



Agri-Smart Solutions using Android Application

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Abstract: Agri-Smart Solutions is an all-inclusive software program created to improve and optimise the effectiveness of contemporary farming methods. By offering a centralized platform that integrates numerous aspects of farm management, such as crop production, maintaining livestock, and financial tracking, this initiative seeks to meet the varied needs of farmers.

This app maintains the database of the farmers information like ,Name, Email, Mobile Number, Farm Area, Farm Location, Password and then they have to choose Crop, City, Market and Soil for registration With the help of this app Farmers can be able to analyze the data of the market and they can be able to decide which crop they have to harvest at this moment to make more profit .It helps farmers to store their available stock data in the app itself .It will show the care for different crops .also it will show the weather forecast for the upcoming days so on that basis farmer can decide its next sowing .It will suggest the pesticides to farmers for their crops .

With the help of this product farmers are able to analyze the overall data of the market to make the right decision which helps them to earn more profit and reduce their losses, as well as stabilize market prices somewhat

This software implements Java at the backend, Firebase for maintaining the database, Google map for location detection system, Google weather API for weather forecasting Android Studio for developing app.

Keywords: Agri-Smart solution, Financial Tracking, Crop Production optimization, Profit Maximization, Market Stabilization

I. INTRODUCTION

Agriculture is not just a means of producing food but also the backbone of civilization and a fundamental element of human survival. It plays a crucial role in the economic development, environment sustainability, and social stability. Agriculture is a cornerstone of human civilization, it's importance cannot be overstated, and it is essential to ensure its long-term viability and resilience.

Since, agriculture plays such an important role in our lives, it is very necessary that we manage agriculture very properly, efficiently and in a future optimized way. In today's advanced generation things have become somehow easier and it is possible to manage the agriculture system.

Here we come in the picture to provide the farmers with all the help they need on their fingertips, our cutting-edge solutions aim to improve efficiency, sustainability, and productivity in the agriculture sector. With a deep understanding of the unique challenges faced by farmers, we are dedicated to creating scalable, data-driven, and environmentally friendly solutions.

We aim to empower farmers to make informed decisions and optimize their operations. Through our project, we strive to foster a more sustainable farming industry, ensuring food security and environmental stewardship. We are excited to embark on this journey and look forward towards creating a brighter, more efficient agriculture system

OBJECTIVES

- 1.Enable farmers to conveniently store their stock data within the app.
2. Farmers analyze market data to maximize profit by deciding which crop to harvest.
- 3.Provide care guidance for various crops.
- 4: Display upcoming weather forecasts.
- 5 .Provide pesticide recommendations for crops



II. LITRATURE SURVEY

1.1 E-farming based application of agricultural products from farm to customer

The aim of the E-Farming application covered in this article is to improve agricultural product marketing by promoting communication between farmers, dealers, users, and administrators. It highlights how crucial website development is for clearly conveying the services and goods provided, highlighting special features, and gaining the confidence of potential clients. Through the use of technology in agricultural activities, e-agriculture is emphasized as a potential source of income production and economic growth for rural communities. The problems with the current system highlight the difficulties small farms have in satisfying the demands of terminal market purchasers, including those related to volume, timing, quality, and delivery specifications. The system requirements cover the use of Tomcat, Windows, Java, J2EE, and the Netbeans IDE for program development .The document's reference list offers information on web-based recommendation systems for farmers, e-agriculture prospects for Indian farmers, and contemporary farming methods.

Overall, the paper emphasizes the value of effective marketing techniques for agricultural the advantages of website creation for expanding one's audience, and the promise of e-agriculture for fostering long-term, sustainable growth in the industry.

1.2 Smart Fertilizer Recommendation system

The study highlights the significance of smart farming technologies in contemporary agriculture to solve crop quality issues such as nitrogen levels and soil depletion .It draws attention to the shortcomings of the systems already in place for recommending fertilizer and emphasizes the importance of taking into account other environmental elements like rainfall and sunshine .Adoption of smart agricultural technologies is hampered by high costs, growers' training requirements, and data security issues .Future applications of fertilizer recommendation systems appear promising when combined with precision agriculture and cutting-edge tools like satellite imaging, drones, and sensors .The suggested framework aims to improve productivity and transparency in the agricultural supply chain by incorporating mobile applications for farmers, cloud-based data storage, and analytics tools .In an effort to give farmers individualized advice, the research presents an algorithm that determines the appropriate fertilizer based on soil samples, crop information, weather data, and historical records .In order to maximize crop growth and boost agricultural operations' efficiency, the article addresses Internet of Things (IOT) applications in agriculture with a particular emphasis on wireless sensor networks and crop growth models .Fertilizer recommendation systems are made more accurate and efficient by utilizing a variety of machine learning techniques, such as Support Vector Machine (SVM) and XG Boost Classifier.

