KRUSHI MITRA: AN APPLICATION FOR FARMERS

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Abstract : The research aims to develop a mobile application catering to farmers, intending to enhance farming profitability. Despite numerous agricultural techniques and information available online, many farmers struggle to access valuable resources, hindering their productivity. The user-friendly app consolidates essential farming information, including plant needs, weather updates, and tips, to aid farmers in managing and monitoring their farms effectively. The "Buying and Selling Crops and Fertilizers" feature of the app enables direct transactions between farmers and customers, allowing farmers to showcase their produce and connect with buyers without intermediaries. This promotes transparency and efficiency in agricultural trade, benefiting both parties. The feature also provides real-time market prices and trends to support informed selling decisions. The research underscores the significance of mobile apps in revolutionizing agricultural practices and emphasizes the potential for further innovation in agricultural services through mobile platforms.

IndexTerms – **Flutter, Firebase, Dart, Bottom navigation**

I. INTRODUCTION

Agriculture serves as the primary livelihood for a significant portion of India's population, accounting for 60-70% of its workforce. However, farmers encounter challenges in accessing and managing precise farming information due to the vast array of data sources and formats available, ranging from traditional print media to modern digital platforms. This complexity often leads to difficulties in obtaining accurate information necessary for effective precision farming practices.

In India, the agricultural sector faces challenges with the profitability of buying and selling crops, often due to intermediary involvement leading to reduced returns for farmers. To address this issue, this research paper proposes a solution that empowers farmers to directly sell their crops to customers through an innovative mobile application. The proposed application includes a feature called "Buying and Selling Crops and Fertilizers," which facilitates direct transactions between farmers and customers. This feature allows farmers to showcase their agricultural produce, such as crops and fertilizers, to a wide customer base, enabling them to set fair prices and connect with potential buyers without intermediaries. By eliminating the need for middlemen, farmers can ensure better returns on their produce. Additionally, the application supports informed selling decisions by providing real-time market prices and trends, further enhancing its value to users in the agricultural sector.

In our research paper, we outline the development of an agriculture app using Flutter, Dart, and VS Code. Flutter's cross-platform framework allows for code that runs on both Android and iOS devices. For the backend, we utilize Firebase, offering robust features such as data storage and authentication. This combination ensures efficient development and seamless functionality across platforms. This paper explores existing Android-based applications beneficial for farmers and delves into the design and development of comprehensive agriculture app offering diverse services tailored to farmers' needs. Crop monitoring plays a pivotal role in meeting consumer demand and averting potential food shortages.

Additionally, Agri app offers valuable information on various aspects of farming, including seeds, soils, fertilizers, pesticides, and crop selection. By providing insights into soil characteristics and optimal crop choices, Agri app empower farmers to maximize profits and minimize environmental impact. Furthermore, Agri app plays a crucial role in promoting sustainable farming practices by educating users about the potential risks associated with excessive use of chemicals and the importance of soil health.

II. PROBLEM DEFINITION

Farmers encounter numerous challenges, including difficulties in connecting with buyers, efficiently managing crops, accessing weather forecasts, procuring quality fertilizers, and expanding their income opportunities. To address these issues, we propose the development of "Krushi Mitra," a mobile app. Krushi Mitra will empower farmers by enabling them to directly connect with buyers, access real-time weather forecasts, receive crop management guidance, and purchase fertilizers. This app aims to provide comprehensive solutions to the challenges faced by farmers, ultimately enhancing their productivity and income prospects.

III. LITERATURE REVIEW

A wide range of mobile app innovations is available on the market that aim to simplify farming. This section provides a comprehensive review of the existing literature and research conducted in the field of agriculture. Available android-based applications which are useful for farmers such as Smart Kisan, Bhoomi Seva, etc. are analyzed in a study paper.

Tejal Yadav, Pooja Sable, introduced the 'SMART KISAN' mobile application to address the challenges faced by Indian farmers during the crop cycle. These challenges include a lack of awareness regarding current farming practices, technologies, and storage facilities, as well as difficulties in determining fair market values for their produce. To address these issues, the 'SMART KISAN' app offers some key features, including automated chatbot assistance, weather alerts, and market and warehouse information. The development of the application was informed by a survey conducted with fifty farmers from Madhya Pradesh and Maharashtra using a Google form. Overall, the app aims to provide comprehensive assistance to farmers in optimizing their agricultural activities [1]. Dr. Neetu Mittal, Ankit Kumar explored the potential of modern agricultural applications to enhance crop yields, food security, and farming efficiency. However, the high cost and expertise required for adoption may pose challenges for smaller-scale farmers. The study focuses on the impact of contemporary agricultural practices and introduces a novel method for farmers to directly trade their produce online, bypassing intermediaries. Additionally, the research covers the implementation and structure of apps on both iOS and Android platforms, with React Native being a key focus [2].

