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Design and Development of a Location-Based Household Service Management System

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Abstract

Household services play an important role in maintaining day-to-day life, especially in urban areas where people depend on external professionals for tasks such as plumbing, electrical work, and general repairs. However, users often face difficulties in finding reliable service providers quickly and efficiently due to unorganized systems and a lack of a centralized platform. This paper presents a location-based household service management system, a web-based application designed to connect users with nearby service professionals simply and efficiently. The system is developed using React (Vite), Tailwind CSS, and Axios for frontend design, Node.js environment along with Express.js used for handling backend operations, while MongoDB serves as the system for managing and storing the database. It enables users to search for services based on their location, book service requests, and track service status in real time. Service providers can manage requests, update job progress, and maintain service records through the platform. The integration of location-based services improves response time and service efficiency. The proposed system enhances accessibility, ensures better communication between users and service providers, and improves overall service management through a user-friendly interface. The implementation demonstrates how digital and location-based technologies can effectively solve real-world problems in household service management.

Keywords: Axios, express.js, full-stack development, household service management system, location-based services, MongoDB database, node.js, React (Vite), real-time tracking system, Tailwind CSS, web-based application

INTRODUCTION

In the modern fast-paced digital age, technology has become essential for making everyday tasks easier and enhancing access to various services. One important area where technology can have a strong impact is household service management. Everyday services, such as plumbing, electrical repairs, appliance maintenance, and general home servicing, are essential for maintaining a comfortable lifestyle. However, finding reliable service providers quickly and efficiently remains a major challenge for many. Users often depend on personal contacts or local references, which may not always be trustworthy or readily available, leading to delays, inconvenience, and uncertainty in the process. The process of accessing household services is often unorganized and lacks proper coordination. Users frequently face issues such as difficulty identifying skilled professionals, a lack of information about service availability, unclear pricing, and poor communication. Simultaneously,

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service providers struggle to reach genuine customers and manage their work effectively due to limited visibility and the absence of a structured system. These challenges highlight the need for a digital platform that can efficiently connect users with service providers while ensuring transparency and reliability [1].

To address these problems, the location-based household service management system is proposed as a web-based solution that connects users with nearby service professionals through a centralized and intelligent platform. The platform enables users to create an account, access it securely, and find services according to their current location. It provides the ability to explore nearby service providers, place service requests, and monitor their progress in real time. By using location-based features, the system enhances response speed, increases convenience, and ensures more efficient service delivery. On the other hand, service providers can register on the platform, manage incoming service requests, update job progress, and maintain their work history. This helps them improve their reach, increase job opportunities, and organize their work more efficiently. The system also includes an administrative module that monitors user activities, manages service providers, and ensures smooth functioning of the platform [2].

Existing service platforms often focus only on basic booking features and may lack real-time tracking, efficient communication, and location-based filtering features. In contrast, the proposed system integrates all these features into a single platform, ensuring better coordination between the users and service providers. The application is built using contemporary web technologies, including React with Vite and Tailwind CSS for designing the frontend, Node.js and Express.js for backend operations, and MongoDB for managing the database. Together, these tools ensure a smooth and responsive user experience, reliable data security, and overall efficient system functionality [3].

The location-based household service management system aims to simplify the process of finding and booking household services, reduce delays, and enhance the overall user experience. By digitizing and organizing the service management process, the system improves transparency, efficiency, and reliability. Ultimately, this platform contributes to better service accessibility and demonstrates how technology can be effectively used to solve real-world household service challenges in a scalable and user-friendly way [4].

LITERATURE SURVEY

Several studies and service platforms have been developed to provide household services using digital technologies. These systems aim to simplify the process of connecting users with service providers and improve the overall user experience. In recent years, many service management systems have integrated web technologies to enable online booking and service management processes. These systems enable users to explore available services, view their schedules, and easily book professionals through online platforms. Some existing platforms mainly focus on basic service booking but provide limited features such as real-time tracking, proper communication, and efficient service management. Other systems include location-based services but often lack accuracy, user-friendly design, or proper integration with service workflows [5].

However, many existing household service systems still face challenges such as a lack of transparency, poor data handling, limited accessibility, and inefficient communication between users and service providers. Therefore, a structured and location-based service platform is required to address these limitations [6].

The proposed location-based household service management system overcomes these issues by providing a centralized, user-friendly, and efficient platform that enables easy service booking, real-time tracking, and improved communication between users and service providers [7].

PROBLEM STATEMENT

Users often face challenges in finding reliable and timely household service providers for tasks such

as plumbing, electrical work, and general repairs. Many existing methods provide unorganized and scattered information, making it difficult for users to quickly identify skilled professionals and access services efficiently [8].

