



Mobile Application for Digitalizing Blue-collar Worker Services

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Abstract: In today's busy life schedule, dealing with household services like plumbing, carpentry, electricity, etc., is a major challenge. To address this issue, household service providers play a crucial role by offering essential services necessary for maintaining and ensuring the smooth functioning of households. However, customers often struggle to find reliable service providers, while service providers may face difficulties in finding employment or may encounter underpayment issues. To overcome these challenges, the "WorkIT" mobile application is proposed, which aims to digitalize the process of connecting blue-collar service providers and customers. The platform offers a user-friendly interface helping customers to get their job done and provides employment opportunities to service providers. This paper presents the design and implementation of the "WorkIT" application, highlighting its features and functionality.

IndexTerms - Blue-collar worker services, Household services, Mobile application, Service beneficiary, Service provider.

I. INTRODUCTION

In recent years, the use of mobile applications to order products, food, and many more things has increased rapidly. This trend has also led to demand for availing of essential household services, such as plumbing, masonry, carpentry, etc. just with a click of a button. To address this need, the main purpose of the paper is to develop a mobile application that handles basic household service management tasks by providing a user-friendly interface to customers (referred to as service beneficiaries) as well as service providers. The proposed system "WorkIT" is innovative and provides an edge over existing solutions [1]-[12] because it combines multiple features into a single app, such as searching service providers, posting service requirements, interacting with service providers, and booking services. Whether the job is short-term or long-term, service beneficiaries can choose from a wide range of services, such as plumbing, masonry, carpentry, and others. Unlike other applications, target users of "WorkIT" include both service providers as well as service beneficiaries. Users can log in as either a service beneficiary or a service provider. The framework is designed to cater to both customers and service providers, even those with limited education [1]. To enhance convenience and accessibility, a mobile application is preferred over a website [2]. This allows users to access the application anytime and anywhere, providing a more user-friendly experience for both customers and workers.

The service beneficiary receives a list of all service providers who offer specific services, and he or she can also use a filter to get a list of service providers in that particular region. After completing the task, the user can provide feedback on the service provider's performance. By integrating all services into a single app, "WorkIT" offers immense convenience and efficiency to both customers and service providers.

On the contrary, the system developed by Poonam et al. [3] and Indravan et al. [4] acted as a middleman between the service provider and the customer. Customers willing to seek services had to book the service and pay through the application. Following this, service providers from the organization will perform the task. "WorkIT" allows direct communication between customer and service provider which will overcome the issue of having a mediator as the service providers may get underpaid and even customers may be overcharged.

Services beneficiaries can post about their service requirements, and service providers will bid on these posts with a quotation. G.H.A.J. Sarathkumara [5] claims that it is difficult to find the most suitable service provider for the relevant service. Even if one finds someone to give the service, in certain cases, the individual does not have the necessary skill set or expertise. Hence, the service beneficiaries can review the bid request made on the job post as well as the service providers' profiles and decide whether to accept the proposed offer.

Furthermore, Malvi et al. [6] observed that in rural areas, it is a significant challenge to find reliable and trustworthy technicians. There are only a few qualified technicians who charge a premium amount for their services. In some cases, service providers do not disclose their fees, leaving customers with limited options but to agree to the services without knowing the cost. This lack of transparency puts customers in a difficult position, as they have little bargaining power or alternatives to choose from. Also, due to a

lack of competition in the service industry, many freshers don't get enough opportunities and might remain unemployed. Thus, the service beneficiaries and service providers must communicate to gain a better understanding of the specifications of the service, which can be handled by including a chat system in the application.

To ensure the authenticity of service providers, Agrawal, D.K.K., Goel, T., Gariya, T. and Saxena, V. [1] suggested that the service should start only when the customer enters the OTP (One Time Password) in the application given by the worker at their doorstep.

One of the key features of "WorkIT" is that it allows service providers to upload images as posts on the platform referring to previous services they provided; this will assist service beneficiaries in hiring the right service provider. A research study conducted by Pathak, R., and Salunkhe, P. [7], showed that expectation plays an important role in service quality. Providing home services will always be in demand but it is necessary to ensure that the satisfaction level of consumers is also met. Thus, after completing the assigned task successfully, service beneficiaries can rate the service provider's work on their profile. As a result, the platform helps to bridge the gap between service providers and service beneficiaries.

The mobile application specifically addresses challenges encountered when hiring blue-collar workers who are engaged in manual labor and compensated on an hourly or piecework basis. Its key goal is to establish a platform that connects the target users, which includes service providers and service beneficiaries. Communication features allow service beneficiaries and service providers to engage in discussions and clarify task specifications [8]. Additionally, service providers can showcase their previous work by uploading images as posts, aiding service beneficiaries in selecting the most suitable provider for their needs. After completing a task, service beneficiaries can rate the service provider's performance, further enhancing the transparency and trust within the platform. Ultimately, "WorkIT" serves as a valuable bridge between service providers and service beneficiaries.

II. SYSTEM TOOLS

The following are the major tools used in the application.

Flutter - The Flutter Software Development Kit (SDK) is based on the Dart programming language developed by Google and used to develop cross-platform applications. Using a single codebase, Flutter enables the creation of mobile applications that can run on both iOS and Android. By doing this, development time and effort are drastically reduced when compared to creating distinct applications for each platform. Flutter is a widget-based technology. This means that one can apply object-oriented programming to any element. It also allows a high degree of flexibility and customization, enabling to create visually appealing and interactive user interfaces. The hot reload feature makes the app development much quicker, there is no need to reload the app to see every single change made in the code. One can easily integrate device-specific functionalities like cameras, geolocation, sensors, and more into Flutter applications. Table 1 provides a comprehensive comparison between Flutter and React Native, two popular frameworks for cross-platform mobile app development which highlights key differences which help to evaluate and make informed decisions while choosing the most suitable framework for the projects.

