EO ANALYTICS

Space-Tech Farming

SYSTEM ANALYSIS AND INVESTIGATION

SMART
AGRICULTURE
EO analytics brings you advanced technology to monitor your farm...

Functional Requirement

The functional requirement section will include specifics of actions performed on each screen, as well as system and output descriptions. The Famer are the major actor in the system, while the Administrator is the secondary actor.

FARMER

- The user should be able to register into the system.
- The user should be able to sign in.
- The user should be able to reset password.
- The user should be able to view Farm performance (Crop Health, Crop Yeild and Moisture)
- The user should be able to make near real time monitoring.

ADMINISTRATOR

- The user should be able to block a user.
- The user should be able to delete a user.
- The user should be able to upload a module database.
- The user should be able to view modules for Crop health, Crop yield. Soil Moisture

Analysis of the Requirements

Login

Description: The Farmer or the administrator enters their login and password in order to gain access to the system during this operation.

Input: Username and password are entered by the user.

Process: The system determines whether a user with the provided username already exists in the system and, if so, whether the password provided is correct. The user gets sent to the system's landing page.

Output: Login was successful.

Logout

Description: The user is done using the system and wants to sign out of it.

Input: The user selects the logoff button.

Process: The system ends the users’ session, and they are redirected to the login page.
Output: N/A

My Farm

Description: This operation allows the user to measure the current state of their Farmers Crop Health, Crop Yield and Soil Moisture

Process: The system calls the models NDVI(Crop Health) and NDWI (Soil Moisture) and Image Classification (Crop Yield)
Output: Satellite Images for Crop health and Soil moisture. Classification Statistics for Yield

Statistics

Description: This operation allows the user to view historic data of their Farmers Crop Health, Crop Yield and Soil Moisture

Process: The system calls the models NDVI(Crop Health) and NDWI (Soil Moisture) and Image Classification (Crop Yield)

Output: Satellite Images for Crop health and Soil moisture. Classification Statistics for Yield

Weather

Description: This operation allows the user to view historic and current data of the weather at their location.

Process: The system calls the weather API from OpenWeather

Output: Weather graphs and Charts

Weather

Description: This operation allows the user to view current trending Agric-News

Process: N/A

Output: Blog Posts

No-Functional Requirements

These are requirement that specifies how the system performs a certain function

- **SCABILITY** – Can the system handle growth? Can the system accommodate more features and functionality as time goes on?
- **USABILITY -** The system has a good user interface and will be easy for people to interact with it.
- **SECURITY – All** communications between the system's data server and clients will be encrypted.
- **AVAILABILITY- The** system will be up and running all time reliable in all the services it will provide.

