INTELLIGENT HOME DEMAND SERVICES APPLICATION SYSTEM

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Abstract

In contemporary society, the modern home has undergone a significant transformation, largely driven by the proliferation of advanced technologies and the ever-increasing demands of home services for convenience, efficiency, and security. While these technological advancements offer numerous benefits, they also give rise to a set of challenges and concerns, including faults, system complexity, and system failures, thus presenting the need for home demand services. This paper presents a system for an intelligent home demand service application, through the introduction of mobile system for swift service requests and deliveries, accommodating users such as customers, professionals, and artisans. The system features diverse user registration and login processes, with a dedicated platform designed for seamless user interaction. To ensure efficient service request monitoring, a rule-based algorithm was modelled to promptly notify users when professionals neglect or reject a request, offering an opportunity for an alternative request, or confirming service provision upon acceptance. Tested as a web-based mobile application, this system has demonstrated effectiveness in providing users with notifications about the status of their requests, promising to redefine the dynamics of service requests and deliveries in various contexts by enhancing convenience, efficiency, and user satisfaction.

Keywords: customers, professional, service request, Wamp server, rule based algorithm.

1. INTRODUCTION

In various parts of the world, there is a constant demand for professional services which can attend to home activities such as cooking, nanny, services of electrical appliances, laundry, etc. of course there are professional and artisans which are specialized for these services, however the major problem is the lack of easy approach to contact them and request for their services. In most part of the works, people who ender this services are contacts at their domain through direct approach and this process can be tedious, time consuming, etc. In addition, some of the person which need this services are always engaged in their own private enterprises and hence don't always have the time to move around and seek for people who can offer this household maintenance services. The need for a system which integrated various service professional on single platform, for remote access and service request provokes the invention of Home Demand Service System (HDSS).

According to Nwobodo and Chibueze (2021), HDSS is a software application that provides customers with access to professional contacts, their services, locations, and platform to request services. Azeta et al. (2010) posited that HDSS system offers numerous benefits to customers, enabling them to easily connect with professionals and artisans for their specific needs. By utilizing this platform, customers can efficiently access a wide range of services and conveniently make service requests (Chen et al., 2012; Shrikant, 2019).

Over the years, many studies have been presented to improve the performance of HDSS. In Ponsignon et al. (2010) a study in the design characteristic and contingencies for service delivery system was presented for the management of electricity sell contacts and bill processing. In Cambell and Savelsberg (2015), an incentives scheme for home delivery services was presented. The study further identified the challenges in the conventional system and then improved on it using web-based automation. While great successes have been achieved by these studies, they are limited to one professional service, which made them lack scalability.

Hwang et al., (2016) presented the design and implementation of a home service delivery and management system based on OSGi service platform. Shaharia (2018) identified the challenges for home demand services which major emphases on repackaging as new system, rather than adding original new features. Larry and Chunka (2018) on the other hand presented application software for digital market dominance, while Tull (2018) designed and implemented a health management information system. Despite the success of these works, solution has not been obtained for a system which accommodates service delivery for multiple professionals.

According to Chibueze (2021), a service delivery system which can accommodate many professionals is vital to ensure easy access to multiple service personals from one point. To this end, the author improved home demand service considering multiple professional; however, there is need for a more detailed description of the system design and also experimental validation of the models. Secondly, even though the author identified the need for web automation in for enhance HDSS, it was not captured in the design. Therefore this paper to develop a HDSS with web automation which help users track service request and then reorder for another services when the request time lapse out.

2. DESIGN METHODOLOGY

The methodology employed in this paper involved several steps. First, a user (customer and service professionals) registration platform was developed to enable login authentication and serve as an access control for registered users. Next, a login system was implemented to provide secure access to the platform. In order to facilitate easy contact, a service registration system was introduced for professionals to register their service information and specify the location of their service domain. This allowed for a comprehensive database of professional service providers, including nannies, lesson teachers, electricians, barbers, and mechanics. Additionally, a platform was created to enable customers to request services. To ensure smooth operation of the system, a simple rule-based model was developed for tracking service requests. This model utilized time functions to monitor the request and acceptance times. If a service request was not accepted within a designated timeframe of 30secs, the user would receive a notification, prompting them to submit another request. Else the user received notification that the service has been

The aforementioned methods were designed and implemented using Android Studio for testing and validation purposes.

