the development of the agriculture area was to advocate the net of Things (IOT) solutions for monitoring of the many parameters for better precision agriculture. Such a device would furnish useful information on plant growth, crops' diseases, and soil properties that are a advantage for crops.

2.1.2. Document Conventions

This furnish the total element about the task what reasonably undertaking we do. Describe the working of project. How we will automate the regular exercise the use of smart smartphone different smart devices to form not possible thing possible.

No body think about it, go farming from traditional thanks to present day way. But there is nothing impossible inside the era inside which we stay we will use the resources to create the development in each and every issue of life.

2.1.3. Intended Audience and Reading Suggestions

Everyone can apprehend the working functionality by means of analyzing the document it also for an target audience which are non-technical additionally for technical person. The non-technical individual can study the theoretical part that make comprehensible experience for them. and also the diagrams that assist any technical individual to hold close how they perform the functionality, which methods, technology they use to style cutting-edge farming system.

2.1.4. Product Scope

Global food security, the employment of renewable uncooked substances and manufacturing of strength from biomass are three of the "Great Challenges" for the 21st century:

- The world population is predicted to develop to up to 9.5 billion humans in 2050. Combined with changing client demands, global meals security will absolutely continue to be a serious challenge.
- The environmental footprint of agriculture (e.g. on water and air quality, and from waste, pollution and greenhouse emission (GHG) emissions) ought to be reduced and herbal capital maintained (e.g. soil, biodiversity) while simultaneously managing the transition from non-renewable to renewable strength sources.

2.2. Overall Description

2.2.1. Product Perspective

This gadget can assist to farmer to try and do the farming the usage of cutting-edge one technology, that supporting him to observe the fields locate moist stage in soil, automated water dripping, forecasting, checking humidity level in environment, also monitoring the fields via gaining the real time pics and videos of fields.

2.2.2. Product Functions

This machine helping him to watch the fields locate moist stage in soil, automatic water dripping, prognostication, checking humidity stage in environment, additionally monitoring the fields by gaining the actual time pix and movies of fields.

This is the requirement of discipline to grant full care as mom do for her child. If you full fill all the targeted matters then the fields furnish appropriate consequences like desirable yield.

2.2.3. User Classes and Characteristics

In the system one consumer can display the sphere just on single click. Every single element which a farmer performs by using the assistance of two or more helpers that helping him to attempt to to the task. On other hand this approach can operate all task. In batter way then human. Because the brand new gadget can perform undertaking barring getting off tired.

2.2.4. Operating Environment

You need to own the android portable, having:

- Android version 7 or plus.
- 4 - 6GB RAM
- 32 – 64 GB ROM
- Latest Processor

2.2.5. Design and Implementation Constraints

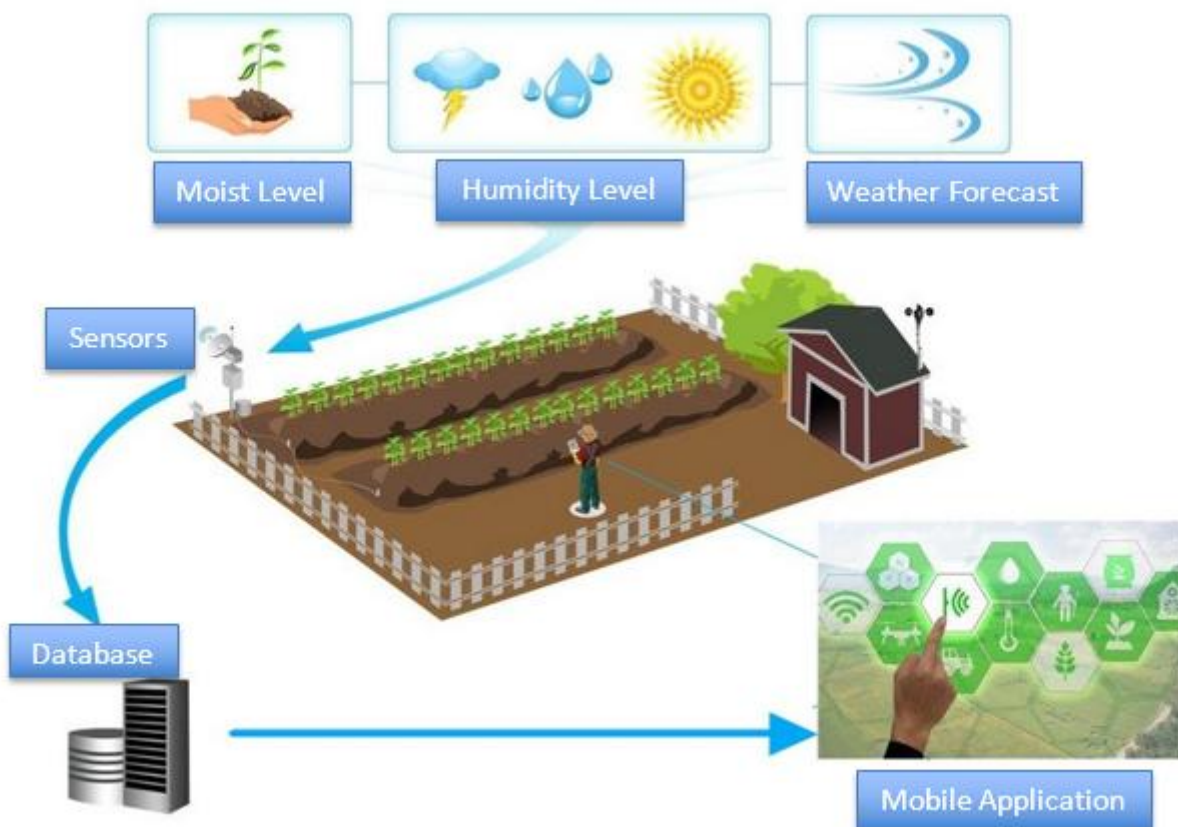


Figure 2. 1: Design and Implementation Constraints

2.2.6. User Documentation

We designing the machine which is consumer pleasant on just single click on you operate add fields. Also we offer Videos Lecture, User guide document that helping the consumer to run the making use of very easily.

2.2.7. Assumptions and Dependencies

We do to communicate the objects having internet. it's viable to communicate the sensor with mobile software to perform some task. Start communication between the clever gadgets the use of net these factor combine together and work as like human and offering better end result than human.

