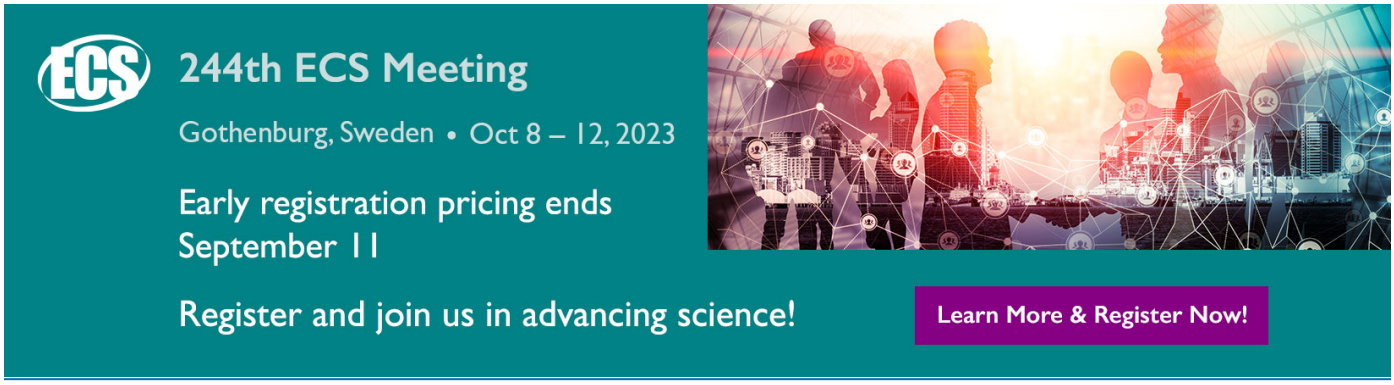
Development and Implementation of Location-Based Mobile Job Portal for Blue-Collar Jobs in Nigeria



Development and Implementation of Location-Based Mobile Job Portal for Blue- Collar Jobs in Nigeria.

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Abstract-
Due to the unavailability of white-collar jobs and a steady rise in the unemployment rate in Nigeria, it has caused many Nigerians to stop their search for white-collar jobs and pick up blue-collar jobs alternative source of income. However, due to high capital demands to open workspace and a general lack of business advertisement, most blue-collar businesses start-up never make it out of the infant stage. Location-based service (LBS) was aimed at solving the above problem. And the implementation of an android E-commerce mobile application that helps blue-collar artisans find job opportunities within their locality. This paper describes the architecture of location-based service and design and develops a mobile app to mitigate the issue stated above.
Keywords: blue-collar, development, jobs and service

1. Introduction

Employment is one of the significant social and economic issues faced by every nation. According to the National Bureau of Statistics, Nigeria's unemployment rate has been on the rise since the last quarter of 2014. Rising from 7.5 percent in the first quarter of 2015 to a record-high of 18.8 percent in the third quarter of 2017 [1]. It is estimated that 4 in every 10 Nigerian are either unemployed or underemployed [1]. The rise in unemployment has caused a ripple effect in the Nigerian labor market, as citizens have started to abandon their search for white-collar jobs and pick-up blue-collar jobs as an alternative. A research conducted by Nations Newspaper stated that more people view various forms of blue-collar jobs as a more viable source of income. It is estimated that informal jobs contribute 41.1 percent of the Nigerian GDP and 68.0 percent of the Jobs created between 2013 and 2016 [2]. With these statistics, it is apparent why this shift was necessary for the country. E-commerce or online business platforms are prominent market places for the exchange of goods and services. For many people, e-commerce is something they participate on daily basics, like payment of bills and purchase of goods. The history of e-commerce can be traced to the Electronic Data Interchange (EDI) created in the 1960s [2]. It aided the transfer of data from one computer system to another. Thus, enabling the first B2B (Business to Business) paperless transaction in the world. This was effortless and required little human intervention.

In 1982, France launched the world's first online service, the Minitel. It used a teletex system that was accessed through telephone lines and was free to telephone subscribers. It connected millions of users. It was reported that goods and services worth over a billion-dollar were purchased on the platform [3], making it the first-ever B2C (Business to Customer) platform. The Minitel system became absolute due to the exponential growth of the internet. In the mid-1900s saw remarkable advancement in the use of the internet as the means of doing business. With the birth of companies such as; Amazon (1995), eBay (1995) and Alibaba (1999) the

leading online E-commerce services in the world, Yahoo (1995) and Google (1998) two of the world's most significant search engines and PayPal (1998) the largest online payment portal. These companies will redefine business to Customer (B2C) transactions and pave the way for more technological advancement.