3. SYSTEM DESIGN

The system design consists of three sections: the backend, frontend, and automation section. The backend encompasses the database design, which includes the data structure and requirements for each user activity. The frontend is responsible for presenting the user interaction section of the design. This aspect was achieved using modeling diagram. Lastly, the web automation section encompasses the rule-based system that tracks service requests and ensures that demand is either accepted or notifies the user of rejected or ignored requests.

3.1 Database Design

The database design was presented in this section as a guide for the implementation of the backend. The design for the customer registration was presented in the table 1;

Table 1: Customer information system

S/N	Name	Data description	Data type
1	Full name	This is the full name of the customer users	Varchar
2	Address	This is the address of the customer location	Varchar
3	Gender	This is the gender information of the person	Varchar
4	State	Customer state of origin	Varchar
5	Local government	Customer local government	Varchar
6	Mobile number	Customer phone number	Integer
7	Email	Customer email address	Varchar
8	Picture	Here is the picture of the customer	Image

This table 1 presents the backend design of the of the customer registration platform. The table presents the requirement for the customer information, considering the data description and data type. The next design in table 2 provided the user registration platform, where service professional can register their services and office location for easy contact.

Table 2: Professional service information

S/N	Name	Description	Data type
1	Service category	Service rendered by the professional such as nanny, mechanic, electrician, chef, lesson teacher and barber.	Varchar
2	Full name	Full name of the professional	Varchar
3	Office address	Address of the professional	Varchar
4	Gender	Gender of the professional	Varchar
5	State	State f origin of the professional	Varchar
6	Email	Email of the professional	Varchar
7	Local government	Local government o the professional	Varchar
8	Mobile number	Phone number of the professional	Integer
9	Office local government	Local government of the professional office location	Varchar
10	State of the office location	State of the professional office location	Varchar
11	Office phone	Office phone number of the professional	Integer

	number		
12	Business description	This user provide brief information about the service rendered	Varchar

The table 2 presents the user registration platform which allows the professionals to provide only vital information about their self, business services, location and data for easy contact. However, other entries like password are not made visible to other users. With this information submitted, the customers can access the professional services and then contact them through their locations, phone number or email through service request. The table 3 presented the back end design for the user registration, while the table 4 presented the login design.

Table 3: Table for access registration for all users (both customer and professional)

S/N	Name	Description	Data type
1	User name	This is the user name of user and business name for professional	Varchar
2	Password	Password of the professionals or users	Varchar
3	Confirm password	Password confirmation of the professionals or users	Varchar
4	Service rendered	This is the type of service offered by the professional only	Varchar

Table 4: Login table for all users (both customer and professional)

S/N	Name	Data description	Data type
1	User name	This is the user name of both users	Varchar
2	Password	Password of both users	Varchar
3	Business type	Category of service (Required for customer only)	Varchar

3.2 Rule based web automation

The rule based algorithm was used to develop the web based automation system which was used to regulate and track service request and ensure that customers are not disappointed. The algorithm used time control function to track every request made by customers and then monitor the status to ensure that request is accepted by the professional, within 30 minutes of service request and when the request is not accepted by the professional after the time out, the customer recovers notification for another service request. The algorithm used to achieve this tracking process is presented as;

Tracking algorithm

1. Start
2. Initialize timer function as (t)
3. Set t= 30secs or each service request
4. For service request
    - Assign it to the appropriate service provider for consideration
    - Start the timer for the request
    - Count down (t-1)
    - Periodically check the status of each service request
5. For acceptance of service
    - Update the status of the request in the database to "Accepted."

- Proceed to discuss service details and informations

6. For t = 0secs // Service rejected
   - Send a notification message to the customer for another request
   - Update the status of the request in the database to "Not Accepted." And remove it from the monitoring process.
   - Send a notification or feedback to the customer stating that their request has not been accepted.
   - Update the status of the request in the database to "Ignored."
7. Send a notification or feedback to the customer stating that their request has been ignored.
8. Allow the customer to submit another service request if desired.
9. Repeat steps 2-4 for subsequent service requests.

3.3 Frontend design

This section presents the design of the frontend using system flow charts in figure 1 which presents the work flow of the entire system starting from the user registration, login and then HDSS for customer service request and then the web based automation.