Purushottam M. Rathi1, Kamal K. Patil developed a Farmer Assistant Android App to cater to the needs of farmers in India, who form a significant part of the country's workforce. The app utilizes smartphone technology to provide farmers with essential information on crops and fertilizers, aiding in decision-making. It supports multiple languages, including Hindi, to accommodate users with varying levels of education and technological proficiency [3]. Sukhdeep Kaur, Jeevan N R focus on the importance of agriculture in India, where it sustains about two-thirds of the population, serving as a primary source of income and livelihood. The emergence of Smart Agriculture 4.0 as a sustainable goal underscores the significance of technological advancements in farming practices. The development of technologies has led to increased yields and revenue for farmers. The study proposes a web application called Farmer Friend, built in Java, to provide farmers and stakeholders with valuable insights into crops, fertilizers, and agricultural practices. The application aims to enhance farmers' understanding and practical application of agricultural concepts, including factors like soil variation, humidity, rainfall, and temperature, crucial for successful crop cultivation [4]. Anand Vijay K M, Chandan Kumar K N, 'An Improved Agriculture Monitoring System Using Agri-App for Better Crop Production' [2018], Crop development is the primary source of revenue-generating fields in nations where agriculture is the primary industry, and farmers rely on crop fields to survive. In order to improve crop yields, The purpose of the agriculture monitoring system is to observe and evaluate information on crops to increase yields. Our idea is an Agro-app. enhanced crop production through a more base-based monitoring system. The purpose of this paper is to increase crop productivity for a higher yield [5].

Seema Bhurvane, Homeshwari Thakreet are developing a mobile application, "BHOOMI SEVA," to enhance profitability for farmers. Recognizing the importance of utilizing various techniques and methods to aid agriculture, the study emphasizes the accessibility of information through digital platforms. The proposed multilingual application aims to address the lack of awareness among farmers by providing essential farming knowledge and features such as farming advice, meteorological data, and a chatbot for assistance. This initiative seeks to empower farmers with valuable information to improve their farming practices and increase production rates [6]. Vamsidhar Reddy M, Renu Babu P, et al., aim to bridge the gap between farmers and customers across India through their Android app. The primary objective is to facilitate networking and mutual support between farmers and buyers. The app offers language options for accessibility and provides farmers with information on government schemes. It features a dial option for both farmers and customers and includes educational resources on crop details. Additionally, the app offers weather selection and suggests suitable soil types for cultivation to maximize yield [7].

IV. PROPOSED METHODOLOGY

The development of mobile applications used by farmers, since farmers are a semi-literate community, an application was developed using these farmers to get an idea about the crops and about good farming tips. In mobile applications, there are three layers known as the presentation layer, the application layer, and the database layer. Users access the presentation layer through mobile devices such as smartphones and tablets. This layer is made up of the user interface (UI) and its process components. Its focus is on the way this application is presented to the user. The application layer, or business layer, is focused on the management of the application. For the information about the soils and tips for Good Farming all the data is coming from the backend Firebase. Connecting the data to Firebase helps us to do the work more easily and quickly using Firebase. If there is a small change in the information we don't need to make the change in the code. Changes in the backend can automatically make changes in the app.

A. System Design and Architecture

The proposed Krushi Mitra application will follow a two-tier system architecture consisting of a user module and an admin module. The user module is designed to provide farmers with a user-friendly interface for interacting with the application. Farmers can access various functionalities within the user module, including browsing detailed crop information, viewing real-time weather updates, and staying informed about market prices. Additionally, the user module may integrate a buying section where farmers can purchase agricultural products.

