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Tractor Suvidha App

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ABSTRACT:

Agriculture plays a crucial role in the livelihoods of small-scale farmers, yet many struggle to access tractors during peak farming seasons due to high costs and an inefficient, unorganized rental system. The lack of affordable options and limited availability hinder timely agricultural activities, impacting productivity.

To address this issue, we propose Tractor Suvidha, a mobile application that connects tractor owners with farmers in need of tractor services. The platform allows owners to list their tractors for hire, while farmers can book them based on real-time availability. This system ensures easy access to essential farming equipment, promoting efficiency, affordability, and better resource utilization in rural communities.

Keywords: User Registration, Tractor Status, Booking System, Live Tracking, Payment, Simple GUI

Introduction:

Agriculture is the backbone of rural economies, and efficient farming practices rely heavily on access to modern machinery, particularly tractors. Tractors are essential for key farming operations such as soil preparation, sowing, and harvesting, making them crucial for increasing productivity. However, the high cost of purchasing tractors—ranging from Rs. 7-15 lakhs—places them out of reach for many small and marginal farmers. During peak farming seasons, like sowing or harvesting, the demand for tractors skyrockets, often resulting in shortages and delays due to limited tractor availability. This app will help farmers **save time, reduce effort**, and ensure timely access to tractors during critical farming periods. Tractor owners can **update tractor statuses** (active, busy, resting), giving farmers a clear picture of availability for bookings. The app is designed with a **simple and intuitive interface**, ensuring that even uneducated users can easily navigate it. **Tractor Suvidha** encourages a **community-based solution** to optimize the use of tractors in rural areas, supporting **sustainable agriculture** and boosting productivity for small-scale farmers.

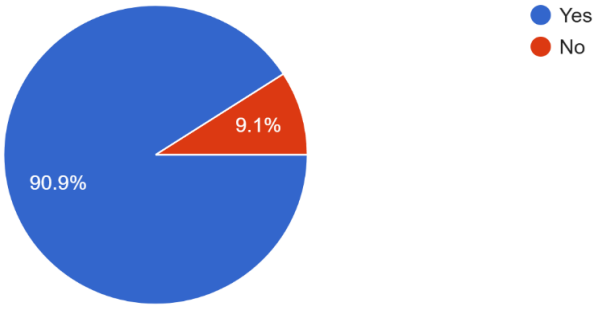
Review of Literature:

Tractor Suvidha is a mobile application designed to help farmers access tractors for agricultural activities. Below is a comparative analysis of Tractor Suvidha with other agricultural applications that provide services related to crop production, protection, smart farming, and allied services.

Agricultural App for Tractors & equipments	Features	Disadvantage	Website	Mobile App
OneFarmer	Focuses on renting equipments	Doesn't include Tractors	No	Yes
Coustomer Hiring Centre(CHC)	Focuses on renting equipments and tractors	It does it for a set of radius of the centre	No	Yes
Tafe Jfarm Services	Focuses on renting equipments and tractors	No status tracking Limited to some states only in India	No	Yes
Farmer City	Focus on hiring services for agricultural equipment,Tractor	Complex UI Higher Cost	Yes	No

Table 1: Comparative study of tractor applications used by farmers

We have also conducted Survey for understanding need of Tractor rental in agriculture sector
Result are as follows



Considering above requirements, we proposed Tractor Suvidha. It is a mobile application Empowering Small Farmers in Rural India with **75-80% of rural farmers using smartphones**, digital solutions like *Tractor Suvidha* make mechanized farming more accessible. Around **80% of Indian farmers** are small-scale and struggle with high equipment costs, relying on credit for cultivation. *Tractor Suvidha* bridges this gap by offering a **real-time tractor rental platform**, allowing farmers to **rent tractors affordably** without ownership. Features like **User Registration, Tractor Status, Booking System, Live Tracking Payment, Simple GUI**

Methodology :

We have designed a system for tractor rental and booking, system design as follows:

