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AGRICULTURE AND RURAL DEVELOPMENT (e-FARMING)

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ABSTRACT: Agriculture has been the primary occupation in India for centuries. The Indian Agricultural Research Institute predicts a surge in demand for edible grains, reaching 345 million tons in the next decade, despite a recent decline in its contribution to India's GDP. Unfortunately, the current situation for farmers is disheartening, with many grappling with severe poverty and resorting to loans to make ends meet, creating challenges in repayment. Our initiative addresses these challenges by making crop seeds and fertilizers accessible at cost-effective rates. Moreover, we provide farmers with the opportunity to rent essential farming equipment. Despite the recent progress in technology, its integration into agriculture has been slow, primarily attributed to negligence and limited accessibility. In the 21st century, farmers continue to face obstacles, including reliance on third-party retailers, which further compounds their financial hardships.

The COVID-19 pandemic heightened the demand for agricultural products, but farmers faced difficulties in accessing materials and information online. Agro marketing emerges as a solution, simplifying and securing transactions. Our E-Farming platform empowers farmers to purchase produce with basic internet literacy. The website acts as a centralized guide, providing information on current market prices for various products without intermediary costs.

Additionally, our platform provides information on diverse government agricultural programs and facilitates access to cutting-edge cultivation techniques. To support farmers during the harvesting phase, the system sends a 6-day weather forecast and schedule through SMS. Furthermore, farmers have the option to engage with agro health advisors to receive advice on crop health and effective farming practices.

KEYWORDS: Farmer, Customer, Fertilizers, Seeds, Vegetables, Fruits, Payment method

I. INTRODUCTION

For more than 15,000 years, agriculture has served as the predominant occupation in India, supporting around 70% of the rural population as their primary source of income. India plays a significant role in global agriculture, accounting for 25% of the world's consumption and 27% of production. The country stands among the top 20 nations in terms of food product exports. Additionally, India holds the position of the second-largest producer globally for various pulses, fruits, and vegetables.

In today's technological era, where tasks are accomplished with machines and data is stored online, the agricultural sector has witnessed global advancements. However, the dissemination of this information to farmers in India's rural villages remains a challenge. E-farming emerges as a beneficial application in the 21st century, aligning with various engineering-related applications aimed at societal betterment.

Prior to the onset of the COVID-19 pandemic, farmers typically had to physically visit markets to sell their produce through intermediaries, a burdensome and frequently unrewarding process. The impracticality of this approach was underscored during the pandemic when some farmers, at great personal risk, continued attending markets. Despite their dedicated efforts, farmers encountered difficulties stemming from a dearth of technology and other factors. This scenario prompted the development of secure e-farming portals as a response to the challenges faced by farmers.

E-farming stands as a worldwide initiative dedicated to advancing sustainable agricultural development and ensuring food security. Leveraging cutting-edge technology and information and communication technology (ICT), it empowers farmers through diverse strategies aimed at resolving persistent challenges and raising living standards.

Currently, there exists a scarcity of comprehensive E-farming systems on the internet. While some platforms offer diverse features, they fall short of providing an all-encompassing solution that enables users to both rent essential farming equipment and procure crop necessities at discounted rates. Statistical data reveals that around 8% of suicides in the country are committed by farmers, often stemming from a sense of helplessness, which can be linked to the slow uptake of new technologies in the agricultural sector.

While the government provides schemes for farmers, the information sometimes fails to reach them. Although there are portals specific to schemes, users struggle to track the status of their applications. In the rapidly evolving 21st century, there is a need to educate farmers about new technologies, yet dedicated portals for this purpose are lacking. Despite government initiatives and inventors' contributions, farmers burdened with debt find little relief. The rise of E-farming has been accentuated by these factors and the challenges posed by the COVID-19 pandemic.

II. RELATED WORK

Introducing a web portal solution designed as an online auction system, this platform aims to eliminate the need for third-party agents. In this system, buyers have the autonomy to choose the products they wish to sell, set their preferred selling rates, and interested sellers can then make direct contact. This application is particularly beneficial for Indian farmers, ensuring they receive fair compensation for their efforts and providing a secure transaction environment.