The major problems include:

- Lack of a centralized platform for household service booking
- Difficulty in finding nearby and reliable service providers
- No real-time tracking of service status
- Poor communication between users and service providers
- Inefficient data management and service record maintenance

To overcome these issues, a location-based web application is required that provides an organized, efficient, and user-friendly platform for booking and managing household services [9].

PROPOSED SYSTEM

The proposed system, the location-based household service management system, is a web-based application designed to simplify the process of finding and booking household service professionals [10].

The application allows users to:

- Search for nearby service providers based on location
- Book household services, such as plumbing, electrical work, and repairs
- Track service status in real time
- View service details and manage service history

Service providers can:

- Receive and manage service requests
- Update job progress
- Maintain records of completed services

The system is built using up-to-date web technologies to deliver smooth performance and an intuitive, easy-to-use interface. The platform aims to improve service accessibility, reduce response times, and enhance overall service management [11].

SYSTEM ARCHITECTURE

The architecture of the location-based household service management system consists of three main components.

Backend Layer

The frontend is responsible for user interaction and visual presentation. It is developed using:

- React (Vite) for building a fast and responsive user interface
- Tailwind CSS for styling and modern user interface (UI) design
- Axios was used to manage API calls and facilitate smooth communication with the backend system.

This layer provides an interactive interface where users can search for nearby services, book service requests, and easily track their status.

Backend Layer

The backend handles incoming user requests and controls the core application functionality. The system was developed using the following:

- Node.js for server-side execution
- Express.js for handling routing, APIs, and server communication

This layer ensures smooth interaction between users, service providers, and the database while handling request processing and business logic efficiently [12].

Database Layer

The database stores all system-related data, such as user details, service provider information, service requests, and the service history. MongoDB is used for efficient and flexible data storage and retrieval.

This architecture ensures smooth communication between the frontend, backend, and database, providing an efficient, scalable, and reliable service management system [13].

ALOGRITHM

The algorithm for this design and development of a location-based household service management system is shown as follows:

1. Start the system.
2. Open the home page of the application.
3. User selects either the register or login option.
4. Check whether the user has completed registration.
5. If the registration process is not completed, the user is required to fill out the registration form and set up a new account.
6. After successful registration, redirect the user to the login Page.
7. User enters login credentials (email/username and password).
8. Validate the login credentials.
9. If the login is incorrect, display errors and redirect to the login page.
10. If login is successful, redirect it to dashboard/home page.
11. The system detects or asks for the user's location.
12. Display available nearby household services.
13. User selects the required service (plumbing, electrical, etc.).
14. User books a service request.
15. The service provider receives the request notification.
16. The service provider accepts and updates the service status.
17. The user can monitor the service status in real time.
18. After completion, the service is marked as completed and stored in history.
19. Users can view service history or log out.
20. End the process.

SYSTEM FLOW CHART

The flowchart for the algorithm and the system is shown in Figure 1.

The system follows a structured flow starting from user login to service completion, ensuring smooth interaction between users and service providers with clear communication and tracking [14].

METHODOLOGY

The development of the location-based household service management system follows several systematic steps.

Requirement Analysis

The first stage involves identifying user requirements, such as service booking, location-based searches, and real-time tracking. The objectives of the system were clearly defined.

System Design

In this phase, the system architecture, database structure, and user interface layout were planned to ensure smooth system functionality.