Location-Based Services (LBS) represent the next generation of e-commerce made possible by advancement in modern technology and the internet [4]. LBS are technologies that leverage the advantages of the E-Commerce, Mobile Application, and Global Positioning System to create an entirely new E-Commerce branch. Axel Küpper defined LBS as a 'mobile service for providing information that has been created, compiled, selected or filtered under consideration of the user's current locations through a mobile devices'[5]. LBS leverages real-time geo-location of a mobile device to compile and recommend services for its user [6].

1.1 Location-Based Service Architecture

LBS is not a standalone technology and incorporates the use of other technologies in other to function. These systems interact with each other at various levels to help retrieve or render the service requested by the user [7]. These systems are geo-positioning, communication network, service and content provider, and mobile user. The geo-position system retrieved the user's geo-coordinates through a network and sent data from the service user to the service provider and vice server. At the same time, the mobile device is used by the end-user to access the framework.

1.2 Mobile internet access: In other to request a service, a user has to be equipped with a mobile phone. Mobile phones are powerful and yet portable gadgets, and they allow users to access the LBS platform and provides a means of tracking the user.

1.3 Location-Tracking and Handset-Based Positioning System: All modern mobile phones come with in-build location tracking systems, handset-based technology, and cellular positioning technology. This technology utilizes the use of in-built tracking technologies within the electronic device in tracking its user. Global Positioning System (GPS) is the most accurate form of a handset-based mobile positioning system. It can estimate the positioning of users precisely up to few meters [8]. But it also has its hindrance, GPS requires a good line of sight with at least four satellites to optimize the accuracy of its tracking. This means that a GPS signal is completely lost when the user is inside a building or doing lousy weather conditions. In addition to this, if the set up expires, the tracking can take a longer time to come up. Because of the drawback of GPS technology, alternative techniques such as blue tooth and Wi-Fi positioning technology was developed [15]. Wi-Fi positioning technology can be used to determine a device's position in a building with an accuracy of between 60-200 meters [8]. It employs the use of wireless technology infrastructures such as Access Point (AP). Bluetooth is also another handset-based positioning technology. It uses radio waves in determining the positioning of users[5]. But unlike the other technology in this category, Bluetooth has a short range of fewer than 10 meters [9].

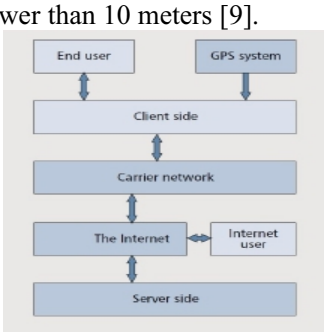

Figure 1.1: Structure of A Handset-Based Mobile Positioning Technology

1.4 **Cellular Position Technology:** Due to the limitations of handset-based positioning technology, most government agencies, and LBS tech Firms have opted to use cellular positioning technology[10]. Unlike handset-based positioning technology, cellular position technology can be used with all types of mobile devices, consume little power, and possess high distance estimation accuracy. This form of positioning technology is made possible by the use of cell towers. In other to make and receive phone calls, Mobile phones are in constant communication with nearby cell towers. For a mobile phone to connect to a cell tower, it has to know the cell-ID. This cell-ID, in conjunction with the Location Area Identity (LAI), can be used to calculate approximately the location of the mobile device using its geo-coordinates. This coordinate can be sent to the content-provider using the Application Programmable Interface (API), which is installed on the mobile phone. For example, Google uses its "my location" query can enable a user to determine their location. This is done even if the gadget does not possess a GPS chip. It is achieved using the cell-ID. The cell -ID sent to the Google location server.

1.5 Service Provider: There are three functions a service provider performs [11]; (a) Client authorization (b) client location function (c) service provisioning. The client authorization is in charge of providing the clients with access to the platform. The client location function is responsible for converting reverse geo-coding (converting latitudinal coordinates into human-readable form, street address) geo-coding and providing routing details to services. In contrast, the provisioning service is responsible for providing permission for the client to use the service.