The main goal is to eliminate intermediaries, and prominent features include a user-friendly interface for purchasing or selling agricultural products, a feedback system, access to weather forecasts, and information on government schemes. The overarching aim is to bring contemporary agricultural practices to remote farmers. Notably, this project surpasses its predecessor by incorporating extra features, being available in multiple regional languages, and introducing a chat box for personalized communication. Weather updates specific to the user's region are delivered through APIs.

Another innovative solution for farmers is an Android application functioning as a reminder service. This application helps farmers keep track of fertilizer, herbicide, and pesticide application schedules. It also offers recommendations for suitable crops based on specific parameters. Real-time crop prices nationwide, a helpline service, and crucial weather information are integral components of this application.

In the domain of online portals, our specialized platform presents crucial crop information and employs external APIs to monitor and furnish weather-related details. The portal not only produces weather reports but also sends notifications to users via SMS. Furthermore, users have the capability to retrieve specific credit information from diverse financial institutions directly through the portal. Designed for user-friendliness, this platform aims to enhance comprehension for farmers, incorporating a Google language translator to facilitate content translation into the farmer's regional language.

III. PROPOSED METHOD

This system's development is geared towards overcoming challenges in the agricultural sector by introducing a multitude of farmers to specialized online web portals dedicated to agriculture. The core objective is to aid farmers in obtaining essential products at reasonable prices while fostering awareness of environmentally sustainable farming in a cost-effective manner. The portal facilitates farmers' access to high-quality seeds and fertilizers at affordable rates. To facilitate effective harvest management, the system incorporates a harvest tracking module. This module allows farmers to record crucial information, including harvest start and end dates, utilized area in hectares, harvest location, recommended fertilizers, and packaging details, based on the seeds purchased. Recognizing the impact of weather on agricultural produce, the system provides farmers with weather updates for up to 6 days, accessible through both the portal and SMS.

Renting equipment is another noteworthy feature designed to offer farmers the benefits of on-time harvesting without the burden of high machinery costs. The portal is user-friendly, ensuring accessibility for farmers with limited technological knowledge. Additionally, it provides information on various government initiatives.

The involvement of Agro Advisors further enhances the system's utility by providing expert guidance to farmers. These advisors aim to familiarize farmers with the latest innovations in sustainable farming practices, contributing to the overall success and efficiency of agricultural endeavors.

IV. MATERIALS USED

As our system does not involve the training and testing of machine learning models, we do not rely on a specific dataset. Instead, we utilize various APIs and generate our dataset, as illustrated.

Our weather forecasting module sources data from the Open Weather Map API. Information regarding government schemes is obtained from the Vikaspedia government website, offering comprehensive details on various programs [7]. Furthermore, we have compiled a dataset specific to our shopping module, containing information about seeds, fertilizers, and farm equipment. This dataset encompasses details such as product cost, basic description, and brand. The product information derived from this dataset is displayed on our web portal.

V. METHODOLOGY

Our approach unfolds in two distinct phases, each encompassing various modules:

A. Phase 1:

User Identification:

Determine the target users of the system.

Requirements Finalization:

Define both functional and non-functional requirements for the system.

ER Diagram and Relational Schema:

Develop an Entity-Relationship (ER) Diagram and Relational Schema to identify the entities and data to be stored in the database.

Functional Requirements Breakdown:

Divide functional requirements into modular components.

Module Conceptualization:

Outline modules by defining module names, features, attributes (implemented through class structures), and estimate the time needed for each module.

Gantt Chart Creation:

Develop a Gantt Chart to establish a timeline for module development and track progress.

B. Phase 2:

UX/UI Design:

Work on the user experience (UX) and user interface (UI) design for each page of the website.

Web App Development:

Code each module individually to construct the web app.

Module Testing:

Conduct thorough testing for each module to ensure functionality and identify potential issues.