Constraints

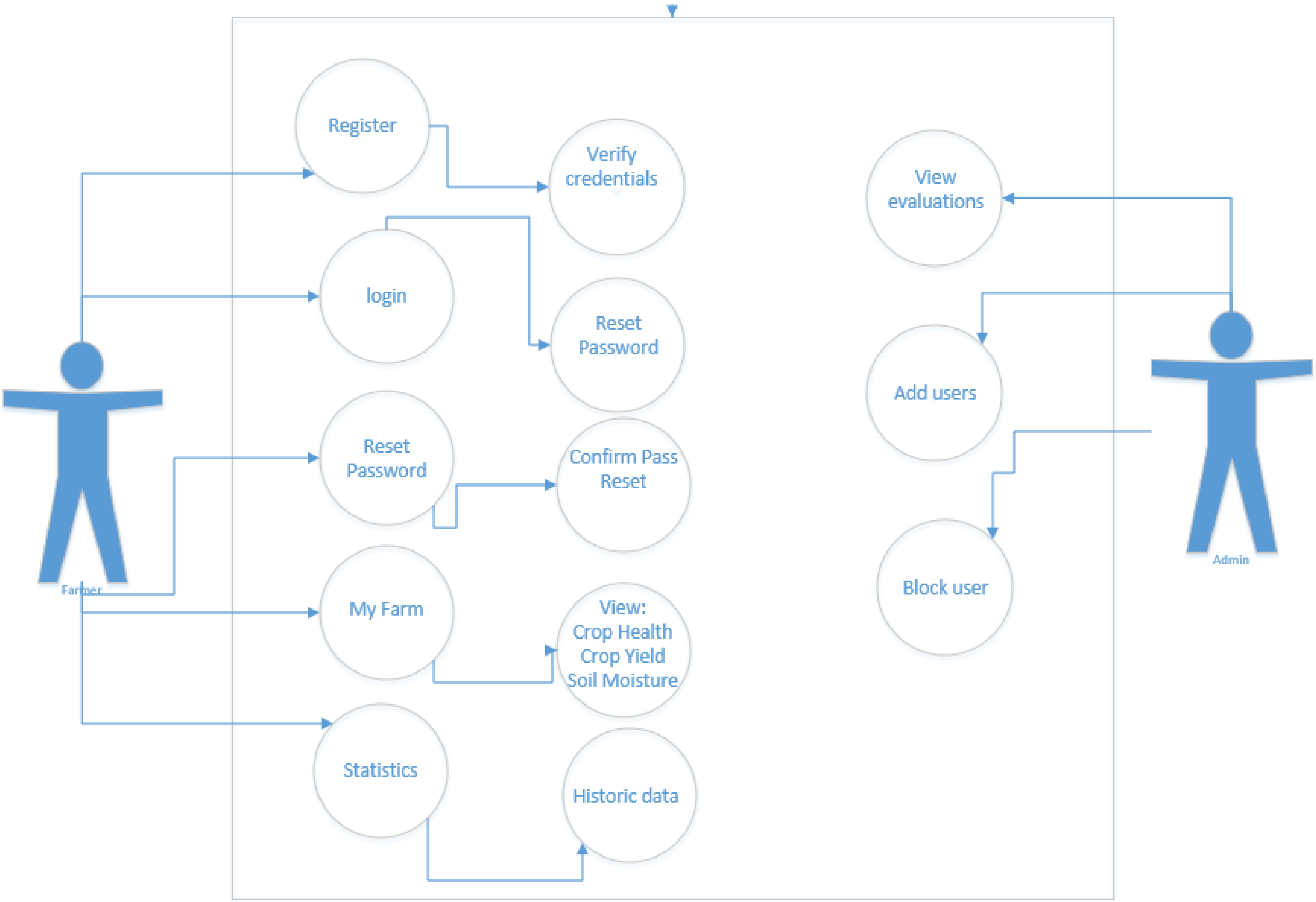
- Username and passwords will be used for identification.
- The admin will have access to user activity.
- Registered users will be only ones to use the system.

Satellite Image Analysis

The process of systemically applying statistical and/or logical approaches to explain and demonstrate, condense and recap, and assess satellite data is referred to as Satellite Image Analysis. The goal of Satellite Image analysis is to characterize the images in the database and to illustrate any possible links between data items in the database. Case studies, class diagrams and activity diagrams are all useful tools.

Initial Use Case

A use case is a written description of how users will perform tasks on the system. It outlines, from a user's point of view, a system's behaviour as it responds to a request. Each use case is represented as a sequence of simple steps, beginning with user's goal and ending when goal that goal is fulfilled. The use case diagram helps one understand how user might interact with the system engineered. The design of this use case helped define and organize requirements. The use case has 2 actors' The Farmer and admin.



Detailed use case descriptions

USE CASE	Register
PRIMARY ACTOR	Famer
DESCRIPTION	A Famer registers to use the system by entering their details on the form provided and submitting afterwards.
PRECONDITIONS	Username and passwords must be available
FLOW OF EVENTS	1. Customer clicks the signup button. 2. Customer is redirected to signup form. 3. Customer click the submit button. 4. Customer signup is successful.
ALTERNATIVE FLOW OF EVENTS	1. Username or password already exists. 2. Invalid email address. 3. Password mismatch.
POST CONDITION	Account successfully created.

USE CASE	Sign In
PRIMARY ACTOR	Famer, Admin
DESCRIPTION	Famer and admin must sign into the system using their username and password.
PRECONDITIONS	Username must be valid.
FLOW OF EVENTS	1. Actor must enter the username and password in log in form. 2. The actor then presses the sign in button. 3. If valid, the actor is directed to main page or the appropriate landing page for that actor.

ALTERNATIVE FLOW OF EVENTS	1. Actors enters invalid or password and an error appears. 2. Access to the internet/Wi-Fi is interrupted in the process of the order update.
POST CONDITION	Sign-in successful.