This research work involves developing a mobile application that would leverage LBS systems' services to connect blue-collar workers to clients who reside within their locality. Blue-collar jobs gain much-needed publicity, and exposure must allow their business to thrive and grow. The proposed application help to bridge the gap between service providers and clients.

2. Methodology

The software development cycle is a framework or process used to detail the structures and stages of software development from its initial feasibility study to the deployment of the software in the required fields [12]. There are different types of software development life cycle models used, and these models have their advantages and disadvantages. Some of the popular models include the waterfall model, incremental model, spiral model, v-model, and b-model. An incremental model will be deployed in this research work.

2.1 Incremental Model

The incremental model is a type of software development model whereby the application to be developed is designed and developed incrementally with new features added until the software is completely built [14]. After each model, the software is tested, and feedback is used to develop the software further. It is a low cost compared to other software development processes. It's the ideal model of use in situations that require changes in software requirements. The model is shown in figure 2.1 below.

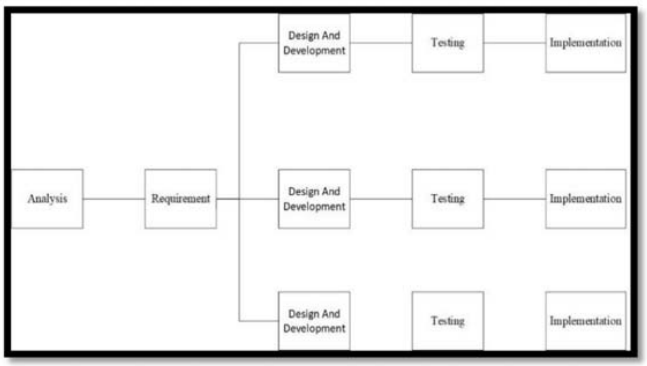

Figure 2.1: Incremental model

The processes used for this model are System Design, Development, and Implementation, Testing, and Maintenance of the System.

2.2 Target Users

The LBS mobile service to be developed is geared towards two target users:

- **Service Provider/artisan (blue-collar workers):** The service providers refer to skilled blue-collar practitioners who use the mobile application for business proposes. They can locate business opportunities within their neighborhood using the geo-positioning feature of the mobile app. Accept or reject job prepositions and locate potential clients using the platform.
- **Service Client (users):** Service clients are the potential clients of the service. They use the application to request the services of the blue-collar worker.

2.3 Implementation and Design

System design is the process of defining the interaction of the various modules, components, and data flow charts that are incorporated in the making of the system. The system design or architecture to be used in the development of the mobile application is the client to server architectural patterns. The application can be broken down into two parts: The client and the server.

2.4 Client-Side: The client-side is the front-end or user interface used for interacting. The client-side of the application will be developed using Ionic, a JavaScript hybrid mobile development platform. The client-side of the mobile app can further be divided into parts: the service provider (artisan), the login section, and the service client (user)—each with its distinct property.

- **The Login and Registration Section:** The login section was designed using Html and CSS (for design). It is equipped with a database authentication security protocol. This protocol crosschecks the username and password entered in the front-end to those stored in the system database. If the details entered matches the one on the database, the user is granted access to the platform. If the details do not correspond, an error message is displayed on the screen, and the login activity is shown in figure 2.2(a).

- **Service User Section:** The service user platform consists of 5 tabs, as shown on the activity diagram in figure 2.2(b); *Profile Tab* allows a user to update his personal information, *Service Request Tab***,** which allows a user to request for blue-collar services. *Service Provider Profile Tab*, which allows the user to view service providers' profile and recommendation, *Booking History Tab***,** which displays a list of

all services requests by a user, *Logout Tab*, which users can use to exit from the platform. It redirects the service user to the login page.

- **Service Provider Section:** The service provider platform consists of 5 tabs as shown on the activity diagram in figure 2.2(c); *Profile Tab* which allows a service provider to update his personal information, *Online/Active Tab* used to indicate if the service provider is available to receive Job request., *History Tab* which displays a list of all service request response by Service Provider, *Logout Tab* which users use to exit from the platform.