Integration and Linking:

Integrate and link each module to build a cohesive and functional system.

Final System Test:

Execute a comprehensive test run on the entire system to validate its performance.

This two-phased approach ensures a systematic development process, from conceptualization and planning to the creation and integration of modules, ultimately leading to a thoroughly tested and functional web application.

VI. IMPLEMENTATION OF MODULES

The workflow is organized into several modules to enhance functionality and user experience:

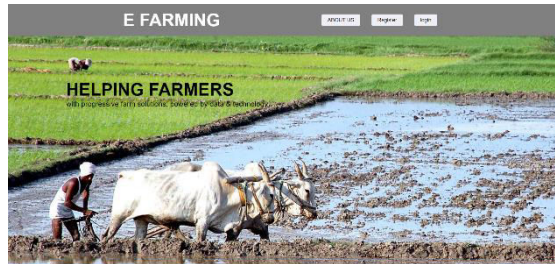


Fig. 1:- Home page

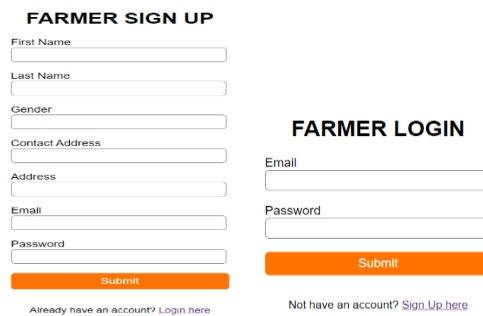
A. Account Generation:

Individuals can register on our platform by furnishing essential information such as their name, mobile number, and email address. A confirmation email containing a verification link is subsequently dispatched to ensure the authentication of the user's account.

Users can log in with their email ID and password.

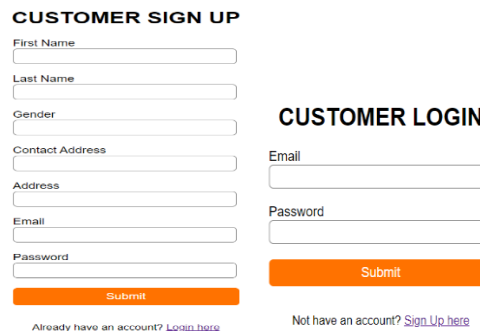
Includes a 'Forgot Password' option.

We Stored Credentials of registered members databases using PHP.



The image shows two forms side-by-side. The left form is titled 'FARMER SIGN UP' and contains input fields for First Name, Last Name, Gender, Contact Address, Address, Email, and Password, with a 'Submit' button at the bottom. Below the form is a link: 'Already have an account? [Login here](#)'. The right form is titled 'FARMER LOGIN' and contains input fields for Email and Password, with a 'Submit' button at the bottom. Below the form is a link: 'Not have an account? [Sign Up here](#)'.

Fig. 2: Farmer Registration and Login



The image shows two forms side-by-side. The left form is titled 'CUSTOMER SIGN UP' and contains input fields for First Name, Last Name, Gender, Contact Address, Address, Email, and Password, with a 'Submit' button at the bottom. Below the form is a link: 'Already have an account? [Login here](#)'. The right form is titled 'CUSTOMER LOGIN' and contains input fields for Email and Password, with a 'Submit' button at the bottom. Below the form is a link: 'Not have an account? [Sign Up here](#)'.