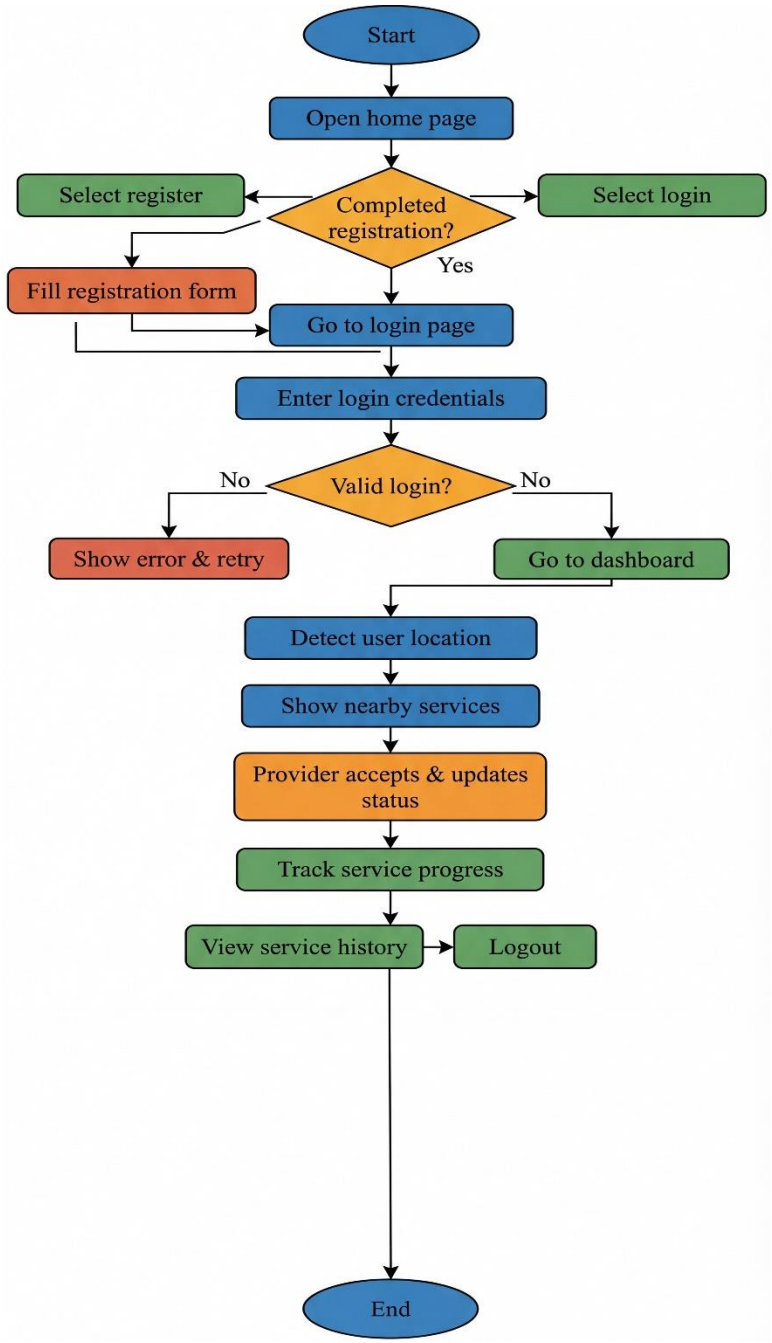

Figure 1. System flowchart.

Frontend Development

The user interface was developed using React (Vite) and Tailwind CSS to provide a fast, responsive, and user-friendly design. Axios is used to handle API requests.

Backend Development

The server-side operations were developed using Node.js along with Express.js, which manages client requests, controls application routing, and executes the core business logic.

Database Integration

MongoDB was used to store data, such as user details, service provider information, service requests, and service history.

Testing and Validation

The system was tested to ensure proper functionality, performance, security, and user experience [15].

MODULES USED IN THE SYSTEM

The location-based household service management system is divided into several modules to ensure smooth functionality and efficient management of services. Each module performs specific tasks within the system.

User Module

This module is designed for customers who want to avail themselves of household services. Users can:

- Register and log in securely
- Search for nearby service providers based on location
- Book service requests
- View and track service status in real time
- Manage their profile and service history

Service Provider Module

This module is for professionals who offer household services. Service providers can:

- Register and create their profile
- View incoming service requests
- Accept or reject requests
- Update job progress and status
- Maintain a history of completed services

Admin Module

The admin module manages and monitors the overall system. Admin can:

- Manage users and service providers
- Verify and approve registrations
- Monitor service requests and activities
- Handle complaints and ensure system security
- Maintain overall system performance

Service Management Module

This module handles all service-related operations. It allows:

- Adding and managing different service categories (plumbing, electrical, etc.)
- Organizing service listings
- Ensuring proper classification of services

Booking and Tracking Module

This module manages the service booking process. It includes:

- Creating service requests
- Assigning requests to providers
- Tracking service status (pending, ongoing, completed)
- Providing real-time updates to users

Location-Based Module

This module enables location-based service functionality. It:

- Identifies user location
- Displays nearby service providers
- Improves service response time and accessibility

System Test Results

The results of testing indicate that the Location-Based Household Service Management System performs efficiently and meets the required specifications. All tests were conducted successfully.

Function	Expected results	Actual results	Priority	Status
Login	Validate user credentials.	User authenticated.	High	Pass
User Registration	Register new users.	Users registered.	High	Pass
Service Search (Location-Based)	Show nearby providers.	Providers displayed.	High	Pass
Service Booking	Create service request.	Booking recorded.	High	Pass
Service Status Tracking	Track service status.	Status updated.	Medium	Pass
Provider Response	Manage service requests.	Requests handled.	High	Pass

Figure 2. System test results.

Communication Module

This module improves interaction between users and service providers. It includes:

- Notifications and updates
- Sharing contact details
- Better coordination for service completion

These modules work together to provide an efficient, user-friendly, and reliable household service management system.

TESTING AND IMPLEMENTATION

System Test Results

The results of the tests indicate that the location-based household service management system performs efficiently and meets the required specifications, as shown in Figure 2. All modules functioned correctly without major issues, and data were accurately stored and retrieved from the MongoDB database. The authentication system ensures secure login and registration, and API communication between the frontend and backend is smooth and reliable. Minor issues identified during testing were successfully resolved, ensuring overall system stability and performance.

Implementation

The location-based household service management system was implemented using modern web development technologies.

