

FYP SRS

Final Year Project
Software Requirement Specification
For
Smart Monitoring And Prediction System of Agriculture
(BSCS)
By

S#	Name	Registration #/Roll #/Section	Mobile #	E-Mail
1.	Rana Muhammad Zaryab Khan	FALL-2018-BSCS-339/Sec H	0303-0422594	ranazaryab000@gmail.com
2.	Muhammad Muaz	FALL-2018-BSCS-320/Sec H	0301-6894878	mmuaz320bscs.h@gmail.com

Supervised by:

Mr. Mirza Shahriyar Baig

_____ (Signature)



Department of Computer Science
Lahore Garrison University

Table of Contents

1. Introduction.....	Page 3
1.1 Purpose	
1.2 Document Conventions	
1.3 Intended Audience and Reading Suggestions	
1.4 Product Scope	
2. Overall Description	Page 4
2.1 Product Perspective.....	
2.2 Product Functions	
2.3 User Classes and Characteristics	
2.4 Operating Environment	
2.5 Design and Implementation Constraints	
2.6 User Documentation	
2.7 Assumptions and Dependencies	
3. External Interface Requirements	Page 7
3.1 User Interfaces	
3.2 Hardware Interfaces	
3.3 Software Interfaces	
3.4 Communications Interfaces	
4. System Features	Page 11
4.1 System Feature 1	
4.2 System Feature 2 (and so on)	
5. Other Nonfunctional Requirements	Page 12
5.1 Performance Requirements	
5.2 Safety Requirements	
5.3 Security Requirements	
5.4 Software Quality Attributes	
5.5 Business Rules	
References	Page 13

1. Introduction

1.1 Purpose

The purpose of this project is to help the farmers and the people related to the field of agriculture and also the concerns regarding to this project are really considerable with all the parameters such as Economy of country, population, developing technologies, etc. Here are some benefits/purposes listed that how this project can handle real time issues and why agriculture related project is chosen as well.

- **Eco-Friendly:** The product is eco friendly in a sense we are not going to use any technology which can harm our environment.
- **Less Work:** By Using this system our farmers have to do less amount of work and take more benefits, as they can monitor their fields by using technology at anywhere and anytime.
- **Overcome Demand:** As with the increase of population the demand of production is increased with time. So, by using this system they can increase the production rate as well.
- **Labor Cost:** By using this system the labor cost is decreased as they do not need any labor for monitoring, they can do it by their own using technology.

1.2 Document Conventions

Using Standard SRS format with:

Main Heading Size = 16

Sub-Heading = 14

For Content Text Size = 12

Text Font = Times New Roman

Alignment = Justify

Line Spacing = 1.5

In Footer = Right Hand Side Page Number

SRS Document is Chapter Wise.

1.3 Intended Audience and Reading Suggestions

Our intended audience are testers, developers, coders, farmers, agricultural managers, and business people in farming sector and also the people who want to make their gardens well organized, well monitored and safe. This report can be read in a manner that for the persons who just want to know about the product they can start by first reading the overview of the document for this they have to read the overall Description section. And For the Developers and Testers it is better to read throughout the document from Overall Description to Non-Functional Requirements.

1.4 Product Scope

The scope of the project is to build a system which will help the people related to the field of agriculture to monitor their field in an easy way without going to fields. With the help of Arduino and Sensors to measure temperature, water level etc. it's helpful for people to monitor their fields with just their smart device.

And also, with an eye catching featuring of the system to predict which crop is best to plant in their field will help them to increase the productivity, and to reduce the production demand.

2. Overall Description

2.1 Product Perspective

Smart Monitoring and Prediction system of Agriculture is a self-Contained Product. As this is the fact that our country's population is majorly related to the agricultural sector. And also, the GDP of our country is based on the revenue generated from agriculture sector. So, it's a good thing to work in the main field which directly or indirectly connected with the stability of government. By automating and using the technology in this sector will increase the productivity, income and reduce the supply chain gap and also helps the farmers to grow well.

2.2 Product Functions

The functionality of the Application is to provide the complete requirement guidance to the Farmer Such as:

- Temperature and Humidity Level.
- Soil Moisture Level.
- PH Level.
- Weather Conditions and their effects.
- Pests' information.
- Predicts which Crop is best for their field etc.

Alerts the Farmer about the need of field.

Allow them to monitor from anywhere and anytime.

- Eco-Friendly.
- Cost Effectively.
- Increase productivity to overcome the demand.

2.3 User Classes and Characteristics

Considering the main purpose of the project for some classes and how they may be able to use them are as follows.