Figure No 1 - UML Diagram

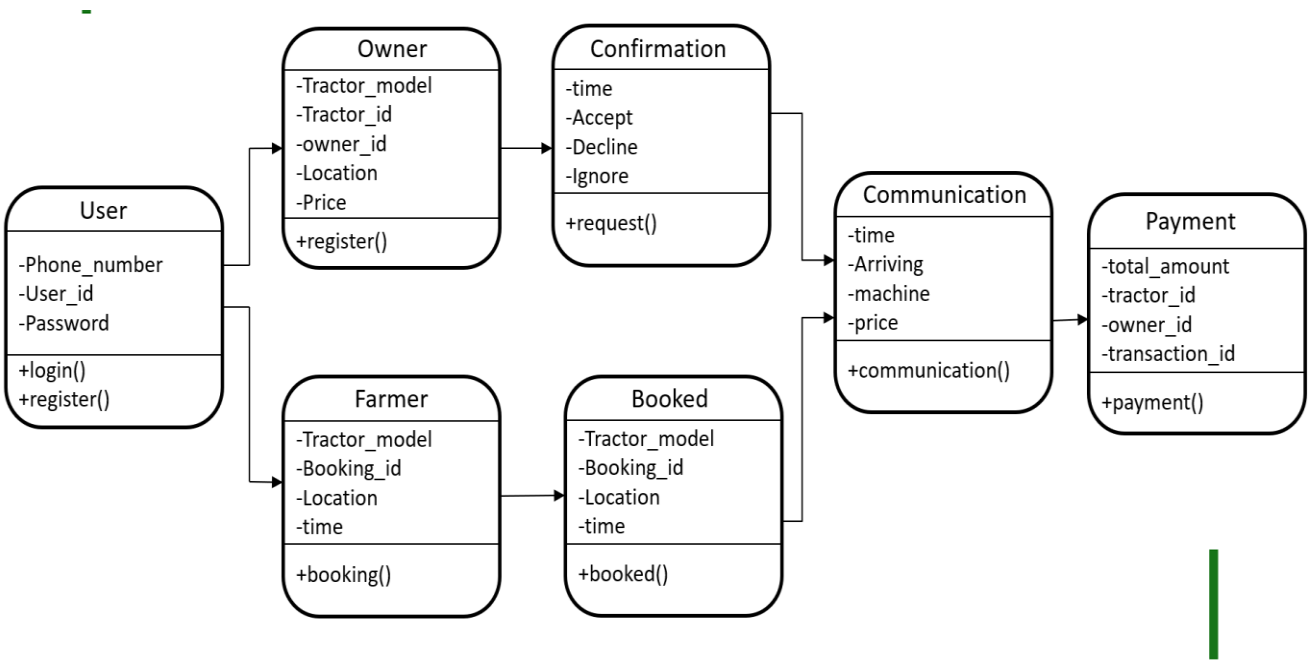


Figure No 2 - DFD Diagram

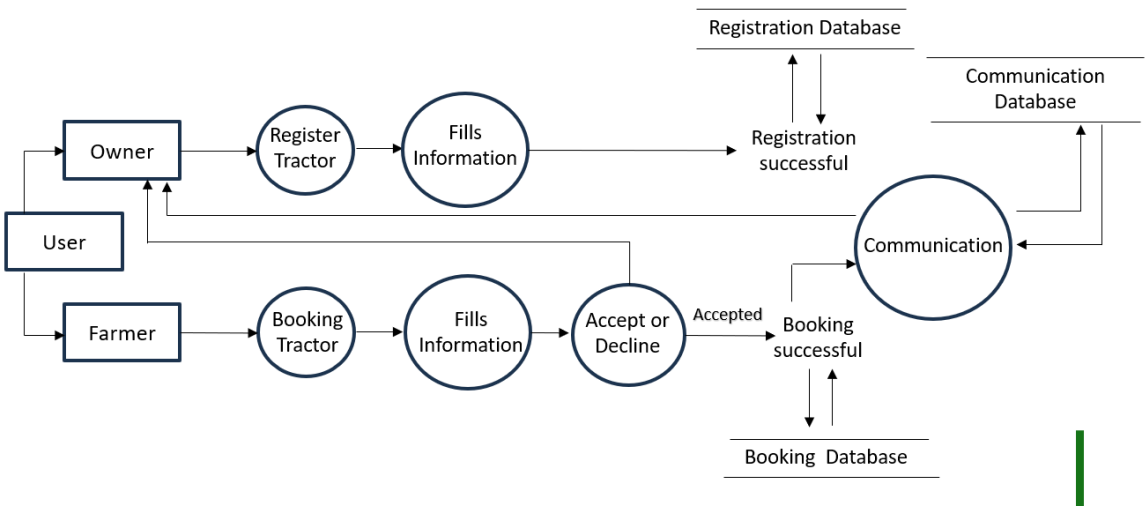
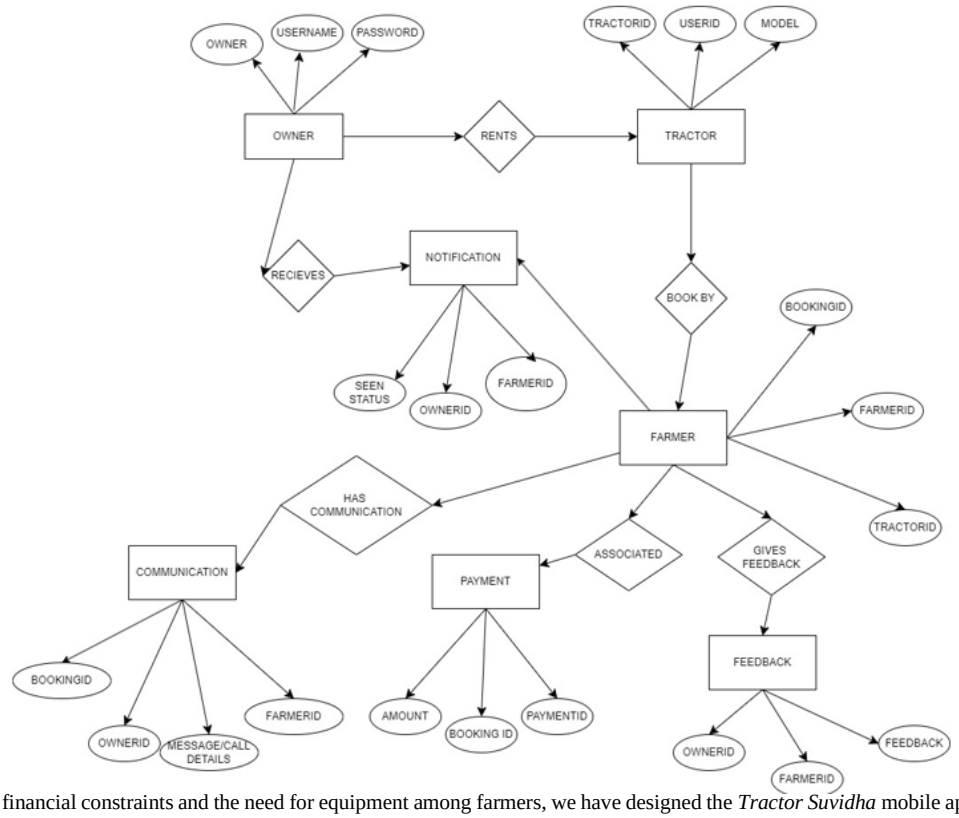


Figure No 3 - ER Diagram



Considering the financial constraints and the need for equipment among farmers, we have designed the *Tractor Suvidha* mobile app using Android Studio and Firebase. The module details are as follows:

1)User Registration and Login Module:

- Description: Allows tractor owners and seekers to create accounts and manage profiles. Features: Easy sign-up, role selection (Owner/Seeker), profile management.

2)Tractor Listing and Availability Module:

- Description: Owners can list tractors and update status (available, busy, rest). Features: Add tractor details, real-time availability updates.

3)Booking and Scheduling Module:

- Description: Farmers search and book tractors based on availability and type. Features: Search, booking, and cancellation options.

4)Chat and Communication Module:

- Description: Enables direct messaging between owners and seekers.

5)Payment and Billing Module:

- Description: Facilitates payment through multiple methods. Features: UPI, QR code, cash, invoices, payment history.

6)Notifications and Alerts Module:

- Description: Sends booking, payment, and availability alerts. Features: Tractor status alerts, booking reminders, payment notifications, User Registration, Tractor Status, Booking System, Live Tracking, Payment, Simple GUI

Frontend Modules:

1. 1)Android Studio: For developing the mobile app interface.
2. 2)Java: Primary programming language for building the Android application.
3. 3)XML: Used for designing the app's layout and UI elements.