Frontend Implementation

The frontend interface includes pages, such as:

- Home page
- User registration and login page
- Service listing and booking page
- Service status and history page

React (Vite) was used to build a fast and responsive interface, Tailwind CSS for styling, and Axios to handle API requests and dynamic interactions.

Backend Implementation

Node.js and Express.js handle server-side operations, such as:

- Processing user requests

- Managing routes and APIs
- Handling authentication and authorization
- Connecting to the database

Database Implementation

MongoDB is used to store system data, such as:

- User details
- Service provider information
- Service requests and status
- Service history records

The database ensures the efficient storage, retrieval, and management of all service-related information.

RESULTS AND DISCUSSION

The implementation of the location-based household service management system demonstrated effective performance and usability. The system successfully provides a platform for users to find and book household services through an interactive web-based interface.

Users can easily search for nearby service providers, book services, and track their statuses in real time. Service providers can efficiently manage requests and update service progress. The integration of Node.js, Express.js, and MongoDB ensures smooth system functionality and efficient handling of data.

The platform improves accessibility to household services, reduces response time, and enhances the user experience through simple navigation and organized data management.

Screenshots: These screenshots show the successful execution of the backend server for the location-based household service management system using the Express.js framework. The backend server was initiated by navigating to the project's backend directory and running the main JavaScript file through the command prompt. The server started successfully, enabling API communication between the frontend and backend and ensuring the proper handling of user requests, service bookings, and database operations.

Figure 3 shows the homepage of the location-based household management system. At the top-right side, we can see the register option; clicking that navigates to the signup page.

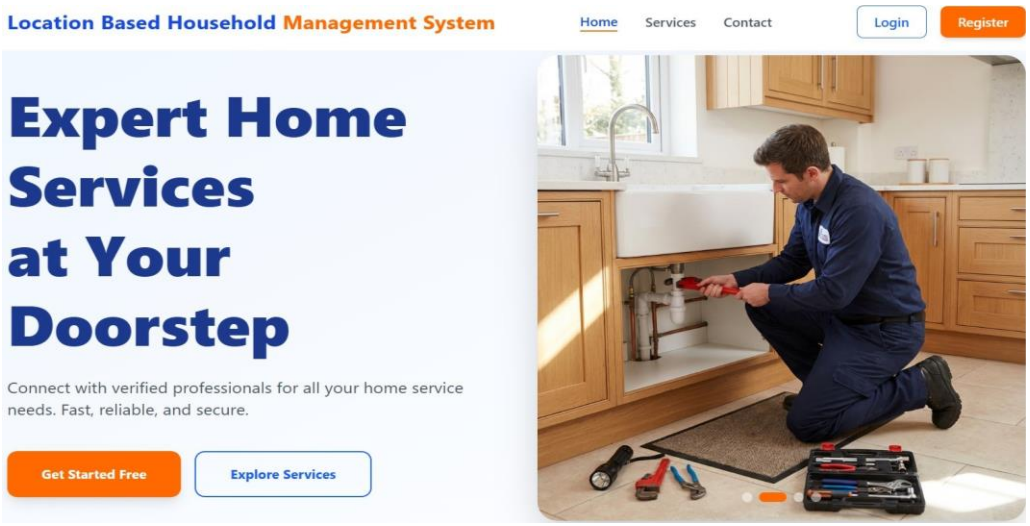

Figure 3. Home page.