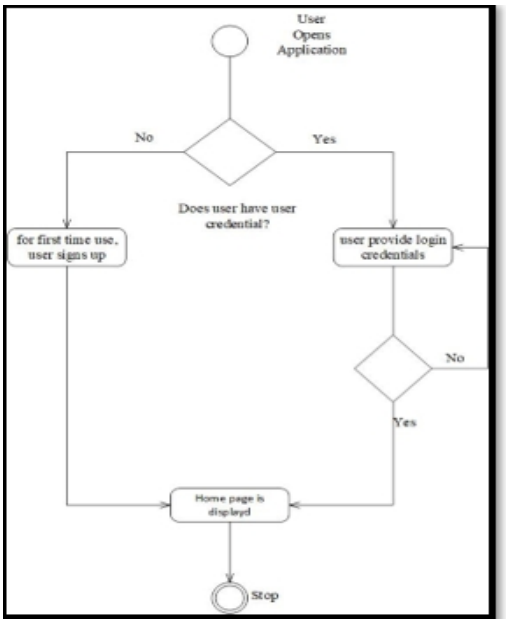

Figure 2.2(a) login activity diagram

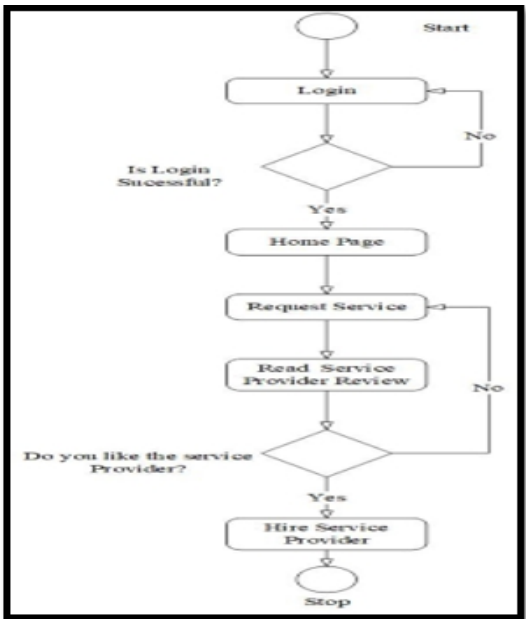

Figure 2.2(b) service user activity diagram

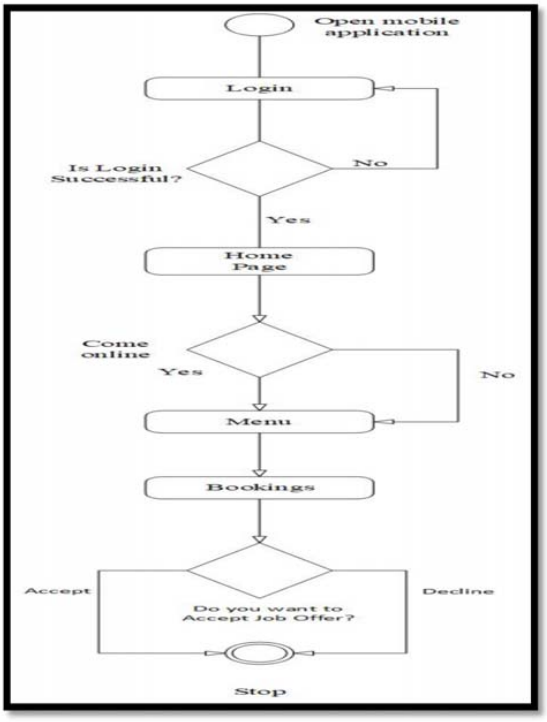

Figure 2.2(c) service provider activity diagram

2.5 Server-Side: The server is the backend application is responsible for all logistics operations. This includes the storage of user-profiles and compilation of user requests, amongst other activities. The server side of the system will be developed using Hypertext Pre-Processor (PHP*)* and MySQL. This server-side or back end of the application includes all the business logic and data structure and storage. The server-side was written using PHP, and client data was managed using MySQL. MySQL is a relational database that stores data in tabular form.

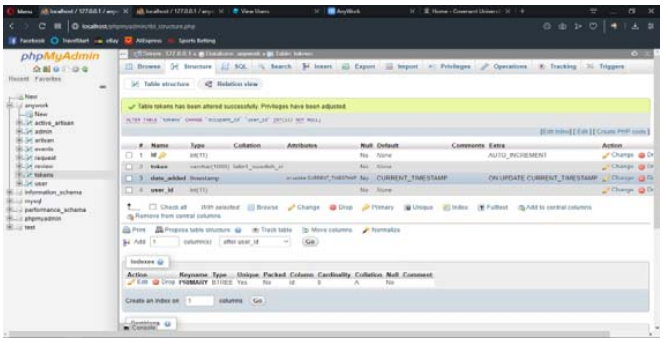

Figure 2.3: MySQL Database

3. Results and Discussion

Three modules make up the mobile application; the login module, the Service user module used by the user to make a service request, and the Service Provider module used by the artisans to accept service requests are shown in figure 3.1 3,2 and 3.3 respectively.