Backend Components:

Back End: -

Firebase Realtime Database: For storing and retrieving real-time data on tractors and bookings

Firebase Cloud Messaging: To send notifications for bookings and tractor availability updates

Payment Integration: QR code sharing or integration with payment gateways for online transactions.

These frontend and backend components work together to create a **seamless and efficient tractor rental platform**. *Tractor Suvidha* ensures a **smooth and intuitive experience** for users, allowing farmers to easily book tractors while providing owners with a reliable way to manage rentals. The system is designed for **security, reliability, and scalability**, ensuring that the app can efficiently handle growing demand and serve rural communities effectively.

Additionally, Tractor Suvidha integrates real-time availability updates, ensuring users can quickly find tractors as per their needs. The platform supports secure authentication and data encryption to protect user information. With a user-friendly interface, even those with minimal technical knowledge can navigate the app effortlessly. Tractor owners can upload tractor images, set rental rates, and manage bookings with ease. Automated notifications keep both parties informed about bookings, payments, and tractor status. The app is optimized for low-bandwidth rural areas, ensuring smooth performance. Future updates may include GPS tracking and AI-based recommendations for better efficiency.

Tractor Suvidha also features a dedicated chat system, allowing direct communication between tractor owners and renters. The booking process is streamlined with a simple request-and-confirmation model, reducing delays and confusion. Multiple payment options, including cash and digital payments, provide flexibility for users. Reviews and ratings help ensure trust and transparency within the platform. The backend is designed to handle high traffic efficiently, preventing downtime even during peak seasons. Regular updates and maintenance keep the app secure and bug-free. Multilingual support ensures accessibility for diverse users across different regions. Future expansions may include integration with government subsidies and farming advisory services.

Tractor Suvidha is designed to simplify the tractor rental process for both owners and booking users. The platform ensures quick and hassle-free bookings with a simple and intuitive interface. Owners can list their tractors with images, availability status, and pricing, making it easy for users to find suitable options. The system provides real-time updates on tractor availability, reducing delays and confusion.

Results :

Tractor Suvidha's user-centric approach extends beyond the frontend interface to encompass robust backend infrastructure and support systems. With efficient booking and reservation systems, the platform ensures a smooth and hassle-free experience for users at every step of the rental process.

Figure 1 : Login page

Figure 2 : Booking Dashboard

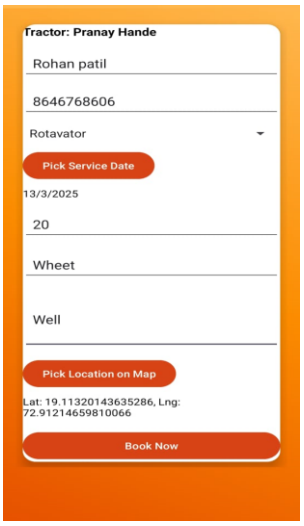


Figure 3 : Booking

Figure 4 : Bokking Confirmation

Figure 5: - Request on Renting

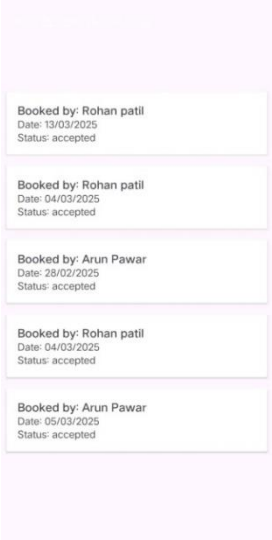


Figure 6: - Accepted Request

Figure 7: - Booking Detail

Figure 8: - Map Towards Field

Conclusion:

In conclusion, the Tractor Suvidha app provides an innovative and practical solution to enhance accessibility to costly farming machinery. By simplifying tractor rentals, it boosts farm productivity, supports rural economies, encourages collaboration, and promotes sustainable agricultural practices. With its scalable, user-friendly design, the app can revolutionize how farmers access and utilize equipment, making modern farming technology more affordable and accessible, ultimately contributing to improved agricultural efficiency and rural development

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