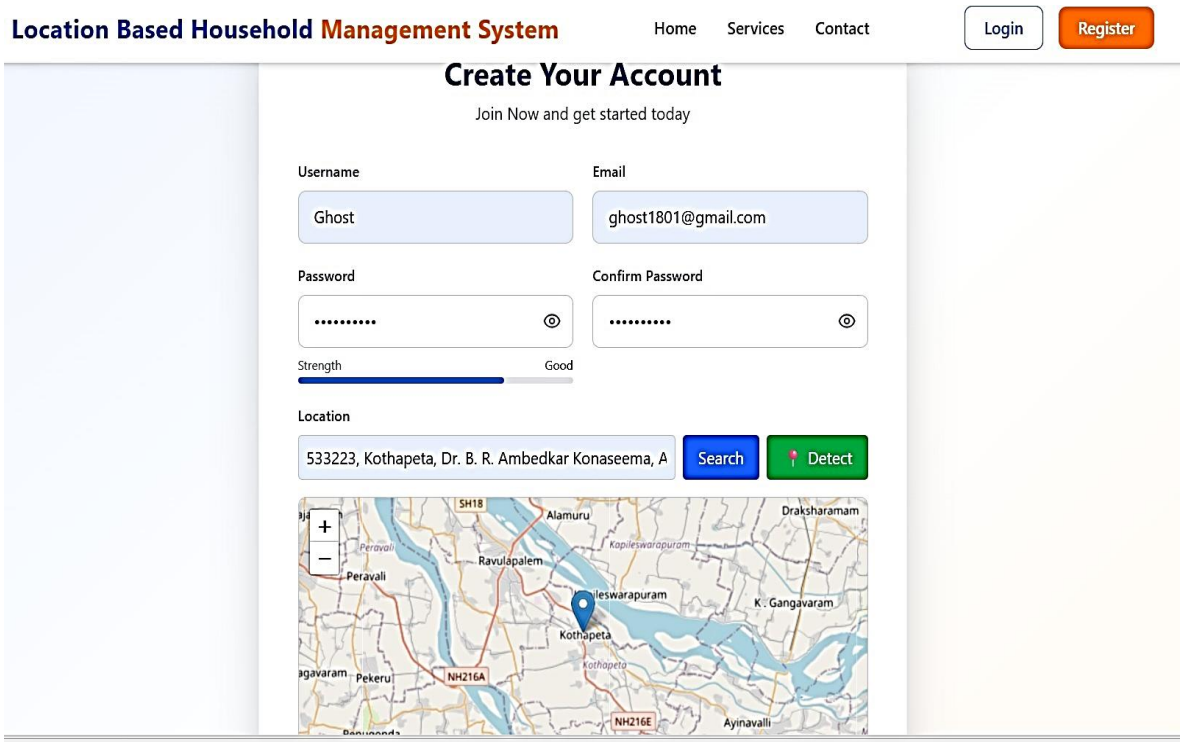

Figure 4. Signup page.

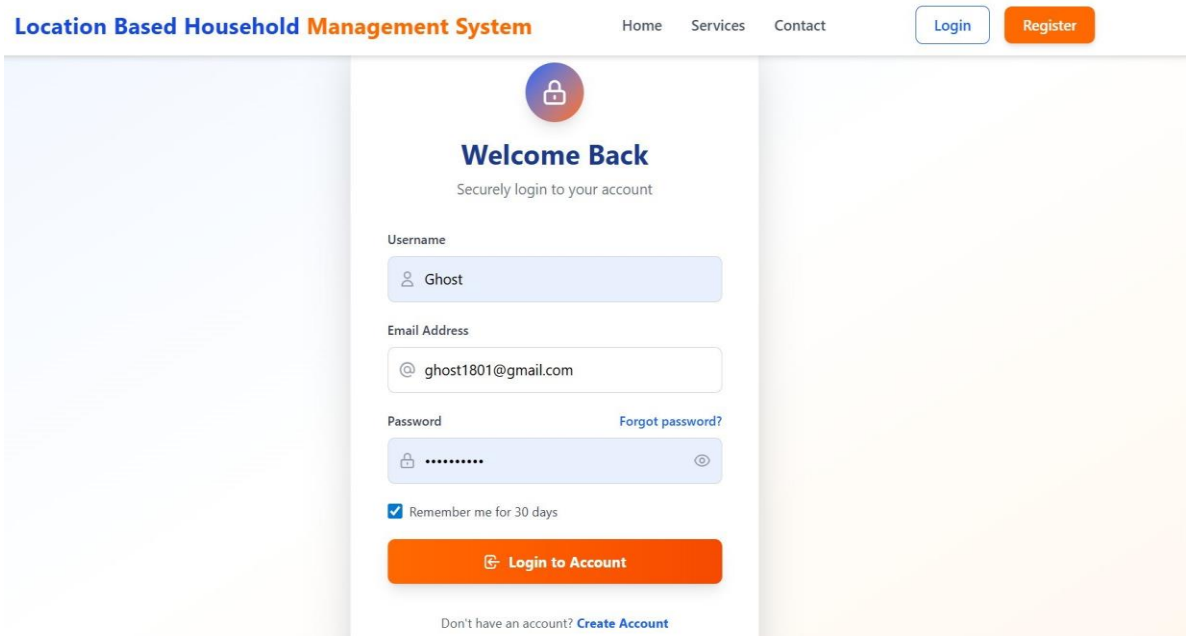

Figure 5. Login page.

Figure 4 shows the signup page where we can create a new account as a user or service provider according to our requirements. After account creation, we logged in by clicking the top-right login button, which navigated to the login page.

After a successful login, based on the need for services, we can book the services as a user, as shown in Figure 5.

Figure 6 shows our services that users can book easily by clicking on them.