USE CASE	Make Measurements
PRIMARY ACTOR	Famer
DESCRIPTION	A Famer makes Crop Health, Soil Moisture and Crop Yeild Measurements by pressing no the My Farm button on the homepage and the module measurements will be displayed to the farmer
PRECONDITIONS	Farmer must be logged in.
FLOW OF EVENTS	1.Farmer clicks the My Farm button. 2.Farmer land on the toggle page. 3.Farmer view s module measurements.
ALTERNATIVE FLOW OF EVENTS	1. Customer session ends.
POST CONDITION	Farmer view measurements

USE CASE	View Statistics
PRIMARY ACTOR	Farmer
DESCRIPTION	A Farmer views historic data of their Farm
PRECONDITIONS	Farmer must be logged in.

FLOW OF EVENTS	1.In the homepage, Farmer selects view Statistics button. 2.Farmer can toggle between the options
ALTERNATIVE FLOW OF EVENTS	1. Poor connectivity to the internet
POST CONDITION	Farmer Views historic Data.

USE CASE	Reset password
PRIMARY ACTOR	Farmer
DESCRIPTION	Farmer can reset password.
PRECONDITION	Farmer must have an active account.
FLOW OF EVENTS	1. Farmer selects change password button on mobile application or website. 2. Farmer is sent confirmation for change of password. 3. Farmer can login with new password.
ALTERNATIVE FLOW OF EVENTS	4. Staff account is not active.
POST CONDITION	Password changed successfully.

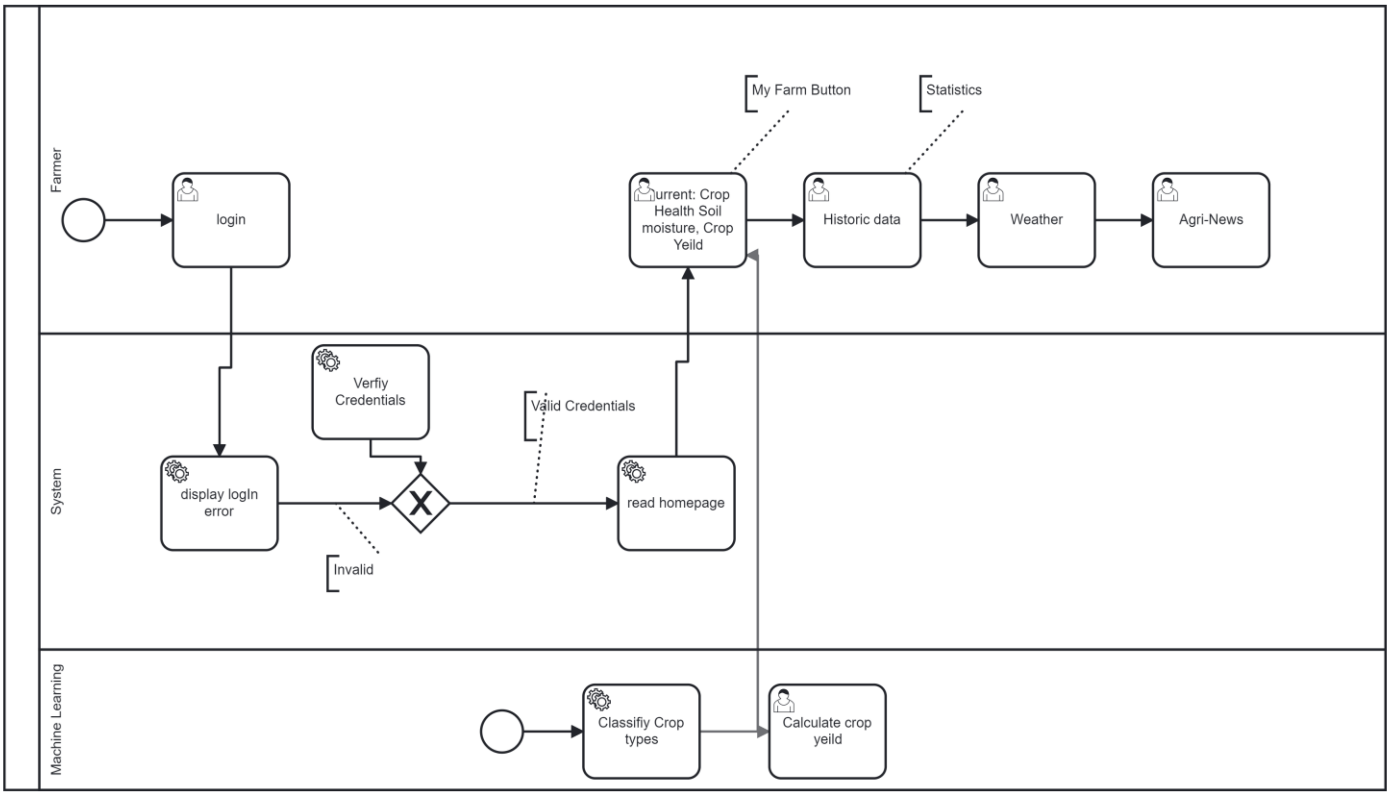
USE CASE	Block user
PRIMARY ACTOR	Admin
DESCRIPTION	Admin blocks user.
PRECONDITION	Admin must have access to the website and be logged in.