Most Important classes are:

- Farmers: They will use this system to find out the requirements of their fields such as water, temperature, soil chemical requirements etc.
- Developers: They are the person who are responsible for the development of the product and also for the future maintenance.
- Business People: These are the people who invests or provides the machinery and other required things, they can also use the system to check the requirements of the fields.

Less Important classes are:

- Agricultural Managers: The people who provide guidance to the farmers if they need it. They help them in the prediction phase.
- Villagers: These are the people who use the system less or just to check the condition of the land.

2.4 Operating Environment

The operating environment for this project will be your land or your garden where you want to set up your system to monitor your land. As you need the product to give you updates when you want so you simply need a real time environment for it to operate in.

Major Hardware Components of our system contains ARDUINO, and Sensors and Environment for testing.

Software Components Includes: ARDUINO IDE (for Arduino coding), Android Studio (for App).

2.5 Design and Implementation Constraints

As we know nothing can be so perfect everything has some limitations so we also have to consider them.

Some of the constraints which may affect our product are mentioned below:

- Lack of infrastructure.
- Less Secure.
- May be costly for applying on large scale.
- May be complex for someone who never use technology before.
- May be affected by surrounding.

2.6 User Documentation

A small user manual will be provided that will help to setup the interface and shows the basics of how the software operates.

User Manual: A bit of do and don't for the product.

2.7 Assumptions and Dependencies

As if we talk about the system the system doesn't contain any faults or we can say don't have any limitations in it. The limitations or assumptions we assume are may be due the factors who are going to use our product. It is possible that the factor of lack of knowledge may affects (farmers or the agricultural persons are assumed to have good knowledge about the application or system) Or may be somehow the factor of affordability may arise. And our system doesn't depend on any other project so there are no dependencies.

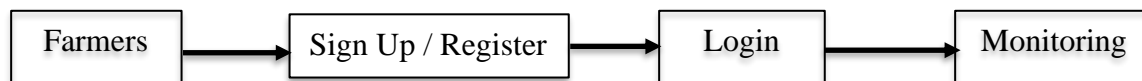
3. External Interface Requirements

3.1 User Interfaces

User interfaces are the way through which end users interact with our system. This should be our app's layout through which anyone can interact with our System. The GUI of the application is user friendly. It includes Farmers Interface which can also be used by any other user.

Farmers Interface:

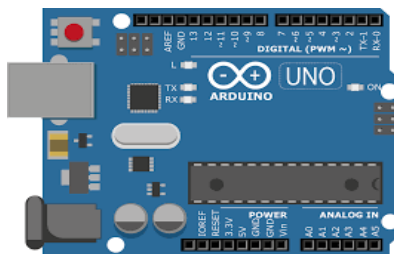
As farmers or the persons related to the field of agriculture are our main concerns and main audience of the system. The interface should be as simple as possible so farmers can understand it easily. User can sign up first by giving its details. Then login into the system and monitor their fields.



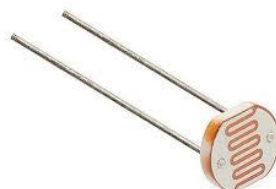
3.2 Hardware Interfaces

Hardware interface contains:

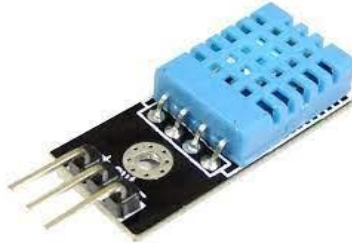
ARDUINO: Arduino Uno is an Open-source Micro Controller Board which can be integrated into a variety of electronic projects such as home automation, smart irrigation etc. Arduino can be interfaced with other Arduino boards, LEDs, Sensors etc. Here is the pictorial representation of Arduino:



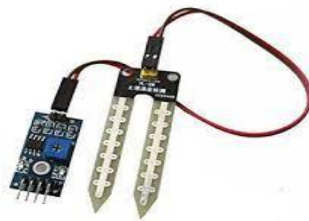
LDR Or Photoresistor: This Sensor is used to measure the amount of sunlight received on the plot of land.



Temperature and Humidity: Temperature and Humidity are major factors in deciding which crop will best to cultivate and begin to produce. So to measure this we are going to use temperature and humidity Sensor (DHT11).



Soil Moisture Sensor: It is very important to know about the moisture level of soil for every farmer because it is not good to give excessive or less amount of water to land. For this purpose we are going to use the Soil Moisture Sensor to sense the moisture level of Soil continuously and send data to the system.



Electrochemical Sensor (NPK): It is good to test soil for nutrient and fertilization, to increase the productivity its important to know the quality of soil for better results. For this purpose we use Soil NPK sensor to check the quantity of nitrogen, phosphorus and potassium in soil and also what is needed to soil to produce better.