Table 1 Comparison between Flutter and React Native

Feature	Flutter	React Native
Performance	Flutter compiles down into truly native apps, resulting in better performance.	Flutter compiles down into truly native apps, resulting in better performance.
Competitive Advantage	Flutter compiles down into truly native apps, resulting in better performance. Flutter aims to work on any platform, including the web, screens, and non-mobile devices, giving it a broader scope.	Flutter compiles down into truly native apps, resulting in better performance. React Native is limited to iOS and Android devices.
Language	Flutter compiles down into truly native apps, resulting in better performance. Uses Dart programming language, which is object-oriented and requires developers to learn a new language.	Flutter compiles down into truly native apps, resulting in better performance. Uses JavaScript, a popular language among web developers, allowing developers with JavaScript knowledge to transition easily.
User Interface (UI) Components	Flutter compiles down into truly native apps, resulting in better performance. Provides its own set of customizable UI components called "widgets" that deliver a native look and feel on each platform.	Flutter compiles down into truly native apps, resulting in better performance. Utilizes platform-specific UI components, such as "View" and "Text," which closely resemble the native components of the target platform.
Native Access	Flutter compiles down into truly native apps, resulting in better performance. Offers direct access to native Application Programming Interfaces (API) and functionalities through platform channels, enabling seamless integration with device-specific features.	Flutter compiles down into truly native apps, resulting in better performance. Provides access to native APIs and functionalities through third-party libraries or modules, which may require additional setup and configuration.

Node JS - Node.js is an open-source and cross-platform JavaScript runtime environment. Node.js is a popular choice for mobile application development because it is efficient at handling concurrent connections and real-time communication. Concurrent connections are when multiple users are interacting with a mobile app at the same time. Node.js can handle thousands of concurrent connections with a single server, which is essential for mobile apps that need to be able to handle a lot of traffic. Real-time communication is when data is exchanged between users in real-time. This is often used for chat functionality or data synchronization.

Node.js is efficient at handling real-time communication because it uses a single-threaded event loop. Thus Node.js can handle multiple requests without blocking the thread and wasting Central Processing Unit (CPU) cycles.

Express JS - Express.js is a small framework that works on top of Node.js web server functionality to simplify its APIs and add helpful new features. It makes it easier to organize the application’s functionality with middleware and routing. Express.js makes it easy to define routes for the application, which maps Hypertext Transfer Protocol (HTTP) verbs to specific functions. This makes it easy to organize the application's functionality and ensure that requests are handled correctly. Express.js middleware can be used to add additional functionality to your application, such as authentication, logging, and error handling. It can be used with any database that is supported by Node.js.

Firebase - Firebase is a Backend-as-a-Service (BaaS) app development platform that provides hosted backend services such as a real-time database, cloud storage, authentication, crash reporting, machine learning, remote configuration, and hosting for static files. Firebase Authentication is used in “WorkIT” as it provides backend services & easy-to-use SDKs to authenticate users to the app. It supports authentication using passwords, phone numbers, and popular federated identity providers like Google, Facebook, Twitter, and more. Authentication using a phone number is preferred over email addresses and passwords, as it offers greater convenience for service providers who may not want to deal with the hassle of remembering login credentials.

MongoDB - MongoDB Atlas is a fully-managed cloud database that handles all the complexity of deploying, managing, and healing deployments on the cloud service provider of choice. MongoDB Atlas is the best way to deploy, run, and scale MongoDB in the cloud. Table 2 provides a clear overview of the differences between MongoDB and Structured Query Language (SQL), considering factors such as database type, data representation, data organization, schema, hierarchical data storage, query complexity, scalability, and consistency. Evaluating these differences helps to determine the most suitable database management system.

Table 2 Comparison between MongoDB and SQL

Feature	MongoDB	SQL
Database Type	MongoDB is a document-based, non-relational database management system, known as an object-based system.	SQL is a table-based system, where the table-based architecture serves as the data query structure for search.
Data Representation	MongoDB stores each record as a separate document.	SQL stores each entry as a "row" in a database table.
Data Organization	Documents from a specific class or group are kept in a "collection" in MongoDB.	Rows (also known as records) of a similar type are stored in a "table" in SQL databases.
Schema	MongoDB has a dynamic schema, allowing flexibility in the data structure.	SQL databases have fixed or static schemas, where the schema is predefined and determines the structure of the data.
Hierarchical Data	MongoDB is well-suited for hierarchical data storage.	SQL databases are not well-suited for hierarchical data storage.
Query Complexity	MongoDB is not as efficient for complex queries.	SQL databases excel at handling complex queries.
Scalability	MongoDB is horizontally scalable, allowing the addition of more servers to handle the increased load.	SQL databases are vertically scalable, meaning they can handle the increased load by upgrading hardware on a single server.
Properties	MongoDB follows CAP (Consistency, Availability, Partition tolerance) properties.	SQL databases follow the ACID (Atomicity, Consistency, Isolation, Durability) properties for ensuring data integrity.

Cloudinary - Cloudinary is a cloud service built using Amazon Web Services (AWS) Simple Storage Service (S3) that makes image and video storage and management easy and convenient. Cloudinary's Flutter SDK provides simple, yet comprehensive image and video transformation, optimization, and delivery capabilities that can be implemented using code that integrates seamlessly with the Flutter application, enabling it to deliver Cloudinary transformed and optimized images and videos inside Flutter widgets. “WorkIT” integrates Cloudinary, to efficiently handle multimedia content uploaded by users. Images are hosted by using Cloudinary provider and then it returns an URL that is referenced in the database.

III. SYSTEM FLOWCHART

Figure 1 illustrates the flowchart of the service beneficiary workflow in "WorkIT", showcasing the process from account creation to finding and hiring service providers. Figure 2 depicts the flowchart of the service provider workflow, showcasing the process from registration to accepting service requests.