3.1 Login Page/ Registration Page

This is the first page to be displayed when the application is opened on a mobile device. It allows first-time users to register unto the platform either as a service provider/ artisan or as a service user. The user registers with necessary information such as name, email address, phone number, and password. The data is stored in the system database. Subsequently, the user will only need to provide an email address and password as credentials to access the platform.

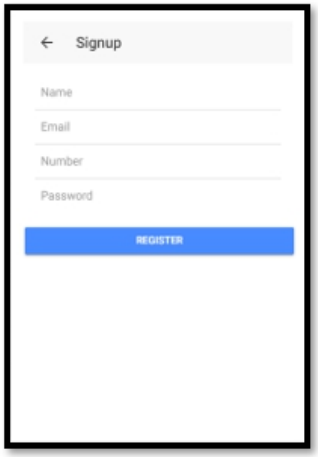

Figure 3.1: Service User Sign Up Page

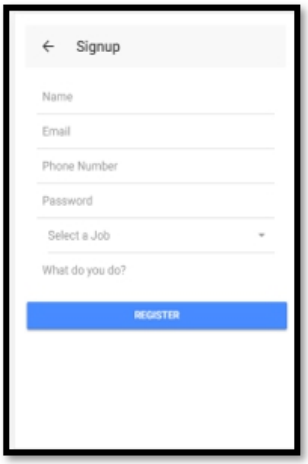

Figure 3.2: Service Provider Sign Up Page

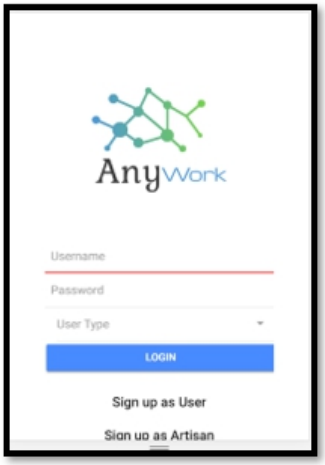

Figure 3.3: Login Page

3.2 Service User Page or Home Page

The home page is the first page after the login sequence has been complete. It consists of three platforms: a map page that shows the user's current location, a side menu that allows the user to navigate to other tabs (profile tab and booking tab), and the three service request icons mechanics, carpenters, and electricians. The home page is primarily used for service requests. When any of the three service request icons are clicked, the application queries the database for artisans within the user area that offer the required service. It then represents the artisan location on the map using map markers. Clicking the artisan map marker will open a link to the artisan profile page where artisans' details, as well as a review, can be seen. The user can also request the artisan's service using the service request button on the page.

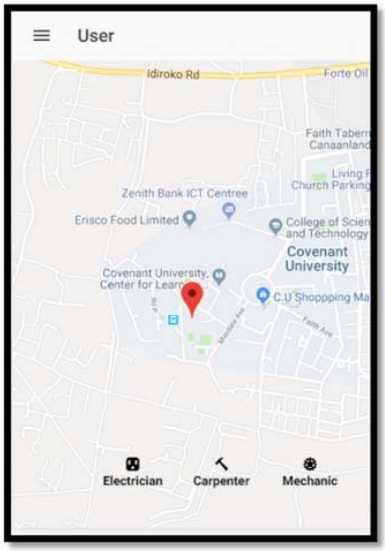

Figure 3.4: User Home Page

- **The Booking Page:** The booking page can be accessed using the sidebar. When a service request has been made, the service request details are moved to the booking tab. The booking tab allows users to either cancel the service request or confirm service requests. Clicking the "cancel" button will terminate the contract, and the service provider will be notified that his/ her services will no longer be needed or by clicking "complete" Button indicates that the service has been completed. The user is then redirected to a review page where the user can write a review about the artisan's service. The" get direction button" generates a road map to the artisan.