Air Quality Sensor: As we know fields/crops needs fresh air to grow, if there are toxic gases present in the air that will harm our lands also. So, to detect the presence of toxic gases in the air we are using the air quality sensor (MQ135).



Rain Sensor: The Rain Sensor can detect the rain falling on it and generates the signal, then the system will sense it and tells the user about it.



Barometric Pressure Sensor (BM180): By using this we can measure the atmospheric pressure and using this pressure data we can predict the weather for short term.



3.3 Software Interfaces

- **OS:**

Windows: We are using the windows operating system for all ARDUINO Uno Coding part, for the configuration purpose and also to make the Android application of our system for user interface. We will also use this to create all diagrams and other presentations as well.

- **Language:**

C: C is a basic language of processors and controllers such as Arduino etc. So all the coding related to sensors would be done in this language.

Java: Java is very secure, reliable language which makes our system more reliable and reusable. In Android studio we are using the java language to design and develop our application.

- **Mobile/Desktop application:**

Android Studio: For the development of our application we are using android studio.

Arduino IDE: For the coding of Arduino circuit and for the sensors coding we are using this Arduino IDE.

3.4 Communications Interfaces

For communication purpose we are going to use the MQTT protocol to send alert messages to the user.

4. System Features

4.1 Registration/Login:

Farmers can register and login to system with great ease. And the credentials of each user should be maintained separately.

4.2 Monitoring:

Monitoring of the lands will be done with ease. Measurement of all parameters such as temperature, moisture level, humidity and all other parameters should be precise for better monitoring.

4.3 Fetching of Data:

All the details of the parameters will be fetching from the land with the help of sensors, is the major feature of the system. Through this fetched data all other processing should be done.

4.4 Prediction of Crop:

With the help of this system, we will be able to predict which crop is better for the field. So with this feature productivity of the land will increase.

4.5 Alerting the User:

When any of the parameter is disturbed such as, water level goes down or water level increases it will notify the user about it.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Data retrieving speed of the system should be fast as possible from the sensors, delays may cause wrong results. Based on the capabilities on current android systems, performance of app will not be an issue. Systems App will work on any android device without slowing down the functions. The features will be very simple, specific and not overly detail so that it will be easy to understand and run. The system will continuously fetch the data from sensors and keeps update the user about it.

5.2 Safety Requirements

Our Agriculture monitoring system will not be harmful for the environment, do not damage any other thing and also our app will not affect the user's device in any case. It will be safe to use and free from any type of virus. It will not disturb or slow down the functioning of other applications. User will be satisfied with the performance of the app. App will be safe to use on Android mobiles.

5.3 Security Requirements

All the information and record stored in the app will remain private. No unauthorized person can change or update the record or data stored in app until unless information owner himself allows an unauthorized person to use his ID to change the information. Personal information given to the app while registration will be kept private and also with this the coding part of the system should also be kept private and secure.

5.4 Software Quality Attributes

The features of the system will be easy to learn and understand. The sensor device in fields will sense unusual activity happening there and will notify it on app immediately so that the precautionary measures will be make as soon as possible. Sensor device will tell us about weather changes, pest attack on fields, soil fertility rate, moisture content, temperature regulation. According to the notifications on app the field staff will get vigilant and make suitable changes and precautionary measures within time. Software working quality will be ensured and will not damage in less time.

In terms of usability, this agriculture sensor device will also be suitable in any weather such as, windy and rainy seasons.

- Availability.
- Correctness.
- Flexibility.
- Usability.
- Maintainability.

5.5 Business Rules

Agriculture monitoring app is used by farmers and field workers. This app is way much better than manual procedures. It is less time consuming. This is designed according to the modern needs. It tells about rain detection, soil moisture content, pests, and temperature variations etc.

References

- **“A Survey on the Role of IoT in Agriculture for the Implementation of Smart Farming”**. By Shoaib Farooq, Adnan Abid, Kamran Abid 2019.
- **“Rural Development of Pakistan with IoT”**, By Muhammad Usman, Wajid Ali 2019.
- **“Agriculture monitoring system”** By N. M. Z. Hashim, S. R. Mazlan ... in October 2015.
- **“IOT based SMART FARMING SYSTEM”**. By Yasir Faheem, Mrs. Taniya Sarkar in December 2018.
- **“Smart Agriculture Using IOT Multi-Sensors”**. By Mai Minh Man, Tan-Y Nguyen in 23 August 2019.
- **“Smart Agriculture Using Internet of Things”**. By Ibrahim Mat, Ahmad Nizar Harun, Ismail Mat Yousaf in 21 Nov 2018.