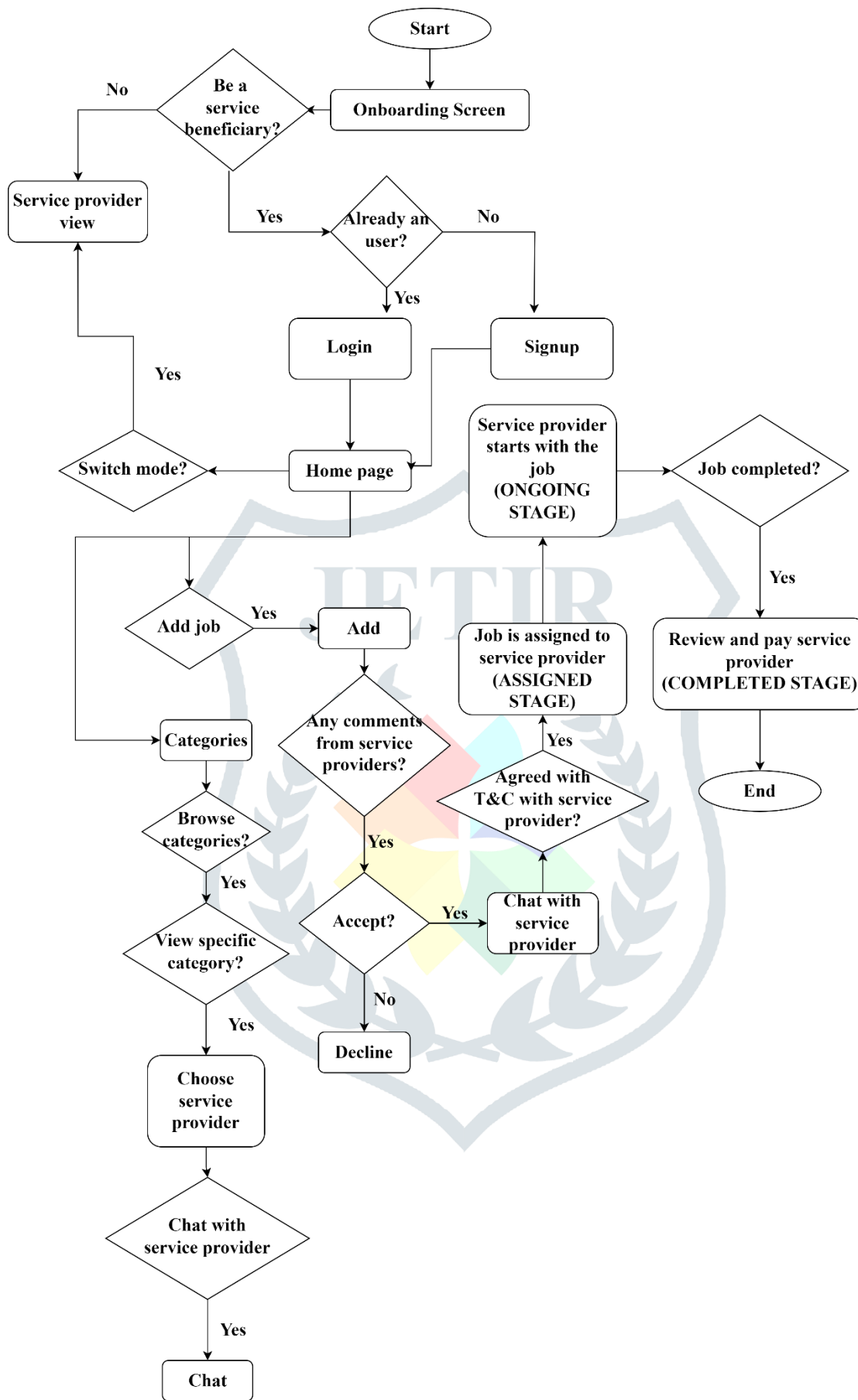


Figure 1 Flowchart for Service Beneficiary

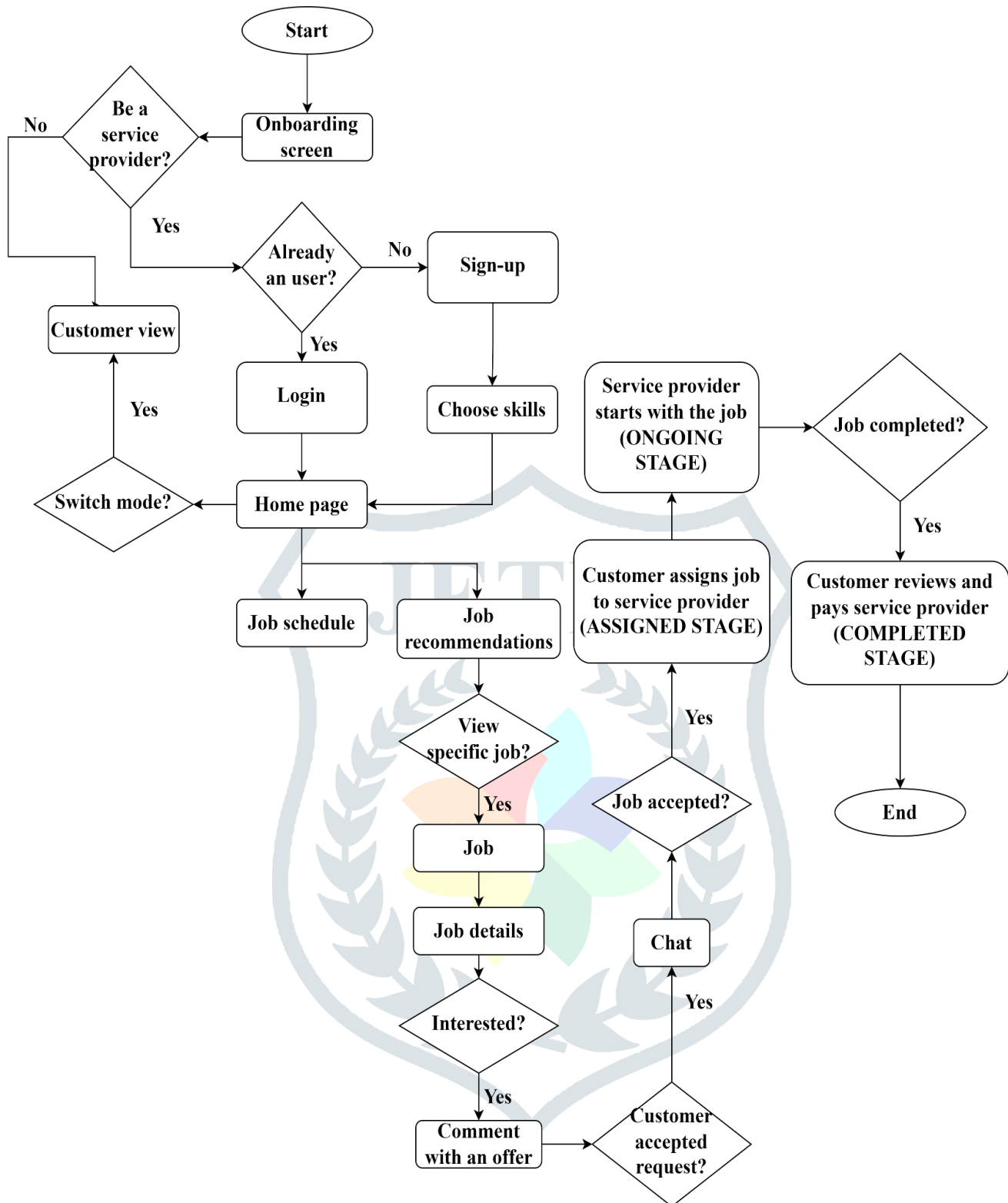


Figure 2 Flowchart for Service Provider

IV. SYSTEM MODULE

The “WorkIT” application has two main actors: the service provider and the service beneficiary. The application offers service beneficiaries the capability to register on the platform, post their job requirements, engage in chat communication with service providers, assign jobs to selected service providers, make payments for services rendered, and provide reviews and ratings for the service provider upon job completion. Simultaneously, service providers can create profiles highlighting their skills and competencies, enabling them to bid on the job posts made by service beneficiaries. Unlike, the system developed by Dharani et al. [9] and Gadiya et al. [10], “WorkIT” does not limit to only a few service categories. Service beneficiaries can seek service for various types of services.

The following are the application modules:

Onboarding Module - The onboarding screen allows users to select their desired role as either a service provider or a service beneficiary during the registration process. Figure 3 illustrates an onboarding screen. Users can also switch from customer to service

provider mode and vice-versa through the settings module. This will provide users with the flexibility to switch between roles and utilize the application in a way that aligns with their specific use case.



Figure 3 On-boarding screen

Registration and Login Module - The service providers can register for free as compared to the system implemented by Kasamani, B.S., and Gikundi, D. [11] where the service provider has to pay to activate the account, which may limit the use of the application only to a few service providers. Once the user chooses the desired role, he or she will be directed to the login screen wherein the user can log in using their credentials. Figure 4 illustrates the login screen. If a user is not registered on the application, the user can register using his or her phone number. Figure 5 illustrates the registration screen. An OTP will be sent to the registered phone number using which the user can create his or her account. Figure 6 illustrates an OTP screen.