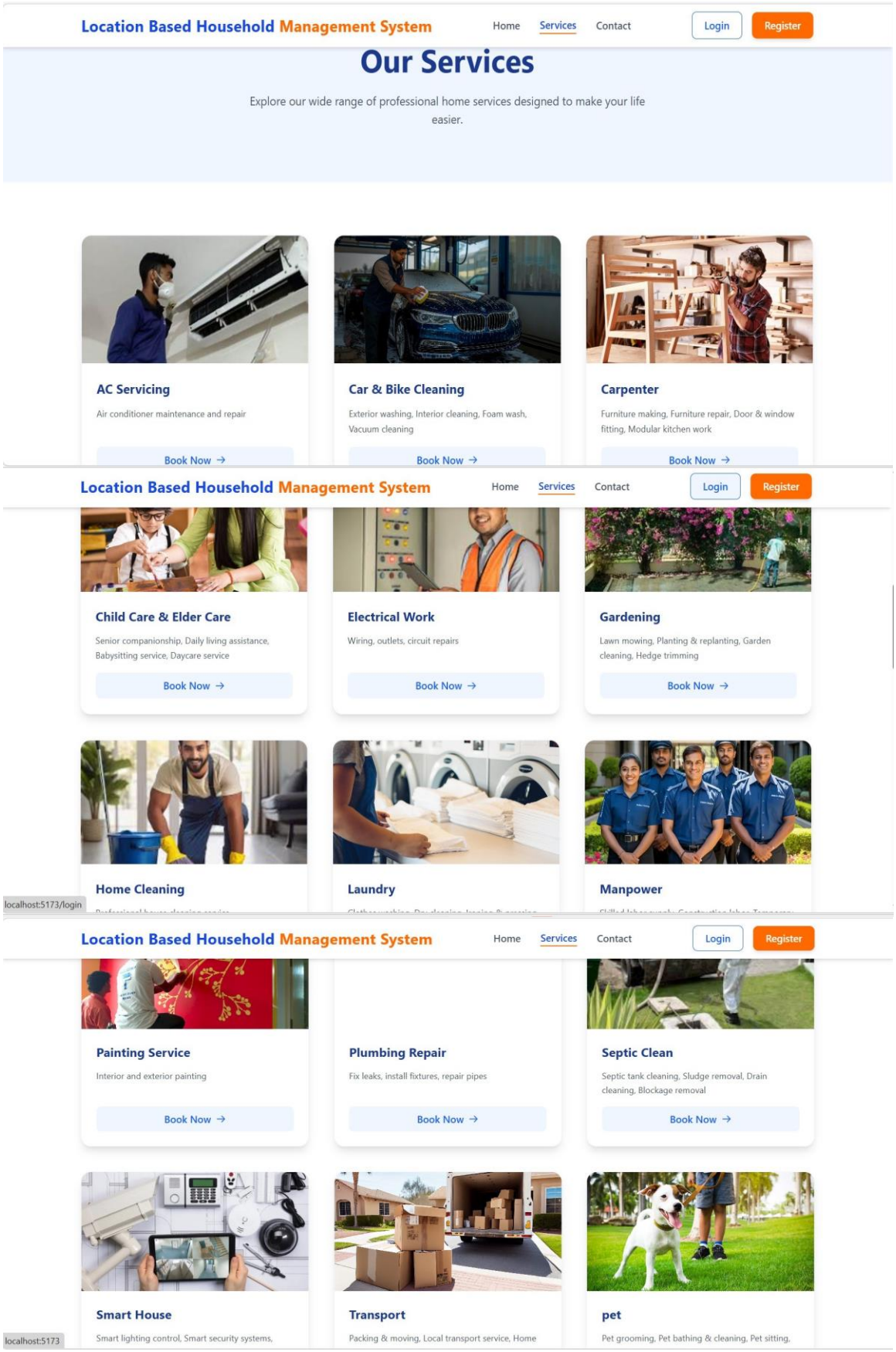

Figure 6. Our services page.

Figure 7 shows the user dashboard. After booking the service, the user can see the status of the service in the service tracking section of the user dashboard.

Figure 8 shows the service provider dashboard, where they can see the user bookings that are automatically assigned by the system or the admin. Based on the service and availability, the user can either accept or reject the service. Also, it shows the no. of requests they made and completed, which describes the efficiency and performance of the service provider.

Figure 9 shows the admin dashboard, which shows the total number of registered users and service providers and the number of bookings made by users. The admin can also monitor the access of the users, service providers' dashboards, bookings, services, and messages that are received from the Contact page.

Figure 10 of the contact page, where we can send our message to the admin directly.