2.3. External Interface Requirements

2.3.1. User Interfaces



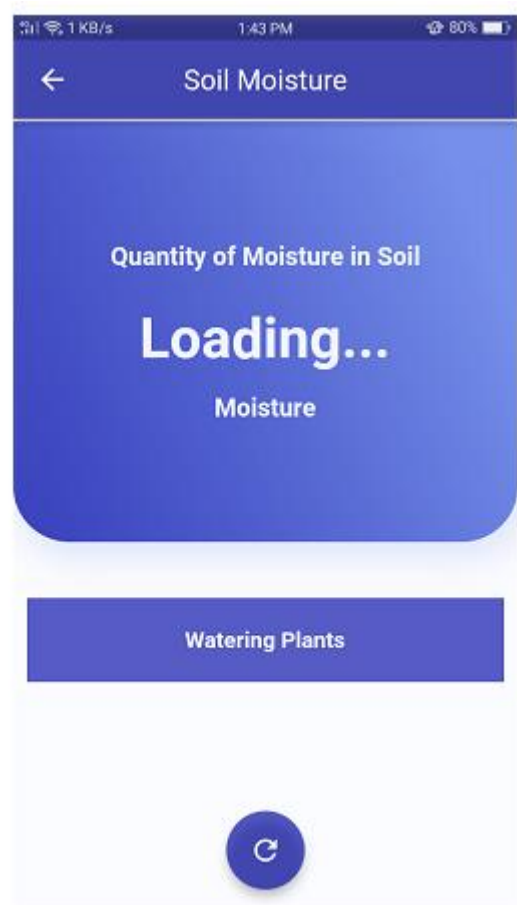
Figure 2. 2: User Interfaces

2.3.2. Hardware Interfaces

You need to own the android mobile, having:

- Android version 7 or plus.
- 4 - 6GB RAM
- 32 – 64 GB ROM
- Latest Processor

2.3.3. Software Interfaces



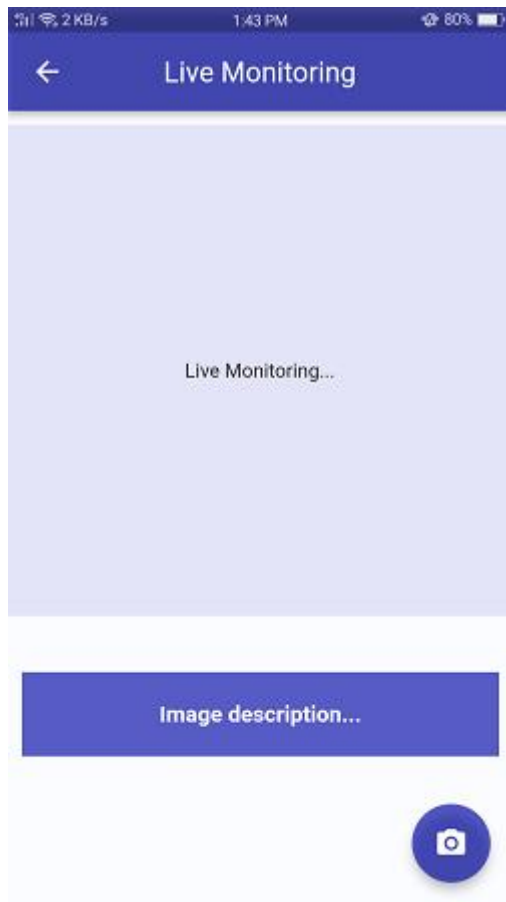
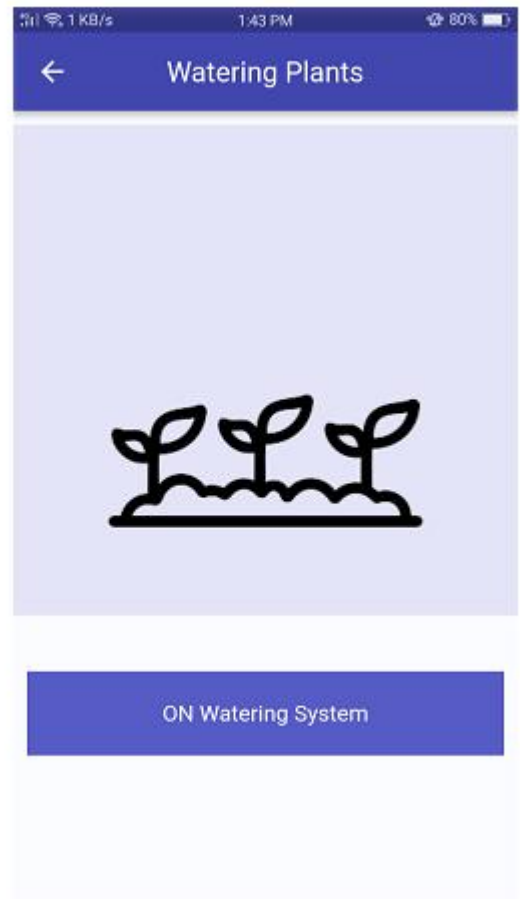


Figure 2. 3: Software Interface

2.3.4. Communications Interfaces

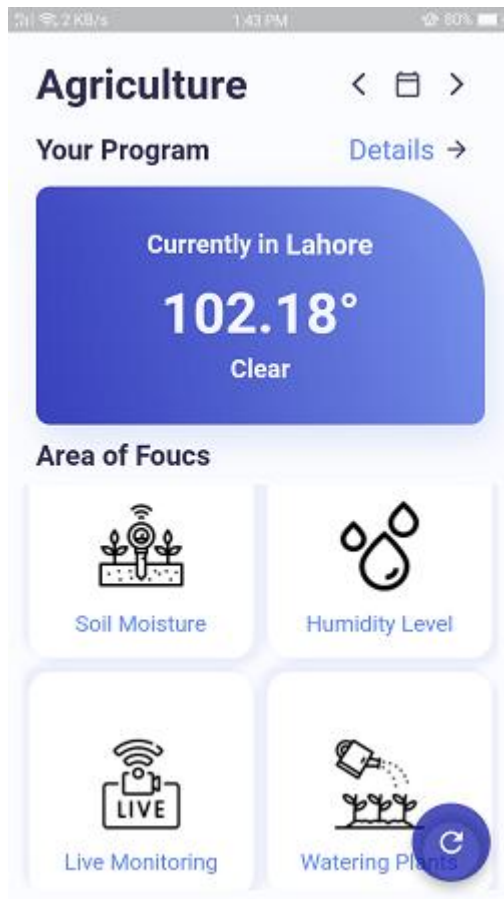


Figure 2. 4: Communications Interfaces

2.4. System Features

In system you'll perform the subsequent things such as:

- Find Moist Level
- Water the Plants
- Find Humidity Level
- Weather Forecasting
- Real-time Monitoring Field

2.4.1. System Feature 1

2.4.1.1. Description and Priority

This system can assist to farmer to are looking for out moist degree in soil, automatic water dripping, prognostication, checking humidity degree in environment, also monitoring the fields via gaining the zero time pics and videos of fields.