FLOW OF EVENTS	1. Admin selects block users' button on mobile application. 2. Admin is redirected to the website. 1. Admin views all users. 2. Admin selects a user to block
ALTERNATIVE FLOW OF EVENTS	3. Poor connectivity interrupts the redirection.
POST CONDITION	User blocked successfully.

USE CASE	Delete user
PRIMARY ACTOR	Admin
DESCRIPTION	Admin deletes user.
PRECONDITION	Admin must have access to the website and be logged in.
FLOW OF EVENTS	2. Admin selects delete users' button on mobile application. 2. Admin is redirected to the website. 4. Admin views all users. 5. Admin selects a user account to delete.
ALTERNATIVE FLOW OF EVENTS	6. Poor connectivity interrupts the redirection.
POST CONDITION	User account deleted successfully.

Activity Diagram

An activity diagram is a behavioural diagram; it depicts the behaviour of a system. An activity diagram portrays the control flow from a start point to a finish point showing various decision paths that exist while the activity is being executed.



Input and output requirement analysis

The mobile application and website will require user input for interaction and in response the system will produce outputs.

Input requirement analysis

Users are required to interact with the system and for interaction to take place, users must register in the system. The process of registration and login requires users to input their credentials into the system. To make measurements and view data users are required to upload files.

Output requirement analysis

Once the user has submitted the forms for registration and log in. Acknowledgements will be sent to by the website. The actors will be to able to see notifications about the progress of the requested services and will be able to get feedback. The website will issue appropriate error messages when input entered is invalid.

Interface requirement analysis

The system must be able to facilitate the user interaction with the mobile application together with the website. There are different stages of interactions, starting with the Farmers viewing files, making measurements up until they receive results. Any user of the system should find it easy to interact with the website and mobile application, from Farmers to the admin. The staff should be able to aid in the rendering of services efficiently. Thus, the interface should be able to accommodate every user and their interface requirements.

The users of the application are:

- Farmer
- Admin

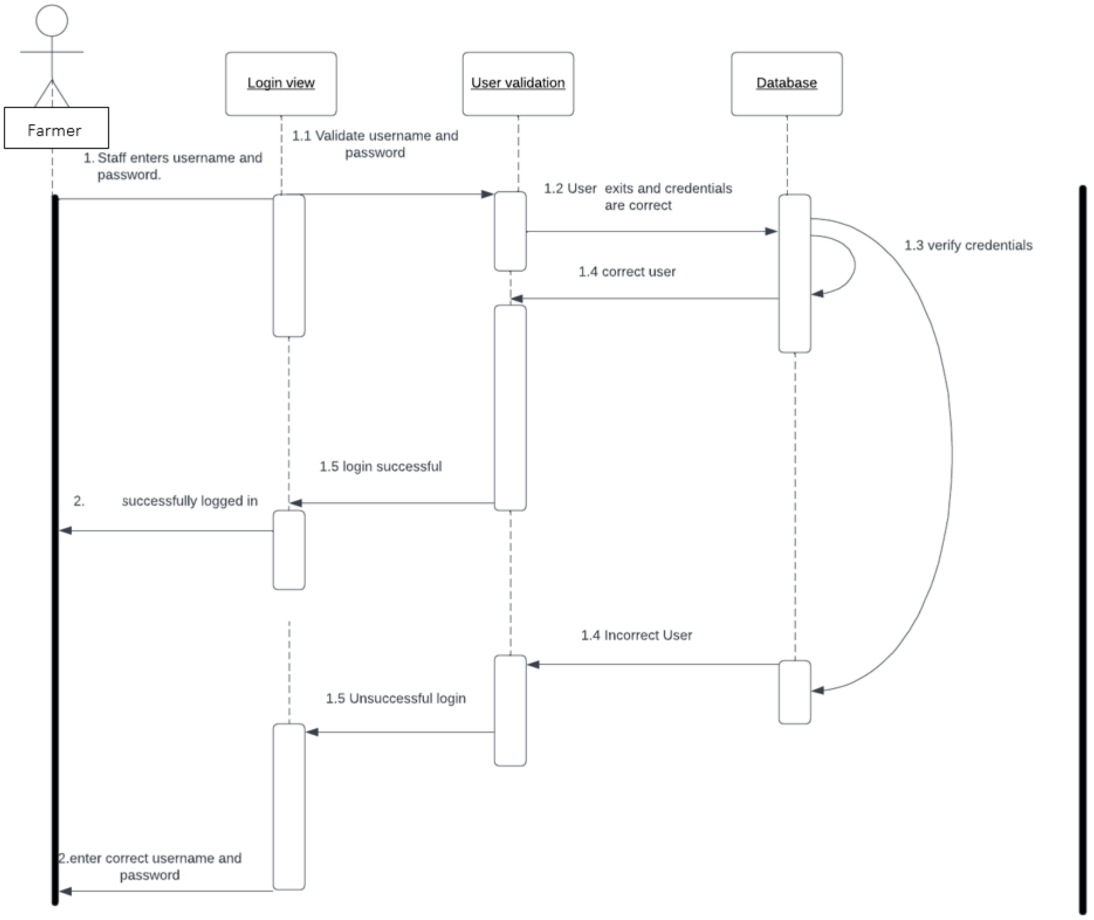
❖ The mobile application and website must have a graphical user interface that is easy to use and eye catching.

❖ The mobile application and website must be able to guide the user on what actions to perform during the process of performing any use case.

Dynamic Model Specification of the System

Sequence Diagram

A sequence diagram shows, as parallel vertical lines (lifelines), different processes or objects that live simultaneously, and as horizontal arrows, the messages exchanged between them, in the order in which they occur. It shows the interaction logic between the objects in the system in the time order that the interactions take place.


Login view
User validation
Database
Farmer
1. Staff enters username and password.
1.1 Validate username and password
1.2 User exits and credentials are correct
1.3 verify credentials
1.4 correct user
1.5 login successful
2. successfully logged in
1.4 Incorrect User
1.5 Unsuccessful login
2.enter correct username and password