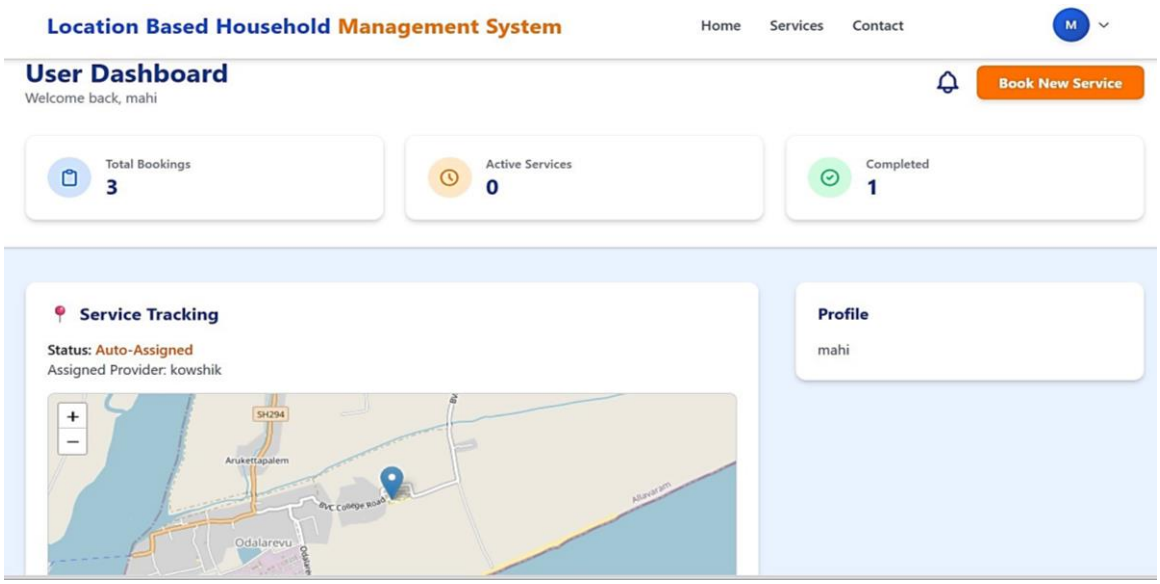

Figure 7. User dashboard.

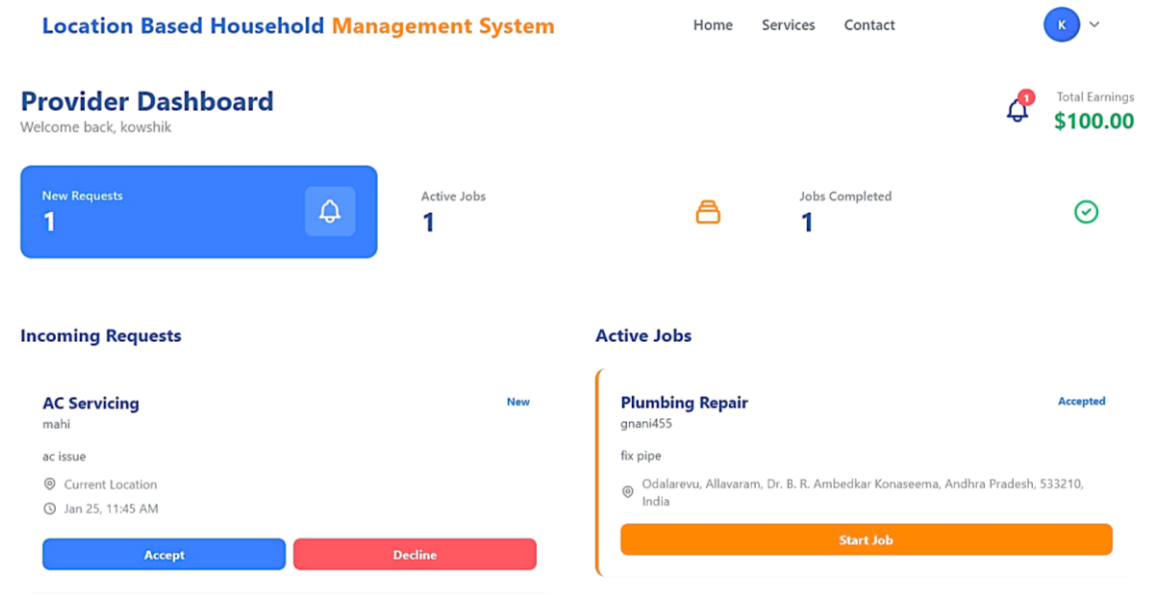

Figure 8. Service provider dashboard.