The admin module, on the other hand, is a restricted area accessible only by authorized personnel, typically the developers of the application. This module provides functionalities for managing the application's content and functionalities. Authorized personnel

can add, update, and manage crop information within the admin module. Additionally, they may have functionalities for managing product listings and potentially user management if the app allows user registration. A secure user access control mechanism will be implemented to differentiate between user and admin access, ensuring that only authorized personnel can modify the application's content.
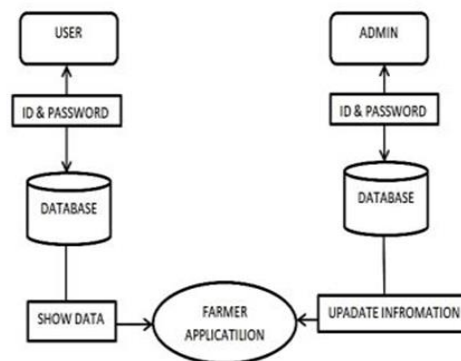

Fig 1. System Architecture

The proposed system is designed to provide a user-friendly interface for farmers. All user's personal information is highly safe and protected. Farmers will receive comprehensive crop information on the mobile app. The application is an internet-based application that allows all farmers to get detailed information about the soil and crops. The various navigation bars provided for the farmer consist of a Home page, Store for buying the crops and fertilizers which is the marketplace for the users, and Profile where the user information will be displayed. The interface is built in a user-friendly manner for the user to access all these segments easily. Once the user clicks on a particular icon, it will directly show him the content related to that icon.

The Krushi Mitra application prioritizes user experience with a simple and intuitive interface. A bottom navigation bar provides effortless access to core functionalities. The Home page acts as a central hub, offering real-time weather information, disease treatment guidance, cultivation tips for various crops, and details on fertilizers. The Store page facilitates a convenient marketplace for buying crops and fertilizers directly within the application. Finally, the Profile section allows users to view their information and conveniently contact the Krushi Mitra team for any inquiries or support. This clear navigation structure empowers farmers to access valuable agricultural resources and manage their interaction with the application seamlessly.
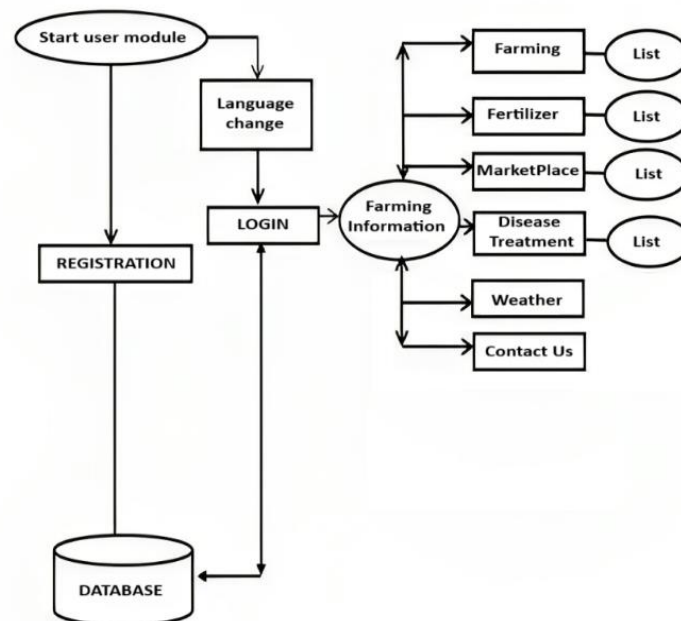

Fig 2. Architecture of Krushi Mitra

V. RESULTS

After developing the core functionality of the system, we implemented the features mentioned earlier. Below given figure represents the start screen of the app.
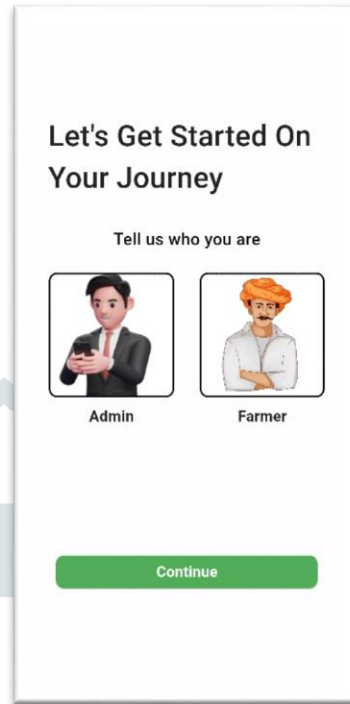