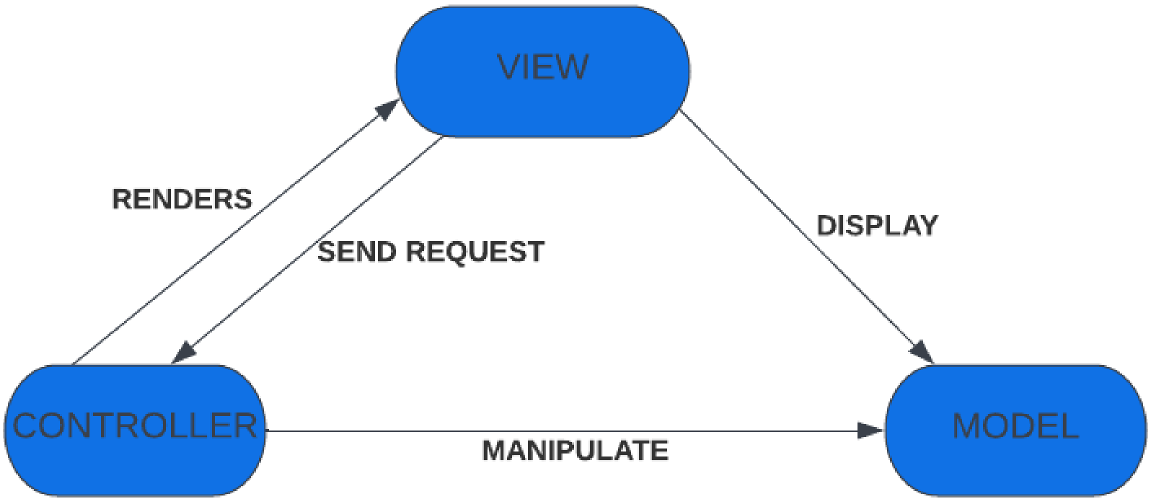
DESIGN

Functional design specification

Architecture

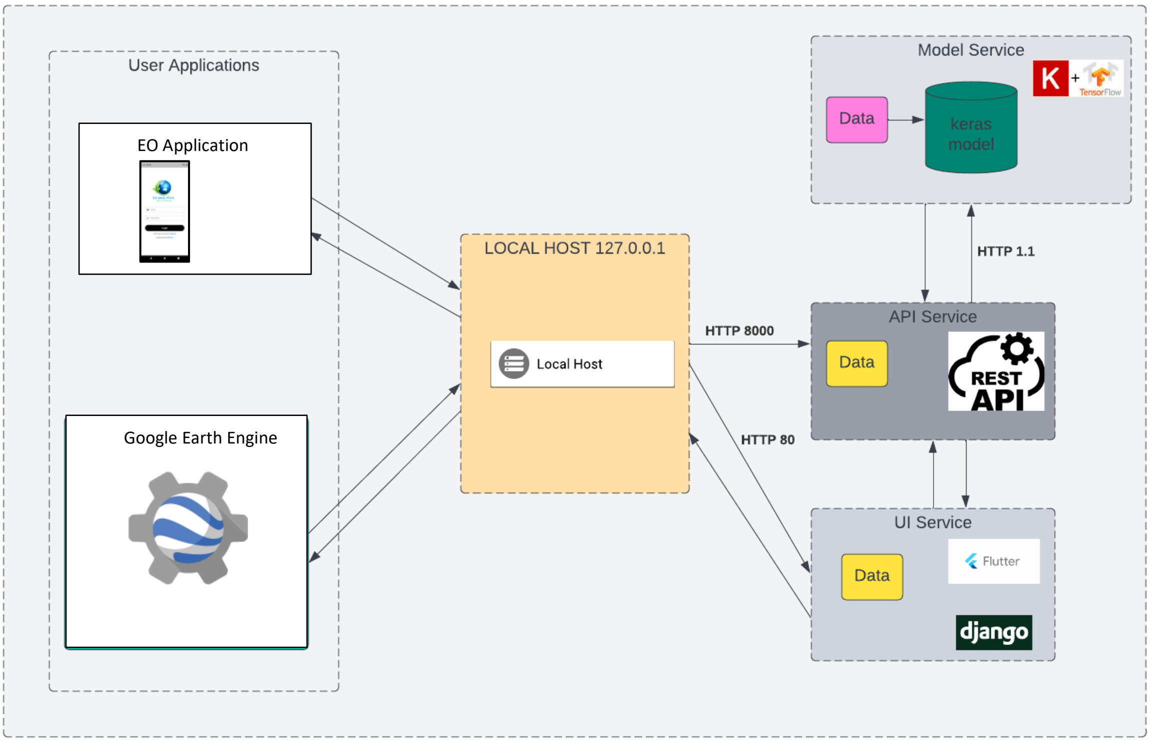
Model View Controller is the system architecture that will be employed. The system architecture specifies how a system is organized, its components, and how they interact with one another and with the environment. It is made up of three parts: the model, which handles business logic, the view, which displays data from the model to the user, and the controller, which provides a logic layer that updates the views when the model is changed. The model does not have a direct link to the view’s component, as seen in *figure 16* All model changes are made via the controller, which subsequently updates the views to reflect the changes. Any action taken by the user through the view is sent to the controller, which updates the model to reflect the user's changes.

Figure 16 Django MVC



The diagram below depicts a high level MVC architecture of the fraud prediction system.

figure 17 fraud prediction system Architecture



The above diagram basically shows how the user manipulates the prediction model via the controller (web application and mobile application), which updates the view (User interface).