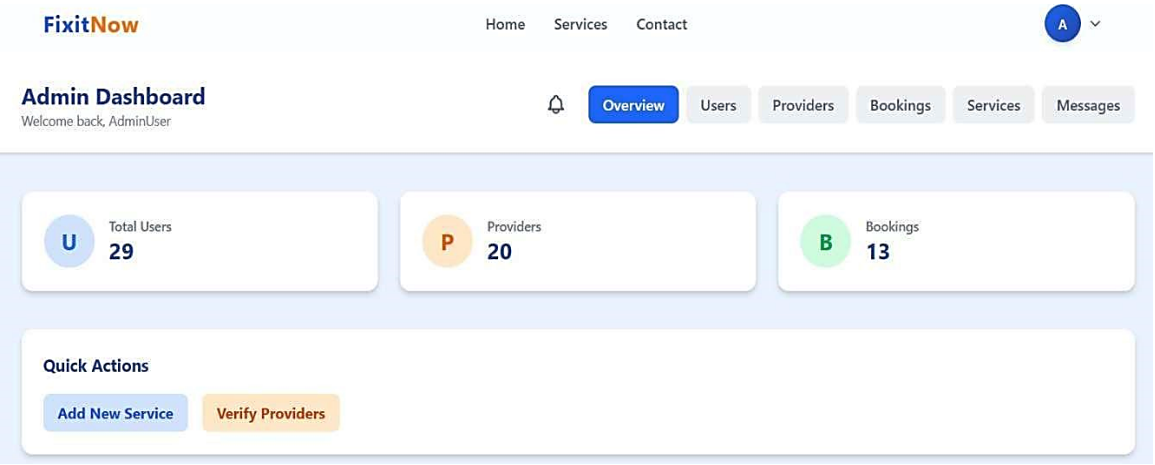

Figure 9. Admin dashboard.

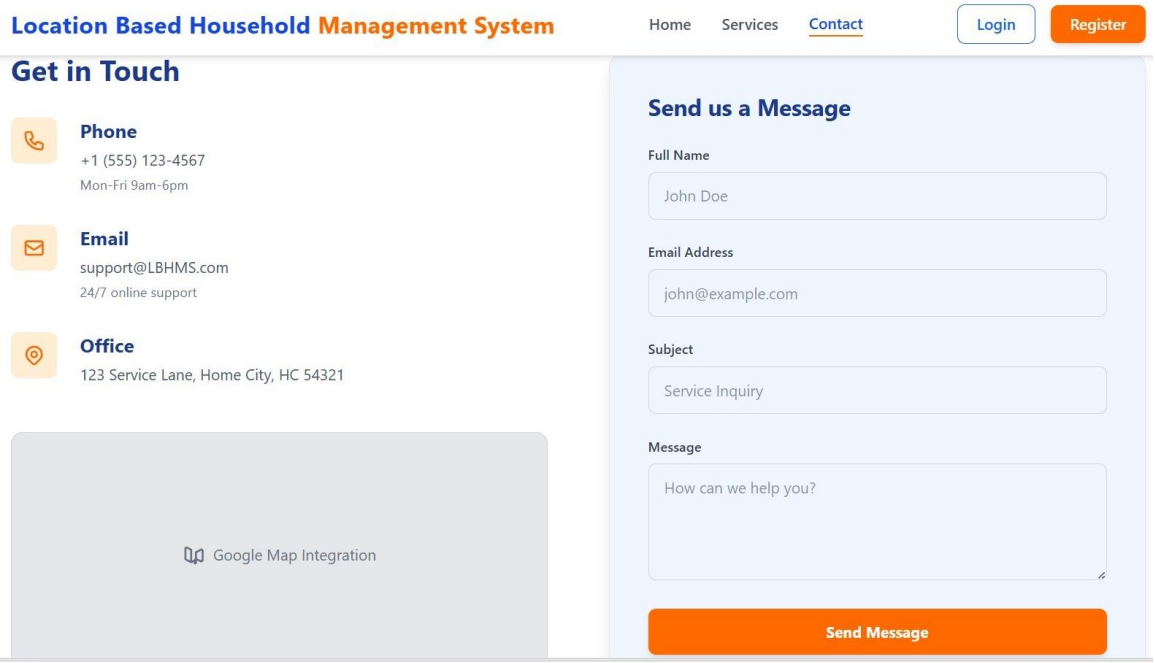

Figure 10. Contact page.

ADVANTAGES OF THE SYSTEM

The location-based household service management system provides several advantages:

- Easy and quick access to household services
- Location-based search for nearby service providers
- User-friendly interface for simple navigation
- Centralized platform for managing service requests
- Efficient data management using MongoDB

The system also improves service efficiency, reduces the response time, and enhances overall user satisfaction.

Future Scope

The system can be enhanced in the future by incorporating additional features, such as the following:

- Mobile application development for Android and iOS
- Online payment integration (Unified payments interface (UPI), wallets, cards)

- GPS-based real-time service tracking
- Multi-language support for different users
- Advanced security features like two-factor authentication

These improvements can further enhance the usability, scalability, and overall functionality of the system and prospects for expansion.

CONCLUSION

Household services are an essential part of daily life, and the need for quick and reliable service access has increased in recent years. The location-based household service management system provides a digital platform that simplifies the process of finding and booking household service professionals.

The system integrates modern web technologies, such as React (Vite), Tailwind CSS, Axios, Node.js, Express.js, and MongoDB, to create an efficient and user-friendly application. It allows users to easily search for nearby services, book requests, and track the progress of services in real time.

By improving accessibility, reducing response time, and ensuring better communication between users and service providers, the system enhances the overall service management. This project demonstrates how location-based and web technologies can effectively solve real-world household service challenges and provide scalable solutions for improvement.

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