Top of listing is to are looking for out Moist Level in Soil.

2nd Automated Water Dripping

and so on. the most intention is to stop wasting water on daily.

2.4.1.2. Stimulus/Response Sequences

User just open software click on any module in utility like test Moist Level of soil then he get the result on display screen which is ship via the sensor in fields. So person can be advised the moist level in soil. is that the moist level is a smaller quantity or fields need water for plant life then just click on on_watering module the water motor in fields begin via water in fields.

2.4.1.3. Functional Requirements

REQ-SF1-1: Analysis of Soil

REQ-SF1-2: Weather Forecasting

REQ-SF1-3: Automatic Water Dripping System

REQ-SF1-4: Monitoring The Fields

2.5. Other Nonfunctional Requirements

2.5.1. Performance Requirements

The system performs the venture in given time not taking an excessive quantity of time to function single task. The verbal exchange between the devices, quickly switch statistics to each and every other. System is super-fast and reliable that different consumer can use it for his or her assist in difficult task.

2.5.2. Safety Requirements

You need to attempt to some security protection for machine in area additionally for device that talk with one any other from rain, animals etc. Also your system no longer detrimental for different stuff you ought to make sure of every single factor for safety.

2.5.3. Security Requirements

Your gadget need to be secure, no other character do attack and function changing in your machine to harm your fields. So there may be authentication procedure that no unauthorized individual can do participate with the system.

2.5.4. Software Quality Attributes

1. Analysis of Soil
2. Weather Information
3. Automatic Water Dripping System
4. Monitoring The Fields

2.5.5. Business Rules

Providing the fashionable work device can assist to farmer to are looking for out moist level in soil, automated water dripping, meteorology, checking humidity level in environment, also monitoring the fields via gaining the actual time pix and movies of fields.

2.6. Other Requirements

This system supporting him to watch the fields discover moist level in soil, automatic water dripping, prognostication, checking humidity level in environment, additionally monitoring the fields through gaining the essential time pictures and videos of fields.

This is the requirement of subject to produce full care as mom do for her child. If you full fill all the favored matters then the fields furnish correct effects like proper yield.

Chapter 3

Use Case Analysis

Chapter 3: System Analysis

3.1. Use Case Model

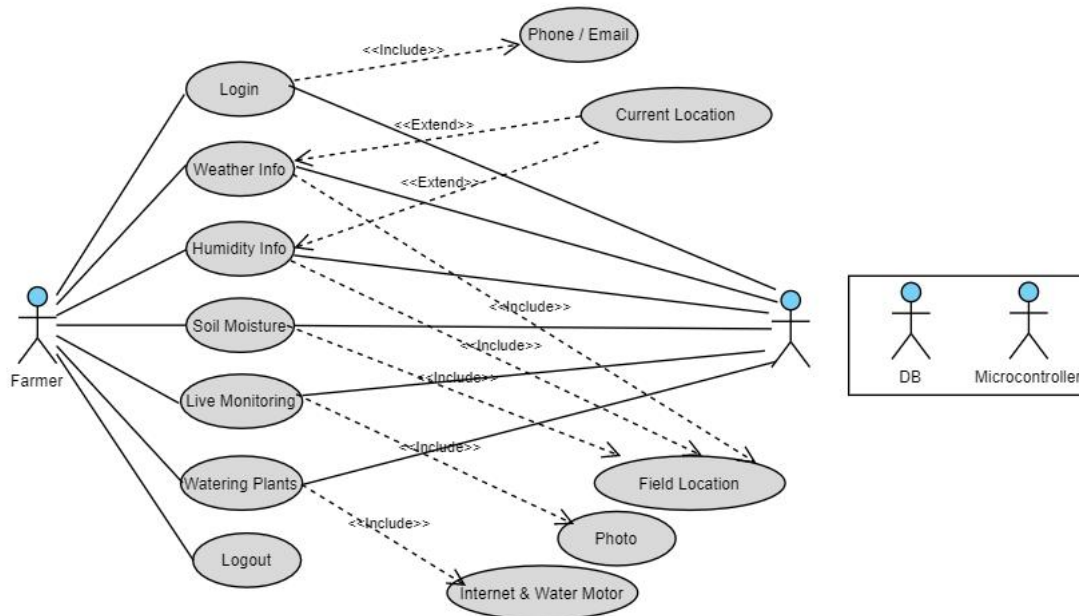


Figure 3. 1: Use Case Model

- Application person first sign up/ create account in the application.
- After signal in/ login user can function the performance such as discovering moisture extent in soil, detects the humidity degree in air, observe the sickness in the flowers and watering the plants.

3.2. Use Case Descriptions

We're talking about things on the net. it is viable to contact the sensor with a mobile software to perform a task. Start speaking between smart devices the usage of the net. These components work together kind of a human and supply higher effects than an individual's.

This gadget can help the farmer to cultivate the use of the most modern technology, which permits him to observe the dripping of water inside the fields, find the moisture degree within the soil, take a look at the moisture stage within the environment, forecast. Helps to predict, and monitors fields in real time.