In order to help choose the right fertilizer type based on crop characteristics, the dataset used for fertilizer recommendations includes information on crop traits and related fertilizer recommendations .All things considered, IOT, sensors, AI, and smart farming technologies are critical to modern agriculture's efforts to maximize environmental effect, cut costs, and increase crop yields.

1.3 Crop Recommendation System using Machine Learning

The research highlights the significance of agriculture in India as well as the difficulties farmers have, including debt and decreased productivity, underscoring the demand for effective crop recommendation systems .To improve agricultural practices and crop yield estimates, machine learning methods such as Naïve Bayes, Decision Trees, Support Vector Machine (SVM), Random Forest, and XG Boost are used.

The main goals of the project are to forecast agricultural yields, suggest crops based on soil properties, and increase crop production using cutting-edge machine learning methods. Various algorithms like Decision Tree, K-Nearest Neighbour (KNN), Random Forest (RF), and Neural Networks (NN) are employed to classify crops accurately based on different parameters .

The research highlights the significance of agriculture in India as well as the difficulties farmers have, including debt and decreased productivity, underscoring the demand for effective crop recommendation systems .In particular, the Support Vector Machine (SVM) is emphasized for its contribution to increased crop categorization and recommendation system accuracy by locating a hyper-plane that efficiently divides various groups.



1.4 Data Analytics for crop management : a big data view

Digital agriculture (DA) improves farming methods and decision-making processes by utilizing big data principles. Big data analytics can be effectively adopted by the shift to DA, which presents fresh prospects for investment and effective methods for crop management. This change offers farmers useful knowledge on how to maximize agricultural growth while reducing environmental effect, which encourages scientific research and creative approaches to problem-solving. tremendous data has a tremendous impact on agriculture, especially on agricultural yield analysis and monitoring.

Based on past sensor data, climate information, and satellite images, a variety of machine learning algorithms are used for prediction modeling, including Support Vector Regression (SVR), K-Nearest Neighbour (KNN), and Artificial Neural Networks (ANN). Farmers can increase output, make well-informed decisions, and adjust to shifting environmental conditions thanks to these technology. In data analysis for agricultural, classification techniques are essential because they help achieve goals related to protection, detection, prediction, and classification. In situations where there is a lack of annotated data or uncertainty, clustering analysis provides an additional way to support classification investigations. The practical application of big data analytics in agriculture is demonstrated by the use of technologies such as Decision Trees (DT) and Convolutional Neural Networks (CNN) for crop yield prediction and categorization from satellite images.

Overall, by offering data-driven insights, streamlining resource management, and strengthening decision-making procedures, the incorporation of big data principles in digital agriculture transforms farming methods. The agriculture industry could undergo a significant transformation with the potential to handle complex problems related to crop production and environmental sustainability through the integration of new technologies and data analytics.

III. METHODOLOGY

The Methodology for the Agri-Smart Solutions involves the following steps:

1.Needs Assesment : The costs at vegetable markets are not consistent, as we have observed. We noticed that the farmers are unable to find daily updates on market rates. Furthermore, farmers keep their maintaining physical warehouse data presents challenges due to its format. Farmers find it challenging to pay attention to impending weather reports. Many farmers become confused by clickbait when looking for pesticides and crop care products. Advertising

2.Objective Definition :

- Farmers are able to determine which crop to harvest right now in order to maximize their profits by analysing market data .
- farmers can benefit from having their available stock data stored within the app.
- It will demonstrate how various crops are cared for. The weather forecast for the next few days will be displayed.
- It will advise farmers to use pesticides on their crops.

3.Platform and Technology Selection:

As Agri-Smart Solutions is an android based application we have opt for android studio to develop this application which is programmed in java and compiled by java jdk we have used firebase for storing data dynamically

4.Data Collection and Integration:

we have used volley library of github from which openweather api is used for displaying weatherforecast for market rates we have used commodity online web page for finding daily market rates

5.User Interface:

this app is user friendly and easy to communicate the UI is designed in xml file of android studio in which user can interact with different features through different tabs without any interaction

6.Development process:

For the development process we have maintained the waterfall model to execute the task as per the given process The Waterfall Model is a linear and sequential software development methodology where progress is seen as flowing steadily downwards through phases like a waterfall. The key phases include requirements, design, implementation, testing, deployment, and maintenance.