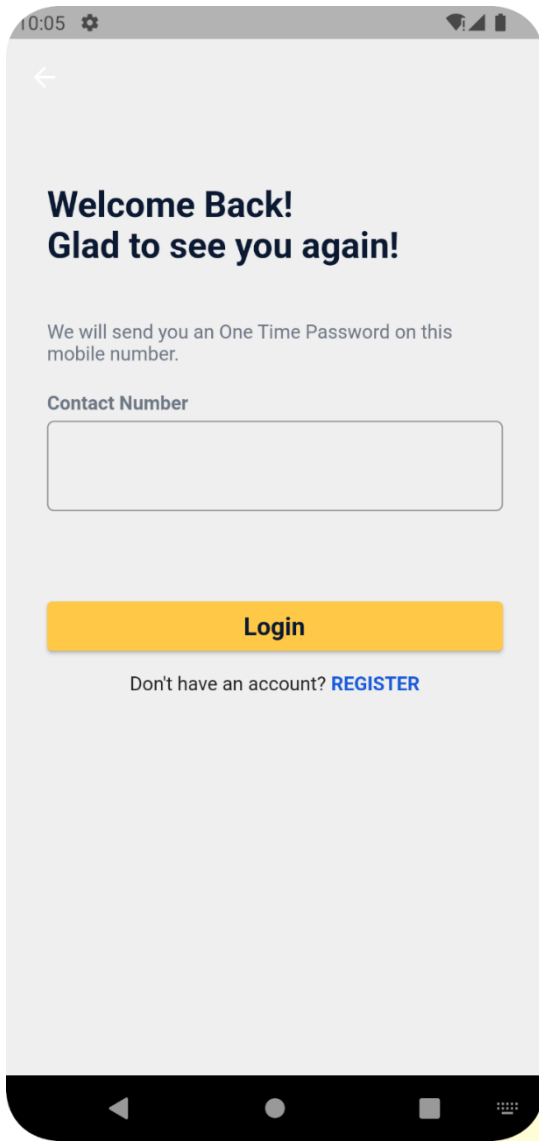


Figure 4 Login screen

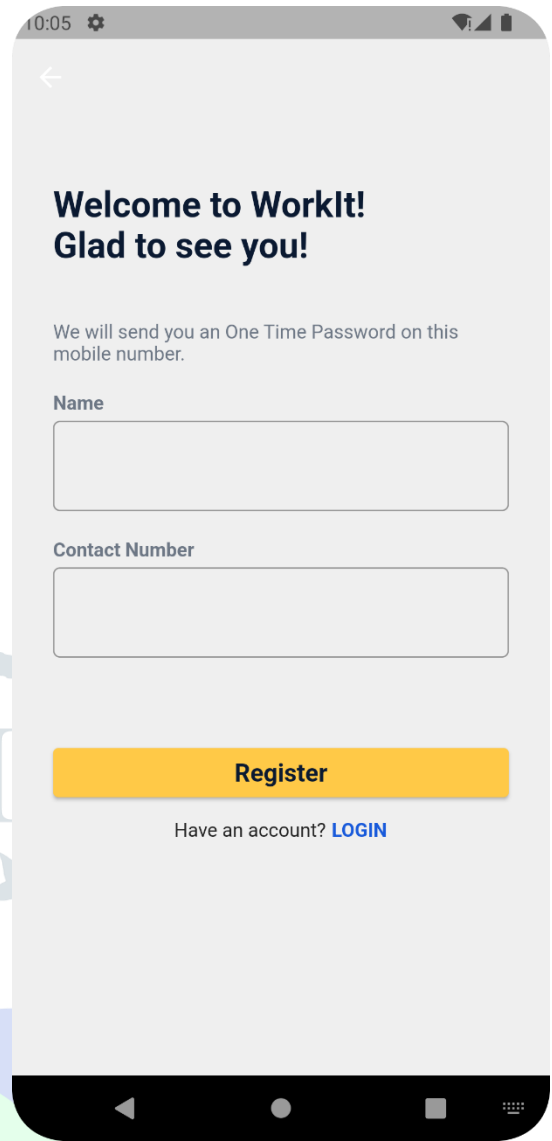


Figure 5 Registration screen

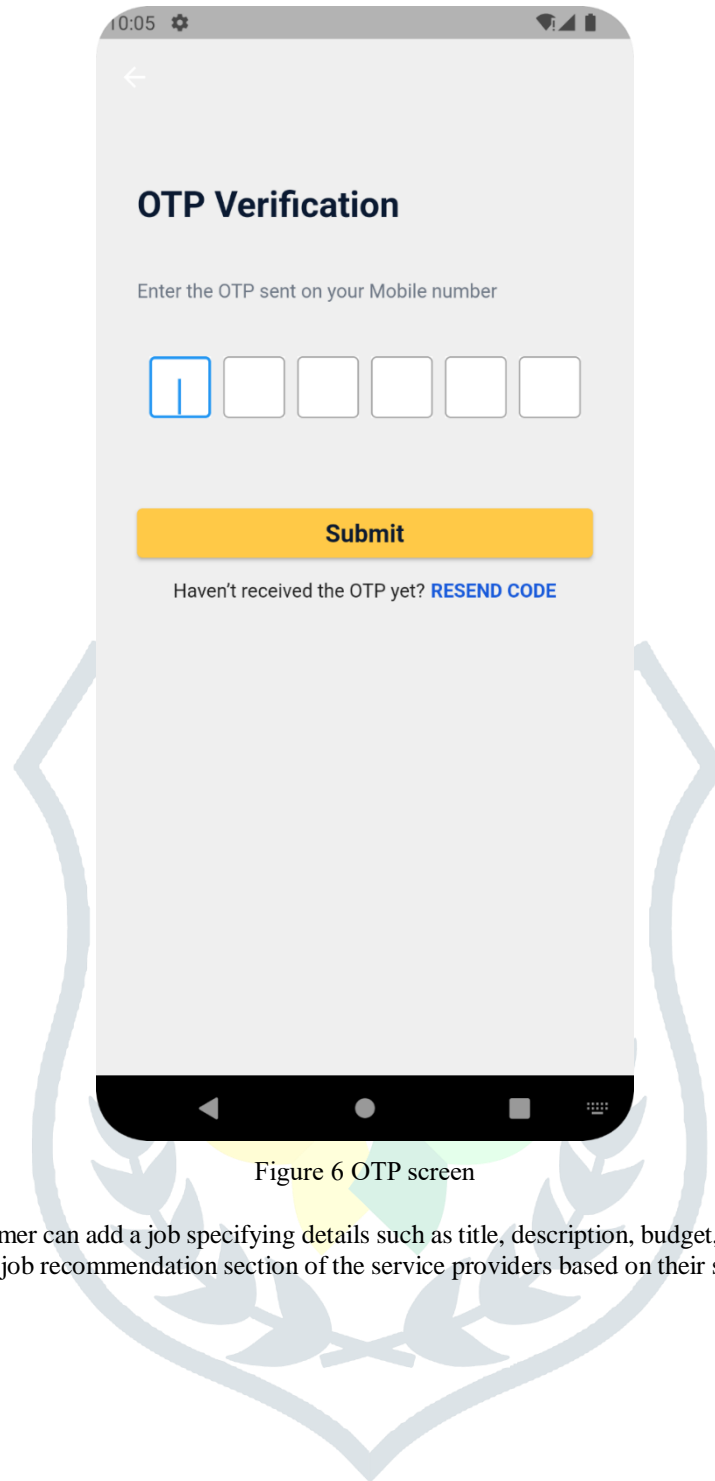


Figure 6 OTP screen

Add Job Module - A customer can add a job specifying details such as title, description, budget, location, skills, date, and image. This job post will appear in the job recommendation section of the service providers based on their skills. Figure 7 illustrates add job screen.