Chapter 4

System Design

Chapter 4: System Design

4.1. Entity Relationship Diagram with data dictionary

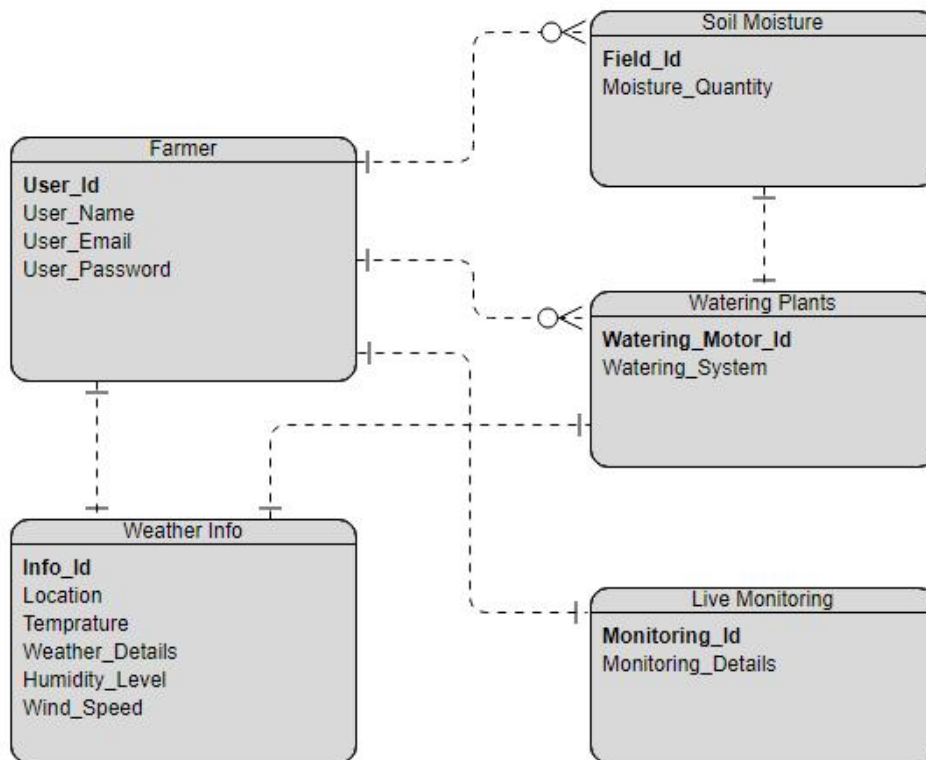


Figure 4. 1: Entity Relationship Diagram with data dictionary

- User sign up/ sign in, in the application using (email/ phone and password).
- User finding moisture quantity in soil.
- User can notice the humidity stage in air.
- User can realize the disorder on leaf.
- Watering the flora on simply single click on mobile application.

4.2. Class Diagram

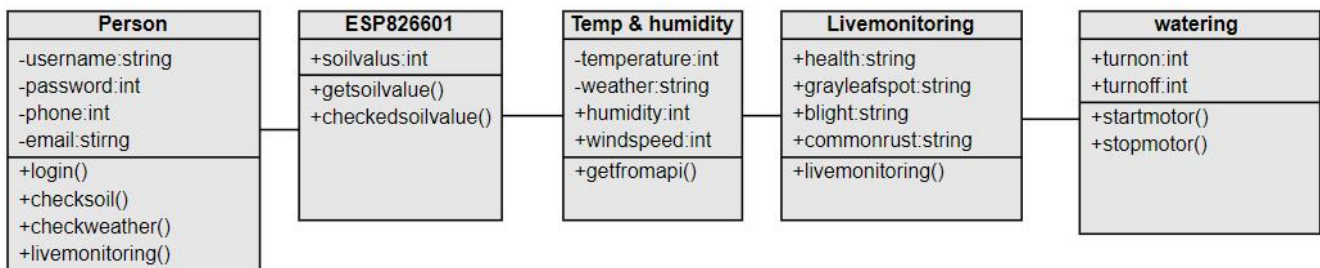


Figure 4. 2: Class Diagram

- User sign up/ sign in, in the application the usage of (email/ cellphone and password).
- Using ESP8266-01 discovering moisture quantity in soil.
- User can notice the humidity degree in air.
- User can observe the sickness on leaf.
- Using ESP8266-NodeMUC watering the flowers on just single click on on_cell application.

4.3. Sequence / Collaboration Diagram

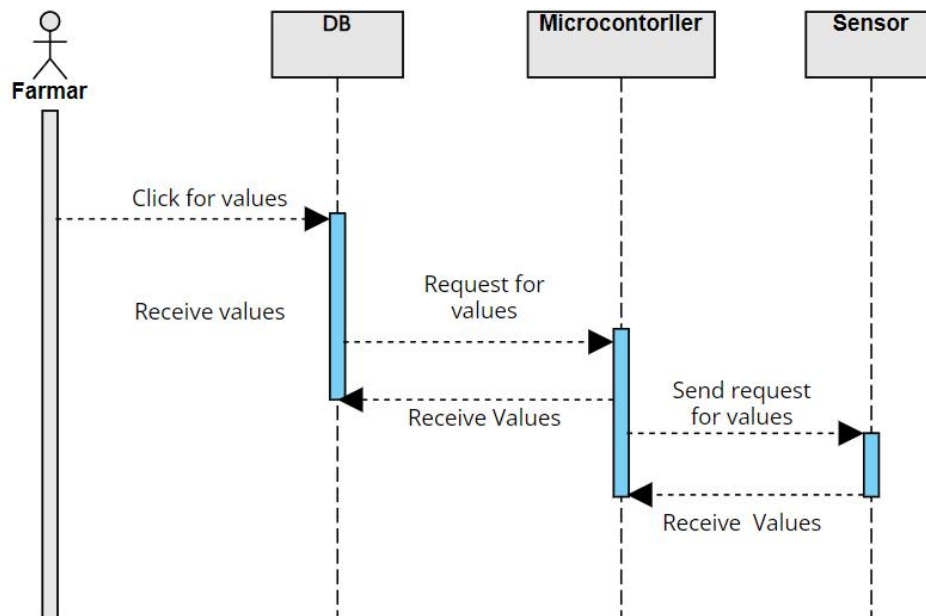


Figure 4. 3: Sequence / Collaboration Diagram

- User request DB to show the values of moisture volume in soil, temperature & humidity degree in air and watering the plants.
- Then DB request the microcontroller, and Microcontroller sends sensor records to DB.
- DB send the values to cellular application.