Fig. 3: Customer Registration and Login

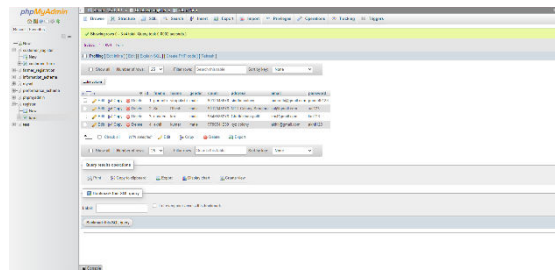


Fig. 4: Farmer Database using PHP

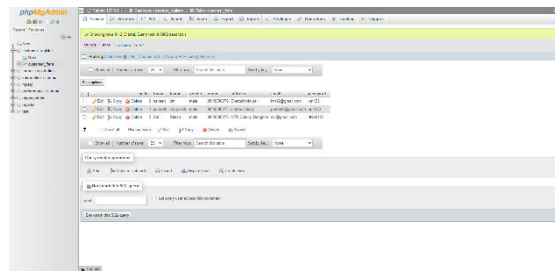


Fig. 5: Customer Database using PHP

B. Cart and Orders:

Encompasses pricing, billing, and online payment functionalities.

Pricing displays the purchase cost of seeds or fertilizers.

Users can view their cart with items, quantities, and variants.

Upon checkout, an order summary is generated, displaying all items, quantities, total costs (including taxes), and an invoice.

The generated invoice includes unit prices and the total invoice amount, which can be saved for future reference.

Online payment options are available, and a receipt is generated and emailed to the user.

Users need to be logged in to access this feature.

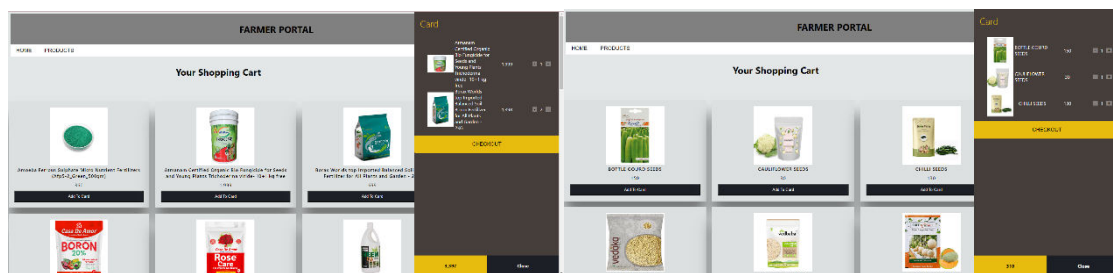


Fig. 6: Fertilizers and Seeds from Farmer Portal

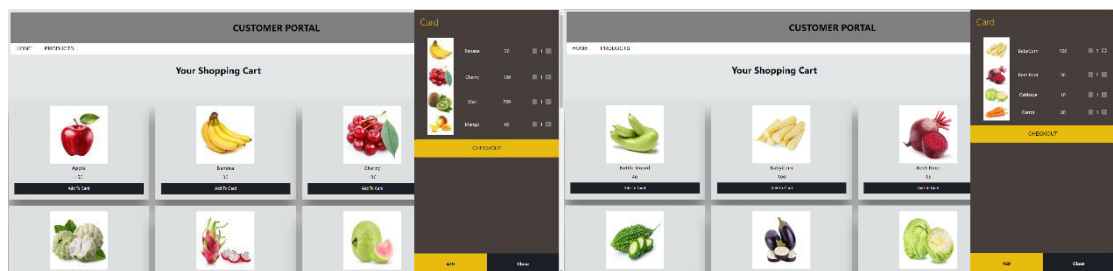


Fig. 7: Vegetables and Fruits from Customer Portal

C. E-Learning:

Provides farming tutorials uploaded by agro-experts.

Covers a diverse range of topics, including information about various crops, new trends, and global farming techniques.

This modular approach ensures that users can seamlessly navigate through the system, from creating and managing their accounts to engaging in online transactions and accessing valuable e-learning resources.

D. Requirements:

We created a Requirement page for customers. In that page Customers can ask Farmers for their required products/ agricultures. Farmers can have the access to see the required products/ agriculture given by Customers and Farmers update the products. Customers can add using that add Symbol.