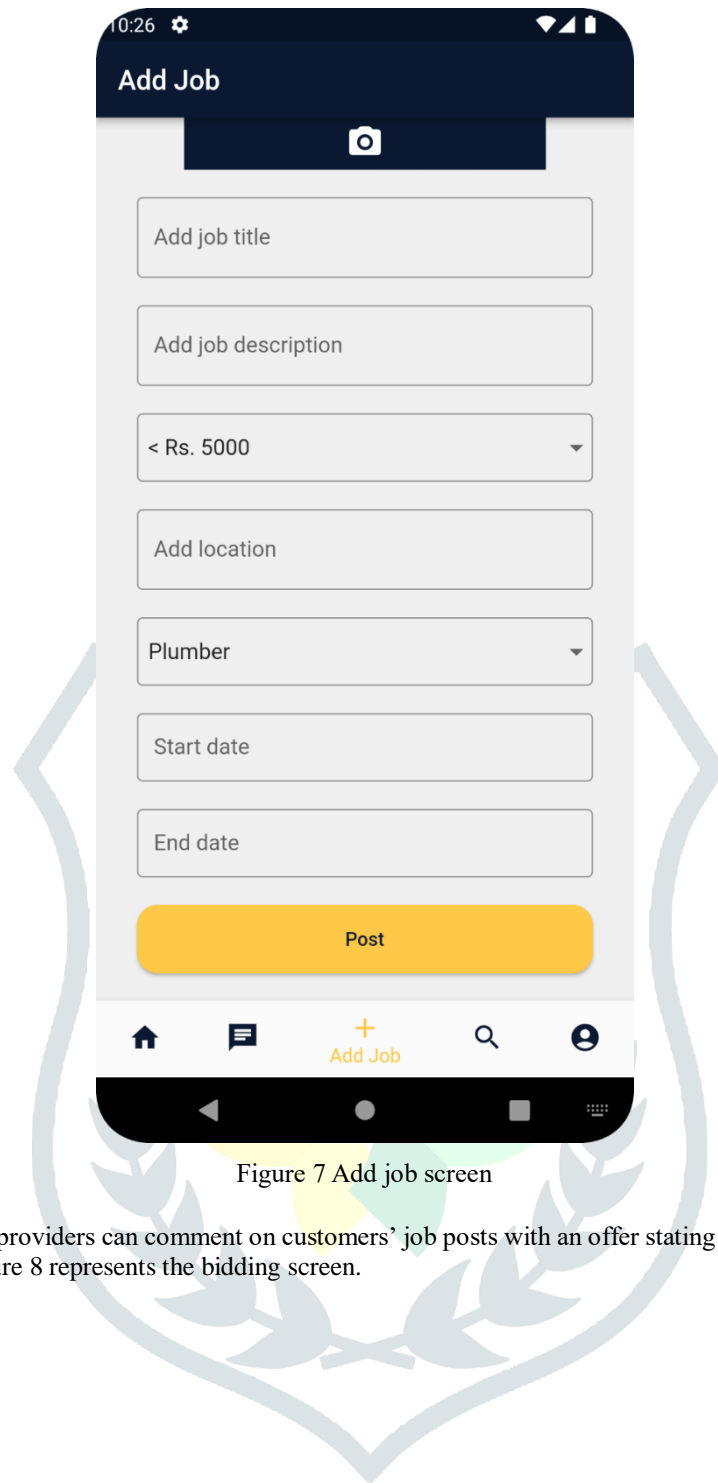


Figure 7 Add job screen

Bidding Module - Service providers can comment on customers' job posts with an offer stating the amount at which he or she is willing to perform the job. Figure 8 represents the bidding screen.



Figure 8 Bidding screen

Chat Module - Unlike the system developed by Sharma et al. [8] where the service provider who accepts the job request first will be assigned to the customer, the proposed system allows the customer to choose the service provider based on their profile and then further customers can initiate a chat with the chosen service provider to discuss job details and requirements. This provides an advantage to the customer to choose a service provider on their skills. Figure 9 illustrates the chat screen. Similar to the feature of availability of the application in a regional language as developed by Bhalgat et al. [12], the proposed system has a chat translation system which allows users to switch language between English and Hindi, to facilitate effective communication for service providers with limited language proficiency. A translation module as seen in Fig.10 is implemented that converts chat conversations between customers and service providers from English to Hindi.