4.4. Activity Diagram

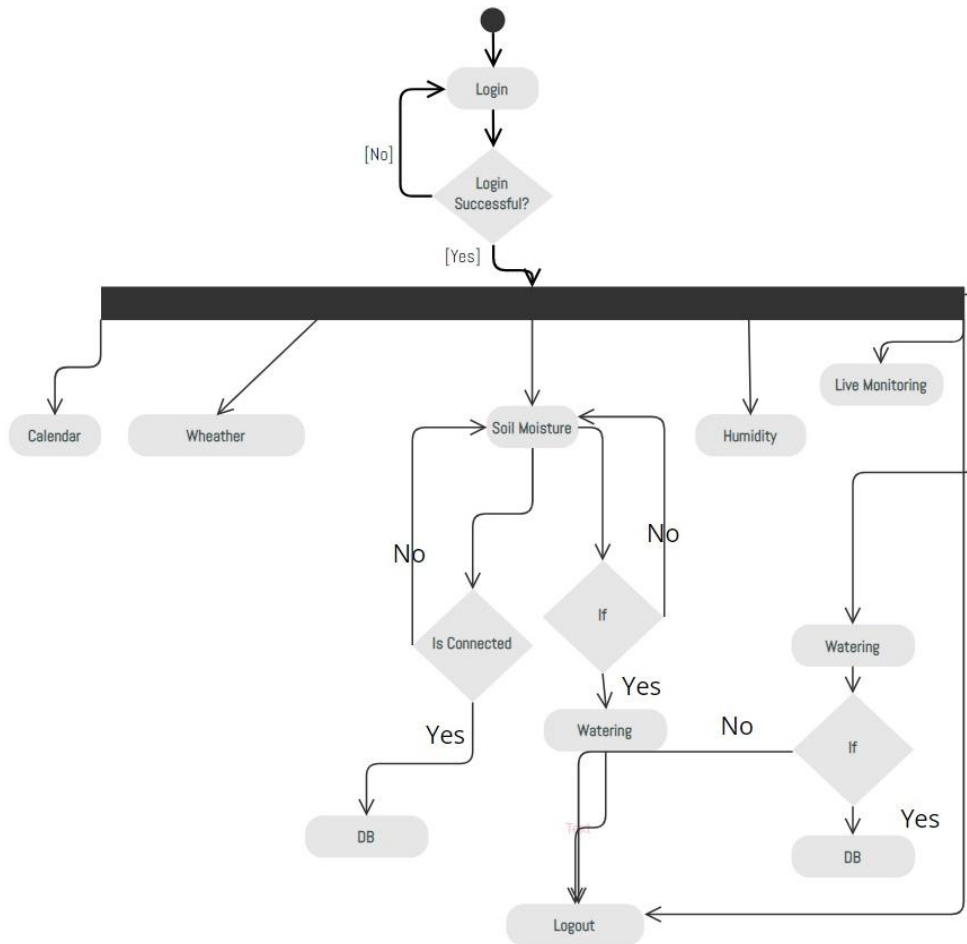


Figure 4. 4: Activity Diagram

- User sign up and signal in, in the software the use of (email/ cellphone and password).
 - o User can watch the records on calendar.
 - o User can watch climate records on application.
 - o Using ESP8266-01 finding moisture extent in soil.
 - o User can discover the humidity degree in air.
 - o User can detect the disease on leaf.
 - o Using ESP8266-NodeMUC watering the flora on just single click on on_mobile application.

4.5. State Transition Diagram

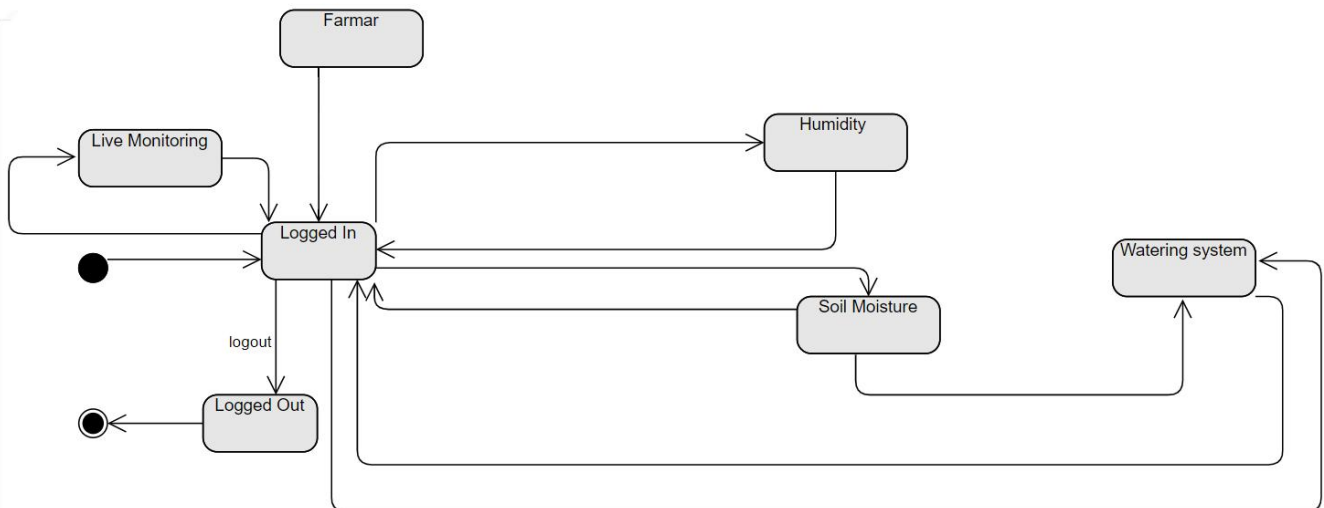


Figure 4. 5: State Transition Diagram

- Application consumer first signal up/ create account in the application.
- After sign in/ login user can operate the performance such as finding moisture volume in soil, detects the humidity degree in air, observe the sickness in the plant life and watering the plants.