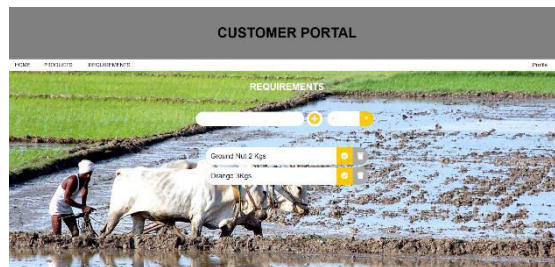


Fig. 8: Customer Requirements

E. Payment Method:

We added Payment page for both Farmers and Customers. They need to make the payment to buy the products in this portal.

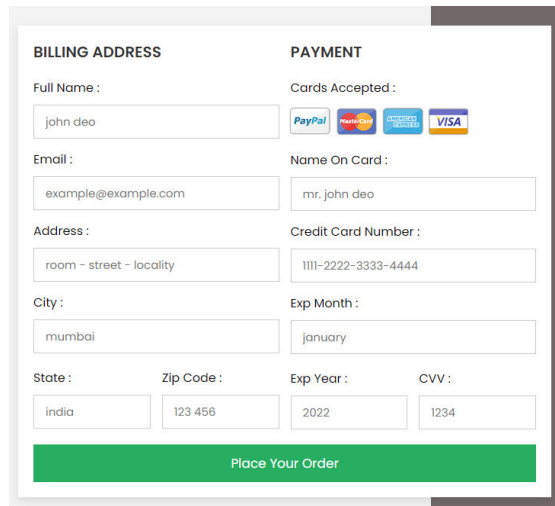


Fig. 9: Payment Page

VII. FUTURE SCOPE

In the future, our goal is to launch our website and host it on the AWS platform. Our focus is on enhancing scalability to accommodate a growing user base. We plan to collaborate with fellow engineers to incorporate additional functionalities that will maximize the benefits for farmers. Additionally, we aspire to establish connections with local distributors to ensure the availability of quality products for consumers across India.

VIII. CONCLUSION

In conclusion, our project has a primary objective of assisting farmers in accessing agricultural products at affordable rates while promoting education on efficient, effective, and eco-friendly farming practices. The platform serves as a valuable resource for farmers to stay informed about market trends, government schemes, compensation, and other pertinent farming information. The inclusion of SMS facilities enhances the user experience, ensuring that crucial information reaches farmers effectively.

Furthermore, our project is designed with adaptability in mind, allowing seamless implementation of future changes. The site will undergo translation into regional and foreign languages to enhance accessibility for a diverse user base. The incorporation of video conferencing capabilities will facilitate real-time interaction, enabling farmers to seek clarification and utilize technology to its fullest potential. Overall, our commitment lies in creating a user-friendly and comprehensive platform that empowers farmers and fosters sustainable agricultural practices.

IX. ACKNOWLEDGEMENT

I extend my sincere gratefulness to all those who have played a vital part in bringing the E-Farming platform to consummation. Foremost, my appreciation goes to the devoted platoon of inventors and programmers whose inexhaustible sweats have converted the original vision into a completely functional reality. Your unvarying commitment to excellence and innovative problem-solving has served as the driving force behind the success of this design.

I would also like to express my profound thanks to the agrarian experts and professionals whose inestimable support and guidance have shaped the content and features of the E-Farming platform. Their perceptivity have been necessary in icing that the platform meets the specific requirements of growers, furnishing them with a comprehensive and stoner-friendly tool for their agrarian hobbies.

A special note of appreciation goes to the growers who laboriously shared in the testing and feedback phases. Your input has played a vital part in enriching the platform and enhancing its overall usability. This cooperative approach embodies the spirit of community-driven development, and I'm thankful for the enthusiasm and openness demonstrated throughout this process.

I want to extend my gratefulness to all stakeholders, collaborators, and sympathizers who have demonstrated confidence in the eventuality of E-Farming. Your stimulant has fueled our commitment to making husbandry more accessible and effective through the transformative power of technology.

In conclusion, this design stands as a testament to the collaborative trouble and collaboration of a different group of individualities, each contributing their moxie to bring E-Farming to consummation. Thank you for being an integral part of this trip toward a more sustainable and technology-enabled future for husbandry.

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