- **The Profile Page:** The profile page can be accessed using the side menu. It allows the user to manage user information. This page allows a user to modify user information such as name and password. This page then submits the modified data to the database for an update. User can also log out of the application from this page.

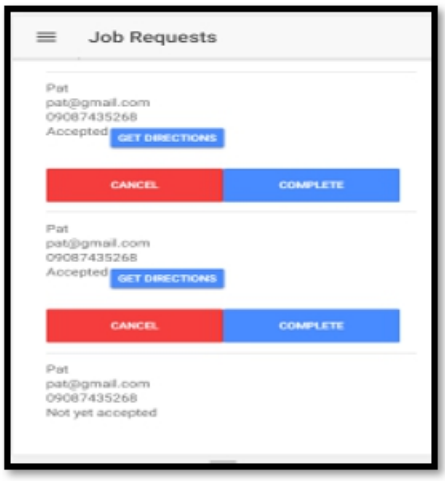

Figure 3.5: Service User Job Request Page

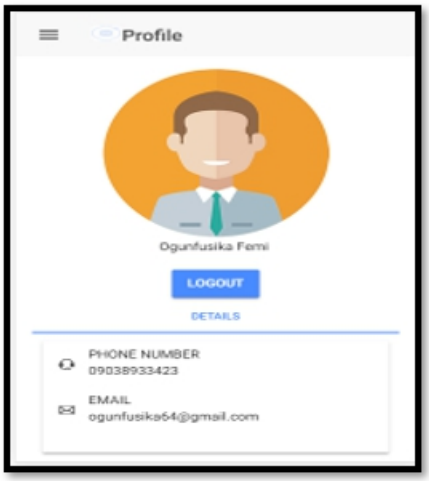

Figure 3.6: Service User Profile Page

3.3 Service Provider/Artisan

- **Home Page:** The home page is the first page to open when the artisan's logs into the application. It consists of the status bar, which indicates if the user is online or offline and the side menu bars, which allows the artisan to navigate the application. The status bar indicates if the user is online or offline. When the user is available and changes the status to active, the app gets the user location and broadcasts it to potential clients in need of the service. If the user is offline, the user location is not updated, and the user is not visible to customers.

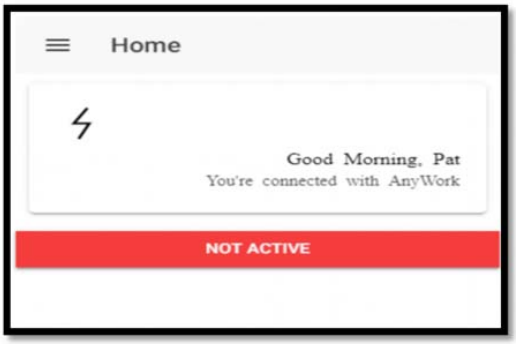

Figure 3.7 Service Provider/ Artisan Home Page

- **Acceptation Page by the Artisan:** It allows the artisans to accepted jobs request from the client through the page. Service request notifications are stored in the booking tab. When a service request is made, the artisan is presented with the “accept” button. This allows a user to accept the proposed Job. Clicking this button will direct the artisan to the user profile page. The user profile page contains the user contact details. It also has a get direction button that generates a road map to the user.

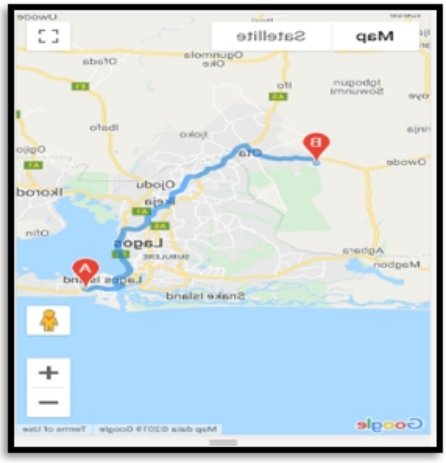

Figure 3.8 Get Direction Page

Figure 3.9 Get Direction Page

4. Conclusion

This project aimed to develop a location-based Job portal that would serve as a medium to link blue-collar workers with service users within their location. This would help increase the job prospect and reach of the blue-collar worker. The mobile application developed makes service provider (artisans) suggestion to service users by tracking the location of the service

user and providing a list of service providers within the user location. The aim and the objectives of the research work have been realized and would contribute to reducing the unemployment level within Nigeria

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