4.6. Component Diagram

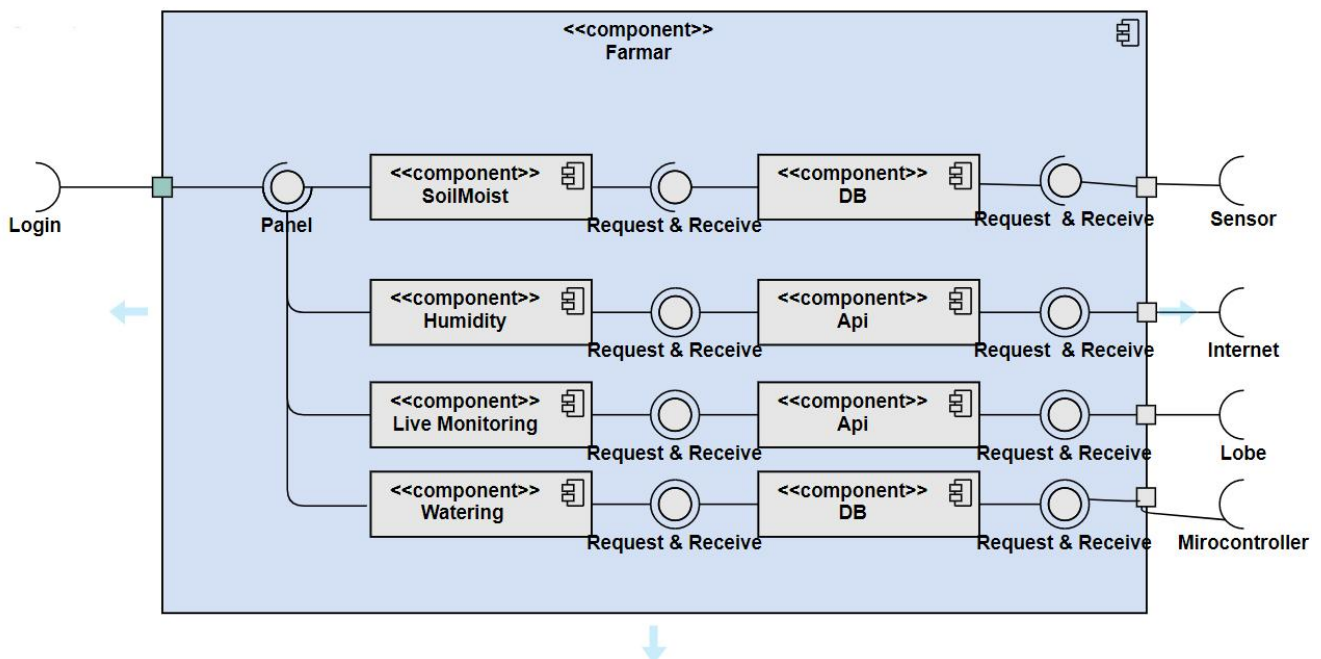


Figure 4. 6: Component Diagram

- User signal up and sign in, in the application the usage of (email/ cellphone and password).
 - o Using ESP8266-01 sensor finding moisture quantity in soil.
 - o User can notice the humidity degree in air the use of Weather API.
 - o User can become aware of the disorder on leaf using Lobe (Image Processing).
 - o Using ESP8266-NodeMUC watering the plants on just single click on cellular application.

4.7. Deployment Diagram

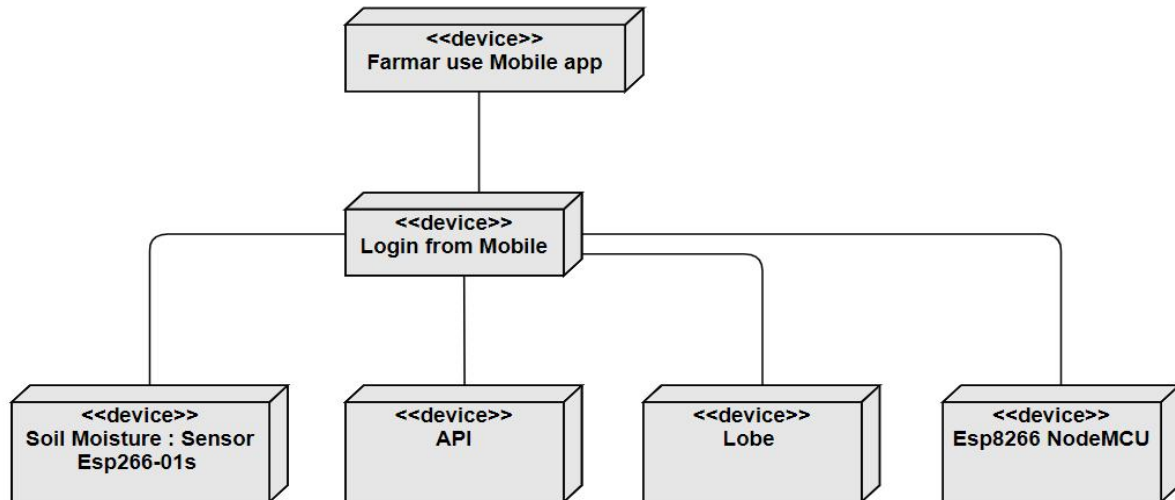


Figure 4. 7: Deployment Diagram

- User sign up and sign in the usage of (email/ smartphone and password), in the application.
 - o Using ESP8266-01 sensor finding moisture volume in soil.
 - o User can discover the humidity degree in air the use of Weather API.
 - o User can notice the disorder on leaf using Lobe (Image Processing).
 - o Using ESP8266-NodeMUC watering the vegetation on simply single click on on_mobile application.