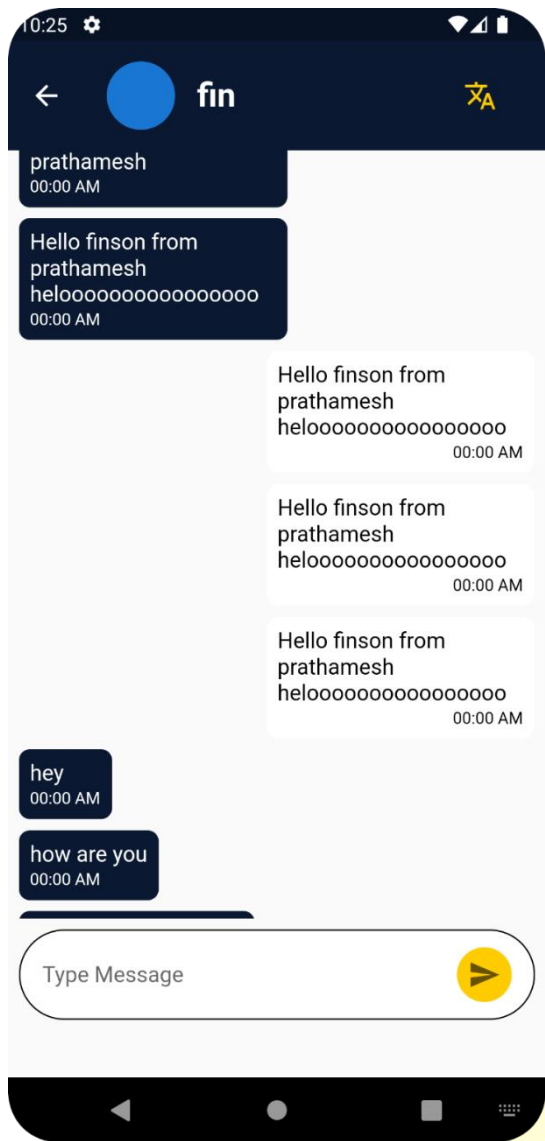


Figure 9 Chat screen

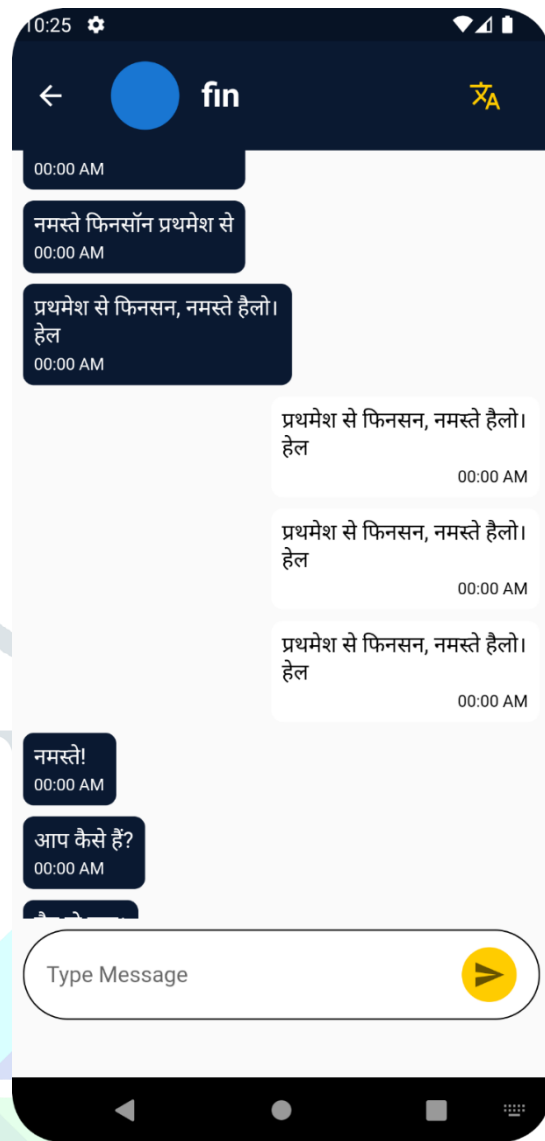


Figure 10 Translated chats screen

Job Assigning and Verification Module - Once the service provider and customer have decided upon the job details, the customer can assign the job to the service provider. Upon the service provider's arrival to perform the task, the customer will generate an OTP, which will be sent to the service provider. The service provider will then share the received OTP with the customer, enabling a verification process to ensure the identity of the service provider. Figure 11 represents the job assignment screen.

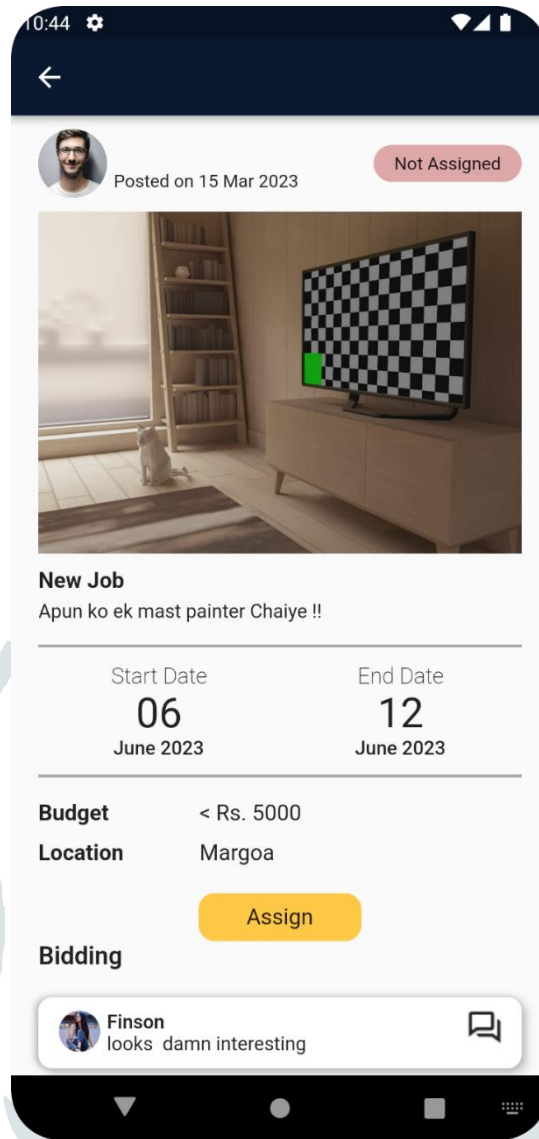


Figure 11 Job assignment screen

Review Module - Once the assigned job is completed, the customer will pay and review the service provider's work on the application. Reviews will appear on the service provider's profile which will be beneficial for other customers seeking to hire their services, providing them with beneficial insights into the service provider's capabilities and quality of service. Figure 12 represents review and pay screen.