Fig 3 Splash Screen   Fig 4. Start Screen

Whenever user opens the application Figure 3 shows the splash screen of the application. Figure 4 shows the start screen of the application. The application implements role-based access control at launch, directing users to either the farmer module or the admin module based on their selection.
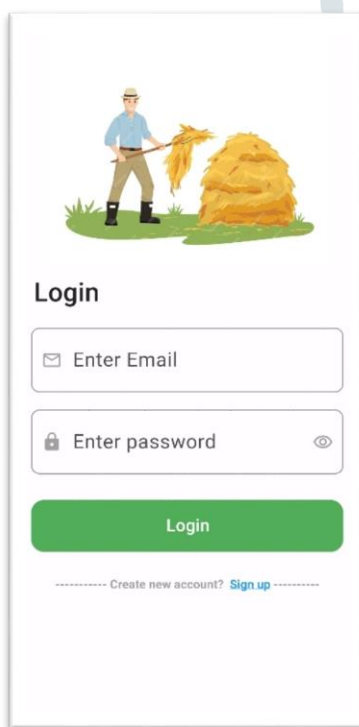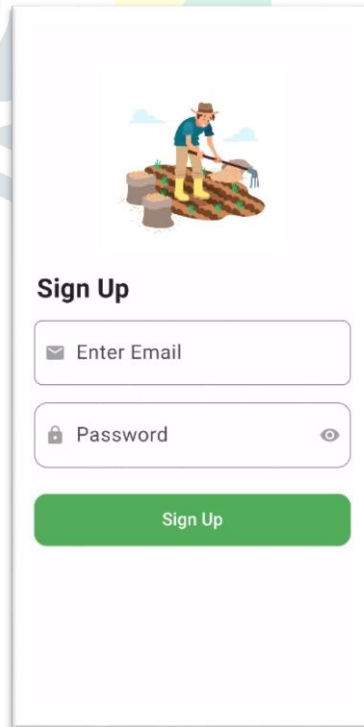

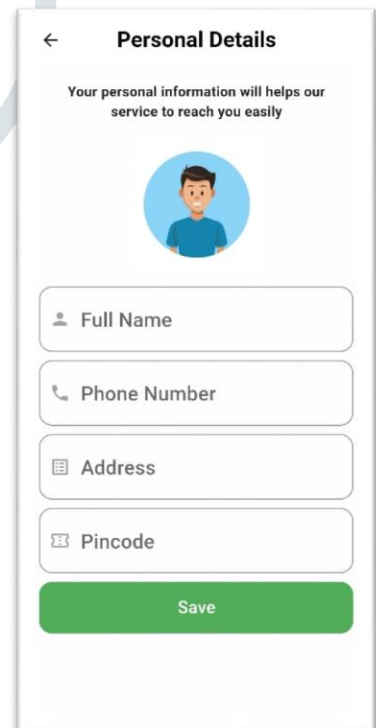Fig 5. Login screen   Fig 6. Signup screen   Fig 7. Registration screen

The Krushi Mitra application implements a secure user authentication process with separate functionalities for login (Figure 5) and signup (Figure 6). The signup process incorporates email verification for user authenticity (Figure 6). A dedicated screen allows users to enter their information after successful registration or login (Figure 7).
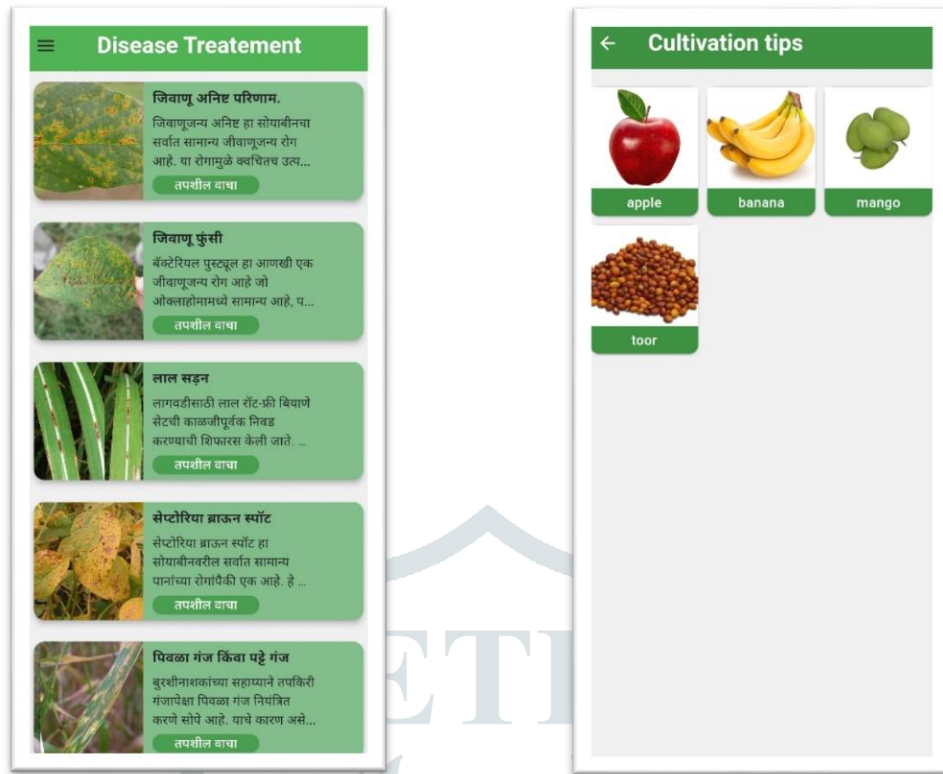
Fig 8. Home Screen