4.8. Data Flow diagram

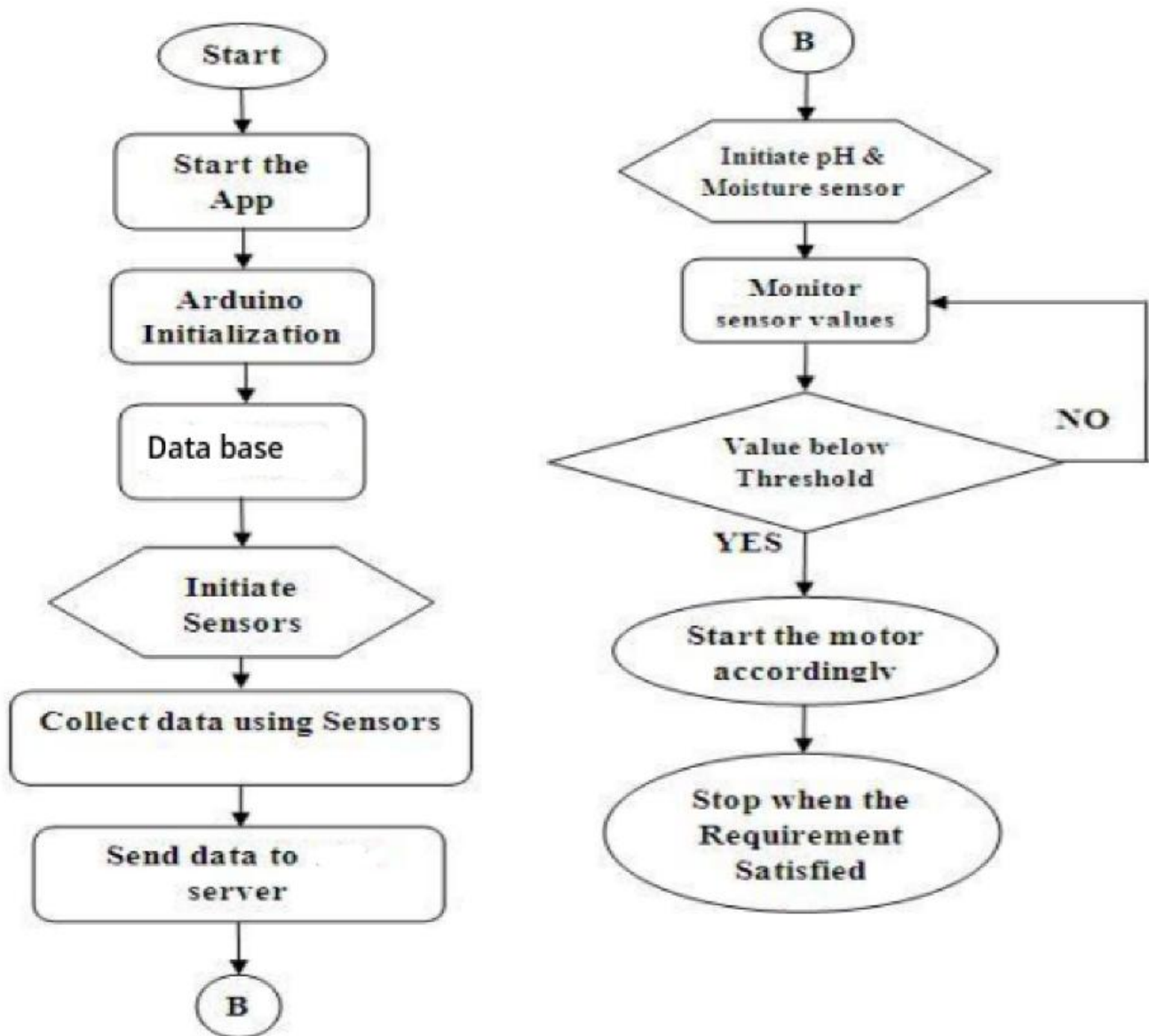


Figure 4. 8: Data Flow diagram

- Application person first signal up/ create account in the application.
- After signal in/ login user can perform the functionality such as finding moisture volume in soil, detects the humidity level in air, become aware of the ailment in the flora and watering the plants.

Chapter 5

Implementation

Chapter 5: Implementation

5.1. Important Flow Control/Pseudo codes

The gadget can assist farmers monitor soil moisture levels, irrigation systems, climate information, environmental moisture levels, and field pictures.

At the highest of the list is discovering the water degree inside the soil.

Second computerized watering system

and so on. the most goal is to quit water loss on a usual.

5.2. Components, Libraries, Web Services and stubs

1. Open weather map
2. 'dart:convert'
3. 'package:flutter/material.dart'
4. 'package:web_socket_channel/io.dart'

5.3. Deployment Environment

1. Android Studio / VS Code
2. Arduino IDE

5.4. Tools and Techniques

1. Android Studio / VS Code
2. Arduino IDE

5.5. Best Practices / Coding Standards

Display stay facts like temperature, humidity, and warmness index from the DHT11 sensor on the cellular app using NodeMCU (ESP8266). We've used a real-time Firebase database to transfer records from NodeMCU to the cellular app. Real-time Firebase Database is extraordinarily speedy for communication, so we use it to circulate live information on cellular app.

5.6. Version Control

1.1 this technique enables farmers to watch soil levels by using discovering soil moisture levels, mechanically dripping water, forecasting the weather, checking atmospheric moisture levels, and getting real-time snap shots and videos of the fields. can do.

Chapter 6

Testing and Evaluation

Chapter 6: Testing and Evaluation

Testing is a mechanism to assure nice of a product, system, or capability (e.g., right product, constructed right). To be effective, trying out can't show up solely at the quit of a development. It need to be addressed continuously throughout the entire existence cycle of development.

6.1. Use Case Testing

- **User Registration**

Table 6. 1 User Registration Use Case Testing

Agriculture Tech Solutions
Test Case ID: ATS_001
Test Priority: High
Module Name: System registration process
Test Title: Test the registration functionality of the system
Description: User has to register in order to get our system services. User must fill all columns and must provide all necessary data which is required to get register.
Pre-Condition: <ol style="list-style-type: none"> 1. User should have internet access 2. Download application from play store 3. Registration form should be working

Step	Test Steps	Test data	Expected Result	Actual Result	Status
1	Click for sign up		User get registration form	As expected	Pass
2	Provide username	example@gmail.com		Must use valid account	Pass
3	Provide Password	*****	Clear stage	Must use special character	Pass
4	Press register		User registered	User registered	Pass

Post Condition: User registered successfully and can easily login to the system.

- **Login**

Table 6. 2 User Login Use Case Testing

Agriculture Tech Solutions
Test Case ID: ATS_002
Test Priority: High
Module Name: System login screen
Test Title: Test the login functionality of the system

Description: Verify login with valid username and password
Pre-Condition: <ol style="list-style-type: none"> 1. User should have internet access 2. User has valid username and password 3. Login form should be working

Step	Test Steps	Test data	Expected Result	Actual Result	Status
1	Navigate to login page		User get login form	As expected	Pass
2	Provide valid username	example@gmail.com		Must use valid account	Pass
3	Provide valid Password	*****	Clear stage	Must use special character	Pass
4	Click on login button		User logged	User logged successfully	Pass

Post Condition: User is validated with database and successfully login to the account.
The details are logged in the database.

• Request

Table 6. 3 User Request Use Case Testing

Agriculture Tech Solutions
Test Case ID: ATS_003
Test Priority: High
Module Name: Generate request
Test Title: Test the request process
Description: Request is one of the main functionality of our system. It must be work properly like generating request area wise and must be able to generate request multiple time with cancelation option.
Pre-Condition: <ol style="list-style-type: none"> 1. User have to search for the required worker 2. Must have a task 3. Requesting process should be working properly

Step	Test Steps	Expected Result	Actual Result	Status
1	Soil Moist Level	User get accurate value	As expected	Pass
2	Weather Forecasting	Must show valid detail	As expected	Pass
3	Real-time Monitoring	Get accurate value	As expected	Pass

4	Water the Plants	User send the request	Tools start doing work	Pass
---	------------------	-----------------------	------------------------	------

Post Condition: User request generate and get required worker for his task and stored in database.

6.2. Equivalence partitioning

Input	Invalid Equivalence Partitioning	Valid Equivalence Partitioning
Id	Less than 1 digits	More than 1 to 6digits
Name	Less than 4 characters	More than 4 to 25 characters
Email	Less than 7 characters	More than 7 to 50 characters

6.3. Boundary value analysis

Accepts legitimate person email, name and password field to work on that device and excess of the characters or digits makes invalid and required digits or characters are legitimate whilst less than the required is also invalid.