7.Features and Functionality:

- Individual profile management for all kind of users.
- Registration data handling for all users.
- Market daily rates and weather data management.
- Market requirement and availability of product.
- Information pages should be dynamic so that user and administrator can view page easily

8.Testing Procedures:

- Testing a farming app is crucial to ensure its functionality, reliability, and usability.
- we have used black box testing to test the app and created different test cases to check the proper functionality of the app

9.Security :

It provides proper security and encryption using firebase authentication to the user user gets verification mail after successful registration

IV. CURRENT SYSTEM

This application is specially designed for farmers, so they can check daily market rates and decide which crop to grow to earn more profit. Farmers will get to know the daily weather report in the app itself. They can also store and maintain their stock availability in the warehouse, so they no longer need to keep the stock data in physical format.

They can check the harvest rate after sowing crops and also get to know how to care for the specified crop. This will suggest some pesticides to the farmer and help them earn more profit.

SYSTEM DESIGN

A. SYSTEM ARCHITECHTURE

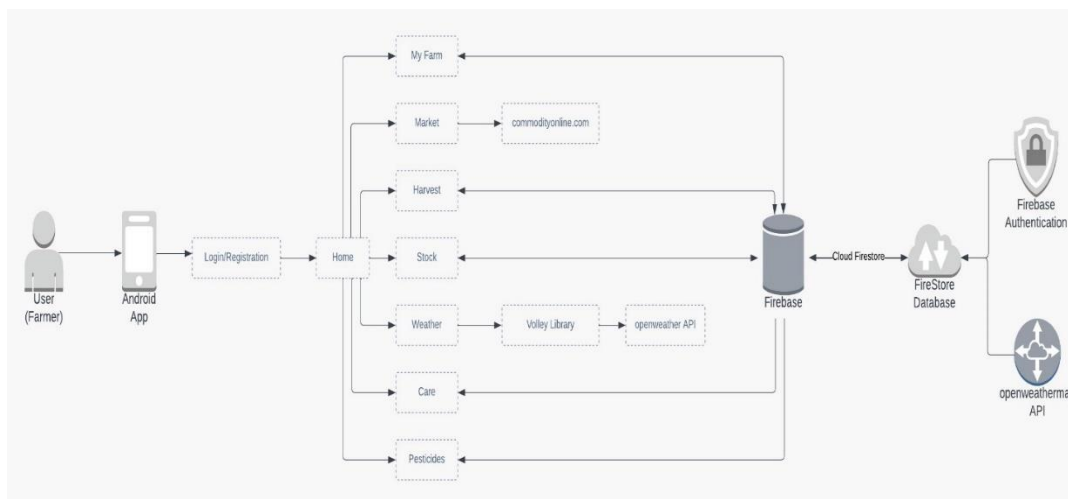


Fig 1-system architecture

Our app requires total 4 main components to run first is firebase database, firebase authentication, weather API and commodityonline.com website. After opening the app user will see first login or registration page which works on firebase database and firebase authentication system after login they will redirect to home page which is static page there they will see several options to visit. In the app there are 3 activities except login and registration which uses firebase database for reading and writing purpose “My Farm, Harvest, Stock”. Market activity directly redirect user to web page called as “Commodity Online” which give proper information about daily vegetable market rates. Then comes 3 rd type of activities which only reads data from database “Care and Pesticides”. Now comes last type of activities which is API based activity, this activity requires weather API’s “Weather Activity”. Firebase directly communicates with firebase firestore and it store location data into database