Fig 8 represents the Home page of the app. This page allows the user to choose between 4 options which are Whether information, Disease Treatment, Cultivation Tips and Fertilizer information. User needs to click on the respective buttons to use these functionalities of the app.
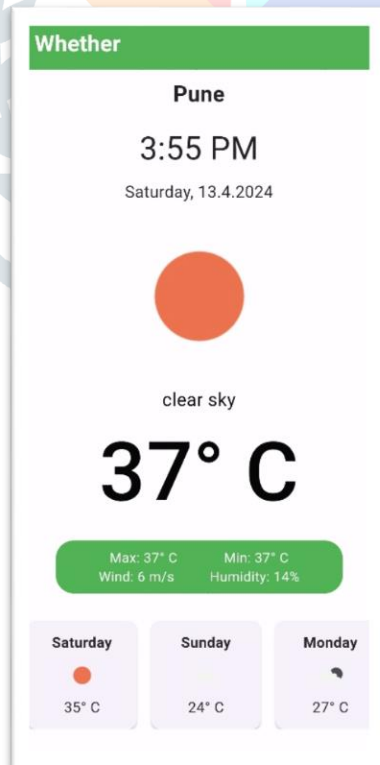

Fig 9. Whether Information

Figure 9 represents the weather information with which it will forecast today's weather and the weather after five days with humidity and wind values.

<div style="text-align:center">Fig 10. Disease Treatment   Fig 11. Cultivation Tips</div>

The application facilitates disease management through a dedicated section (Fig. 10) listing various diseases. Clicking on a specific disease redirects users to a detailed information page. Figure 11 represents cultivation tips for the farmers for various crops and fruits. Clicking on the specific crop or fruit redirects the user to a detailed information page.

<div style="text-align:center">Fig 12. Marketplace   Fig 13. Profile</div>

The application integrates a marketplace (Fig. 12) for purchasing crops or fertilizers directly. Additionally, a dedicated user profile section (Fig. 13) allows users to view and update their information.

VI. RESULT ANALYSIS

ID	Testcases	Expected Output	ActualOutput	Pass / Fail
01	Sign in	User can log in using verified email id.	Login Successful with the verified email id and password	Pass
02	Whether	Users can access accurate weather information for their specific city.	Users are getting accurate information according to their respective city.	Pass
03	Cultivation Tips	User must be able to get cultivation tips according to selected crop.	Cultivation tips displayed successfully.	Pass
04	Marketplace	User must be able to buy any crop from the store.	Users can add products to their cart and complete purchases successfully.	Pass

VII. CONCLUSION

Numerous advanced technologies have emerged in agriculture, and the Indian government is increasing its support to enhance farmers' productivity. However, due to ineffective management, farmers often lack timely access to essential information and agricultural plans. Many farmers remain unaware of the utilization of modern technology in agriculture. Consequently, researchers aim to bridge this gap by introducing an innovative method to educate farmers about modern agricultural practices. This smartphone app will outline the process and approach required to educate farmers about new, varied agricultural information and assist them in enhancing our country's agriculture.

By bridging the knowledge gap and fostering direct trade, the Krushi Mitra app offers a comprehensive solution for Indian agriculture. Notably, the "Buying and Selling Crops and Fertilizers" feature empowers farmers to secure better profits and connect directly with consumers, ultimately benefiting both parties. With the help of this proposed application, the aim is to resolve various issues of the farmers and make their life easier.

VIII. REFERENCES

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