- **Register**

Table 6. 4 Registration Boundary Value Analysis

Boundary Value Analysis of Email		
Invalid	Valid	Invalid
6 characters	7 to 20 characters	21 characters
Boundary Value Analysis of Name		
Invalid	Valid	Invalid
2 characters	3 to 20 characters	21 characters
Boundary Value Analysis of Password		
Invalid	Valid	Invalid
5 digits	6 to 16 digits	17 digits

- **Login**

Table 6. 5 Login Boundary Value Analysis

Boundary Value Analysis of Email		
Invalid	Valid	Invalid
6 characters	7 to 20 characters	21 characters
Boundary Value Analysis of Password		
Invalid	Valid	Invalid
5 digits	6 to 16 digits	17 digits

- **Request**

Table 6. 6 Request Boundary Value Analysis

Boundary Value Analysis of Moist Level		
Invalid	Valid	Invalid
Offline	Online	Cancel
Boundary Value Analysis of Weather Forecasting		
Invalid	Valid	Invalid
Offline	Online	Cancel
Boundary Value Analysis of Real-time Monitoring		
Invalid	Valid	Invalid
Offline	Online	Cancel
Boundary Value Analysis of Water the Plants		
Invalid	Valid	Invalid
Offline	Online	Cancel

6.4. Data flow testing

Data flow testing is a family of test techniques primarily based on deciding on paths via the program's control drift in order to discover sequences of events related to the reputation of variables or information objects.

The simple thinking in the back of this structure of testing, is to expose the coding errors and mistakes, which can also end result in to flawed implementation and utilization of the data variables or information values in the programming code i.e. records anomalies, such as:

- All the information variables, current in the programming code have been initialized or not.
- Data variables which are put into use, have been, priory initialized or not.
- If the initialized data variables, has been used, at least once, in the programming code.

So, whilst information glide checking out some undeclared variables shouldn't be the part of our project. It is better to be removed.

6.5. Unit testing

The unit testing was achieved after the coding phase. The cause of the unit testing was once to come across mistakes in the contemporary module, unbiased of the different modules. Some changes in the coding were accomplished in the course of the trying out phase. Finally, all the modules have been in my view check following backside to top approach, beginning with smallest and lowest modules and then testing one at a time.

- **Testing**

- Checked all the validations on every field.
- Wrong inputs in the fields of the forms.
- Database testing.
- Checked error e.g. syntax error.

- **Benefits of Unit Testing**

- Codes are more reusable. In order to make unit trying out possible, codes need to be modular. This capacity that codes are less difficult to reuse.
- Unit checking out will increase self-belief in changing/ maintaining code.

6.6. Integration testing

Integration trying out is a degree of software checking out the place character devices are blended and tested as a group. The motive of this degree of checking out was once to expose faults in the interplay between built-in units. Integration testing is an important phase of the testing cycle as it makes it less complicated to discover the defect when two or more modules are integrated.

- **Integration Test case**

Verifying the interface link between the login web page and the home web page i.e. when a user enters the credentials and logs it must be directed to the homepage.

6.7. Performance testing

Performance testing is the manner of deciding the velocity or effectiveness of a computer, network, software program, program or device.

Software Performance checking out is type of trying out function to decide the overall performance of gadget to main the measure, validate or verify excellent attributes of the machine like responsiveness, Speed, Scalability, Stability under range of load conditions. It is very necessary to interact with the system.

- **Processor Usage** - amount of time processor spends executing non-idle threads.
- **Memory use** - amount of bodily memory accessible to techniques on a computer.
- **Disk time** - quantity of time disk is busy executing a examine or write request.
- **Bandwidth** - suggests the bits per 2d used by a network interface.
- **Private bytes** - number of bytes a technique has allocated that cannot be shared amongst other processes. These are used to measure memory leaks and usage.
- **CPU interrupts per 2d** - is the avg. wide variety of hardware interrupts a processor is receiving and processing each second.
- **Network bytes whole per 2nd** - rate which bytes are dispatched and received on the interface along with framing characters.
- **Response time** - time from when a person enters a request till the first character of the response is received.
- **Throughput** - rate a pc or community receives requests per second.
- **Amount of connection pooling** - the number of consumer requests that are met by means of pooled connections. The greater requests met with the aid of connections in the pool, the higher the performance will be.

6.8. Stress Testing

Stress checking out is used to test the steadiness & reliability of the system. This test commonly determines the machine on its robustness and error managing below extremely heavy load conditions. The purpose of stress trying out is to analyze the behavior of the system after failure. For stress trying out to be successful, system have to display fantastic error message while it is beneath excessive conditions.

- **Tool for Stress Testing**

Stress Tester: This tool offers substantial evaluation of the android application performance, gives results in graphical format, and it is extremely handy to use. No high-level scripting is required and gives precise return on investment.

Chapter 7

Summary, Conclusion and Future Enhancements

Chapter 7: Summary, Conclusion & Future Enhancements

7.1. Project Summary

The backbone of Pakistan's economy is agriculture, which relies closely on its predominant crops. Farmers are using usual strategies of farming management which ends up in loss of inputs and reduced yield thanks to incorrect kinds and amounts of fertilizers inside the area which relies upon on soil evaluation and plant production. Modern drip irrigation structures extensively decrease water consumption in contrast to trendy methods.

7.2. Achievements and Improvements

We advance solutions for real-world problems. this is regularly our best achievement. We graph the appliance that farmers use for agriculture. Modern drip watering structures considerably decrease water consumption in contrast to typical methods.

7.3. Critical Review

It is very difficult for us to function functionality the use of contemporary technology. Do what the farmer does. Getting live information from the surroundings where plants are developing is for better plant growth.

7.4. Lessons Learnt

We find out how to supply quite a number superior technologies to human pirates. a way to create a communicating, bypass data and build a link between things on the internet which implies Internet of Things (IOT).

7.5. Future Enhancements/Recommendations

We will use photograph processing, laptop gaining knowledge of at some point of this challenge in order that the assignment decides and performs the work in step with the given facts which it receives from the surroundings using sensors.

Appendices

Appendix A: User Manual

Appendix A: Appendix Title

In system you'll be able to perform the subsequent things such as:

- Find Moist Level
- Water the Plants
- Find Humidity Level
- Weather Forecasting
- Real-time Monitoring Field

Appendix B: Administrator Manual

1. Find Moist Level in Soil.
2. Find Weather condition.
3. Automated Water Dripping.

And so on. the most goal is to prevent wasting water on everyday.

Appendix C: Information / Promotional Material

System can help to farmer to search out moist level in soil, automated water dripping, prediction, checking humidity level in environment, also monitoring the fields by gaining the 000 time images and videos of fields.

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Reference and Bibliography

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Figure 8. 1: Plagiarism Report