B. DATA FLOW DIAGRAM

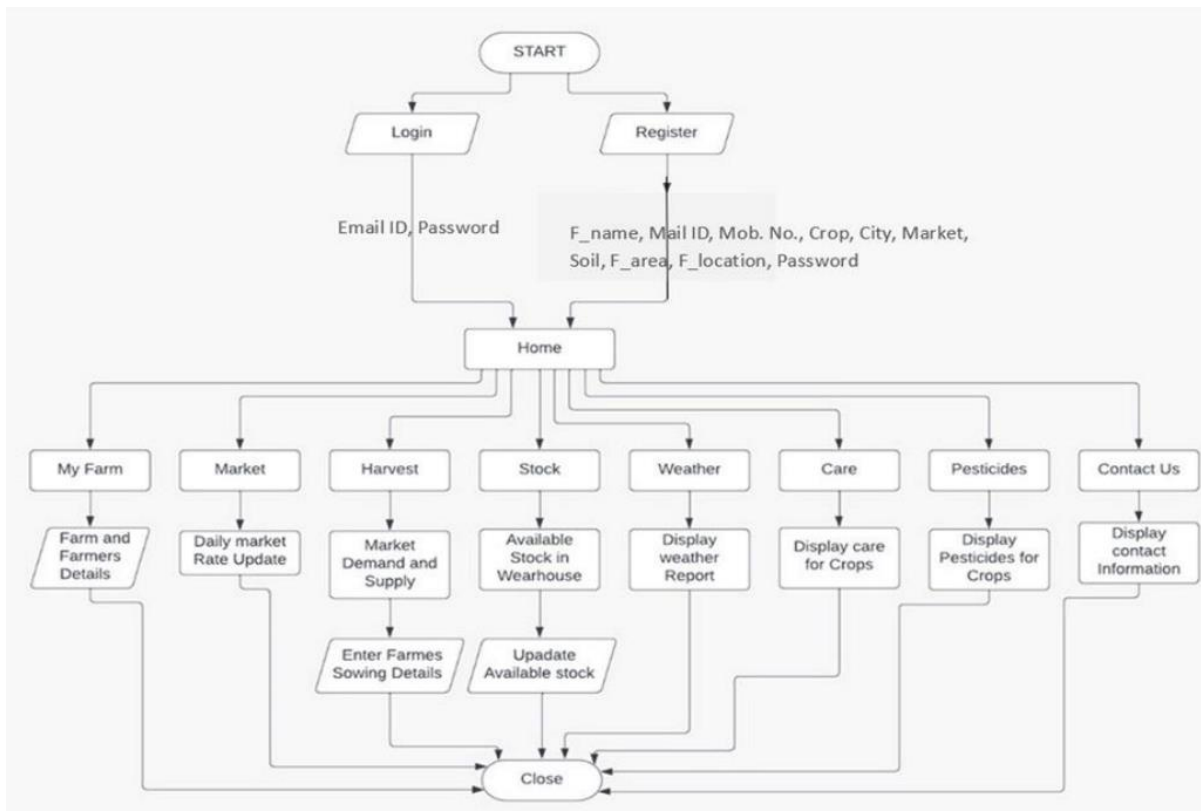


Fig 2- Data flow diagram

This diagram shows the data flow of the Agri-Smart solutions app.

From which user can register and login at initial stage and then can access all the tabs as per requirement

Android Studio :

- The official integrated development environment (IDE) for creating Android apps is called Android Studio. It offers an extensive collection of tools for creating, evaluating, and debugging Android apps. These are a few of Android Studio's main features:
- **User Interface:** To make the development process easier, Android Studio includes a simple user interface. It comes with a code editor, a visual layout editor, and numerous project management tools.
- **Code Editor:** To develop Android apps, Android Studio offers support for the Java, Kotlin, and C++ programming languages. Features like code completion, instantaneous error checking, and sophisticated debugging tools are included with the code editor.
- **Visual Layout Editor:** Using this editor, developers may drag and drop components onto the screen to construct the user interface for their apps. For creating app layouts, it offers a WYSIWYG (What You See Is What You Get) interface.
- **Emulator:** A robust emulator built into Android Studio enables developers to test their apps across a range of virtual devices, each with a different screen size, resolution, and Android version.
- **Built-in Gradle Support:** Android Studio builds, tests, and packages Android apps automatically using the Gradle build system. For project configuration, it provides extension and flexibility.
- **Rich Plugin Ecosystem:** To improve its usefulness, Android Studio supports a large number of plugins. The IDE can be made to include extra tools and capabilities by using these plugins.
- **Android SDK Manager:** The Android SDK Manager is a tool included with Android Studio that lets developers download and manage system images, other tools needed for app development, and Android SDK components.



- Version Control System Integration: Version control systems like as Git are easily integrated with Android Studio, facilitating project management and teamwork for developers.
- Performance Profiler: To find areas for optimisation and improvement, developers can utilise the integrated performance profiler to assess the performance of their apps.
- Integrating Android Studio with Firebase: Google's Firebase is a feature-rich mobile development platform. Numerous features, including real-time database access, cloud functionality, authentication, and more, are provided by Firebase.
- Instant Run: One of the features of Android Studio is Instant Run, which lets developers immediately observe how changes to their code affect an application that is currently running without having to restart it completely.
- To support the most current versions of the Android platform and best practices for development, Android Studio is regularly updated with new features and enhancements. With a stable environment that caters to both novice and seasoned developers, it has established itself as the industry standard for Android app development.

V. CONCLUSION AND FUTURE WORK

In conclusion the implementation of our application shows a significant step towards modernizing and stabilizing the agriculture practices. Through this application farmers will be able to control their farms and resources efficiently and also enhance the productivity of their farms.

This research and development process emphasized the major needs of a farmer and their challenges related to resource management and other necessary utilities.

We have tried the best to make this application and helping the farmers by doing so hope that the agriculture sector will be more optimized and farmers will be able to do their work efficiently.

We look forward to continuously refine this application based on the reviews provided by our users, by doing so we hope that our application remains relevant and useful, supporting, user-friendly and impactful to the farmers.

Future Work:

- While our primary goal in this project is to somehow stabilize the market.
- In future, we are planning to add the e-commerce system by which people can buy and sell their products by this application.
- Also, we are going add chatting system to give advice to the farmers based on their problems.

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