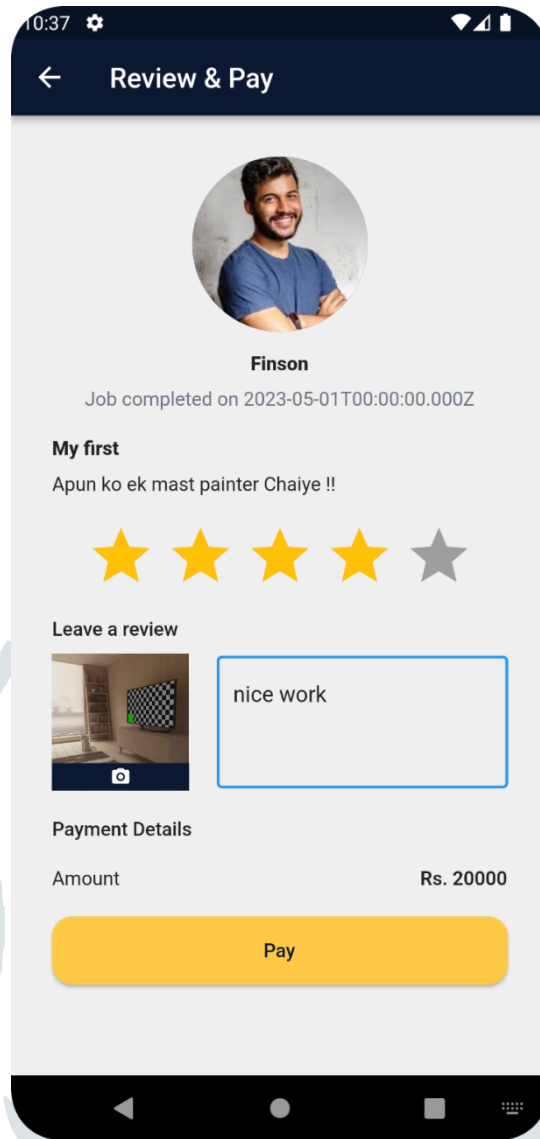


Figure 12 Review and pay screen

Post Module - The service provider can improve his or her portfolio by adding images of any previous work done, thereby presenting potential customers with visual evidence of their expertise and the quality of services they offer, and hence opportunities for securing new projects will increase. Figure 13 represents post screen.

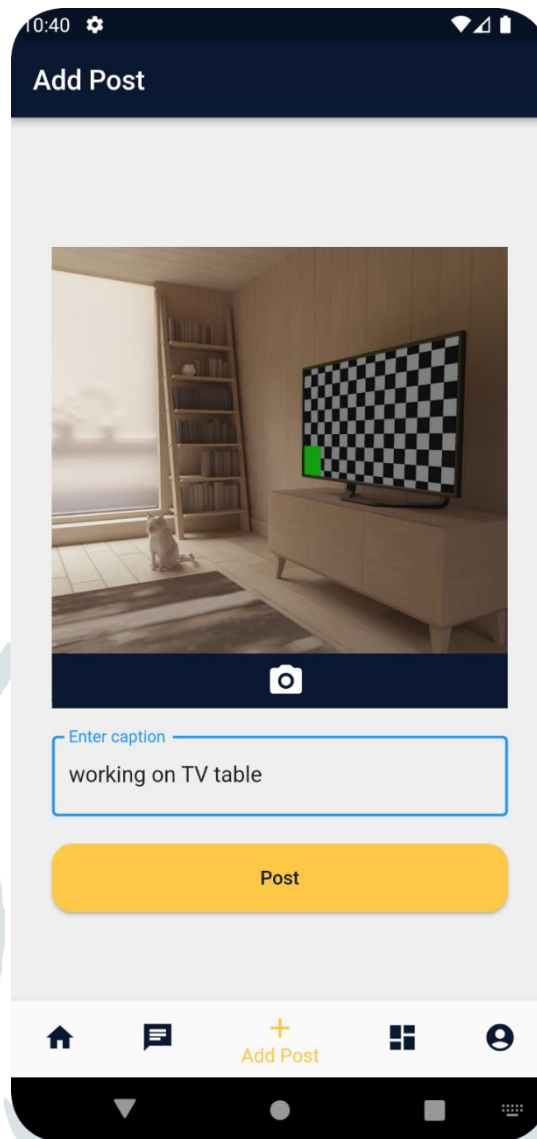


Figure 13 Post screen

Edit Profile Module - Customers and service providers can edit their profiles.

V. RESULTS

The proposed solution offers a platform wherein service beneficiaries and service providers can connect without any hassle. This problem is tackled by creating a service provider's portfolio of all their work and reviews from their previous service beneficiaries. Since the service provider has to depend on their network and has to go in search of a new job every time, WorkIT provides a platform for service providers to post their services and allows service beneficiaries to post their job requirements and get quality services at a competitive price. The application is user-friendly and provides a safer environment for both service beneficiaries and service providers.

VI. CONCLUSION

"WorkIT" provides a platform for both customers and service providers to eliminate major challenges encountered in current internet-based home service assistance platforms. It facilitates direct communication between customers and service providers, eliminating the need for mediators [1], and offers multilingual support. Instead of limiting service categories [9, 10], "WorkIT" covers a wide range of service categories, expanding its use case. It allows price bargaining and allows customers to choose service providers based on their portfolio instead of first-come first-serve basis [6]. As a mobile application, it provides convenient access anytime, anywhere compared to website-based solutions [12]. Thus, "WorkIT" offers a comprehensive and efficient solution that aims to revolutionize the digitalization of blue-collar worker services.

VII. FUTURE SCOPE

The following features can be added to further improve the application:

- **Location-Based Map Feature:** Users will be able to navigate and discover nearby service providers, allowing them to select the most suitable options.
- **Payment Module:** It will allow simplify the process of making transactions within the app.
- **Improving chat module:** The chat module can be further enhanced to allow users to send images, videos, and files.
- **Authenticating service providers:** To ensure the authenticity and credibility of service providers, an Aadhar card verification system can be implemented, enabling customers to verify the identity of the service providers.

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