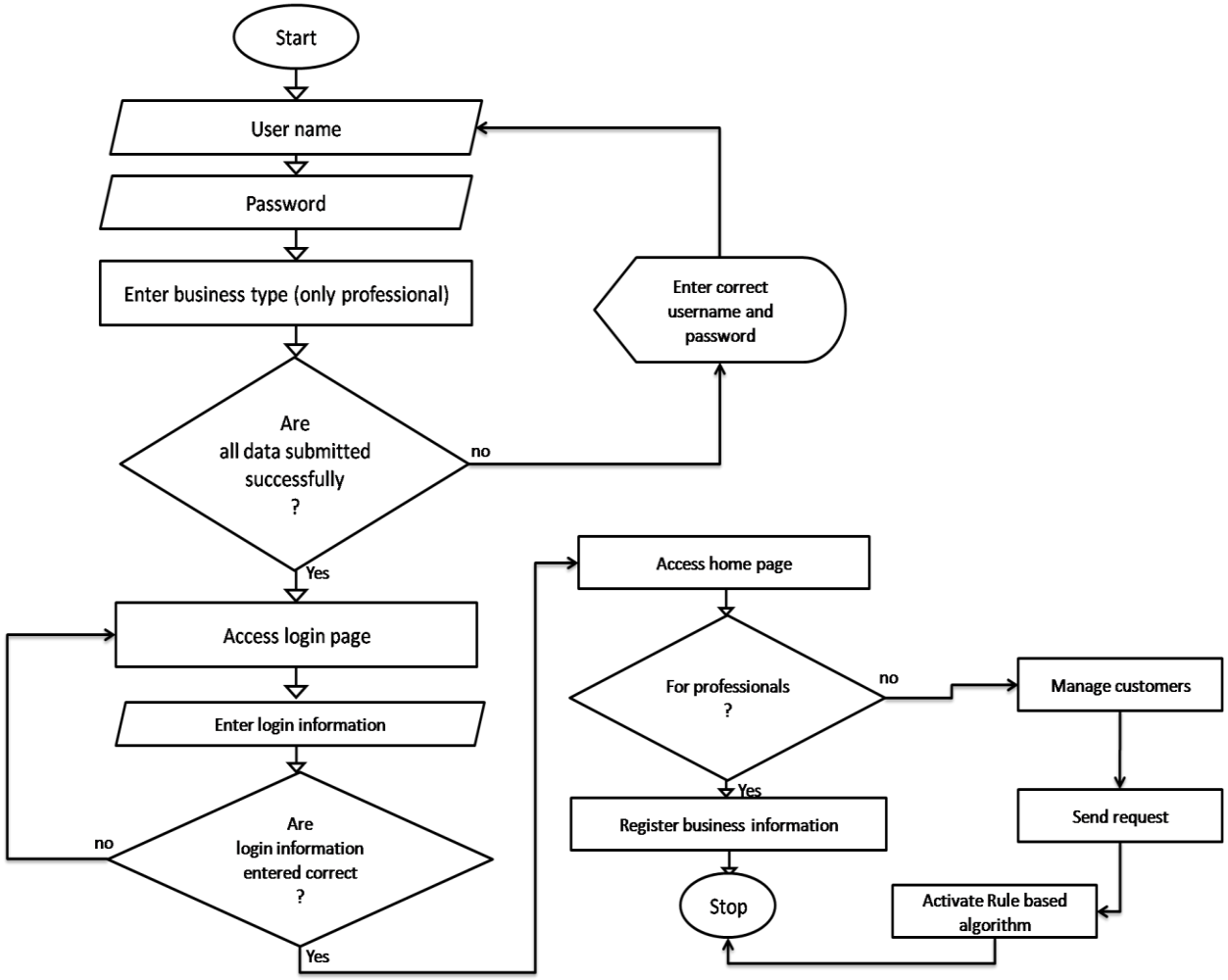

Figure 1: Flowchart of the HDSS

The figure 1 presents the system flow chart which starts with the user registration process which was modelled in the table 3 for the professional and also the customers. When the registration process is completed, the details were used to gain access to the HDSS though the login page designed with the table 4. For professional login, their business information is registered, however for customers, service of professional is selected and then service is requested which is then monitored by the rule based algorithm which ensured the user is notified if he service is rejected or ignored after 30 seconds of service demand. This customer information system is modelled using the table 3, while the professional service manager is modelled with table 2.

4. RESULTS AND DISCUSSIONS

The system was implemented as a smart HDSS using android studio, MySQL and tested locally with Wamp server. The customer information design in table 1, and also the professional service registration which was designed with table 2 was implemented with MySQL, and then the frontend interface was presented as figure 2 and 3 respectively.

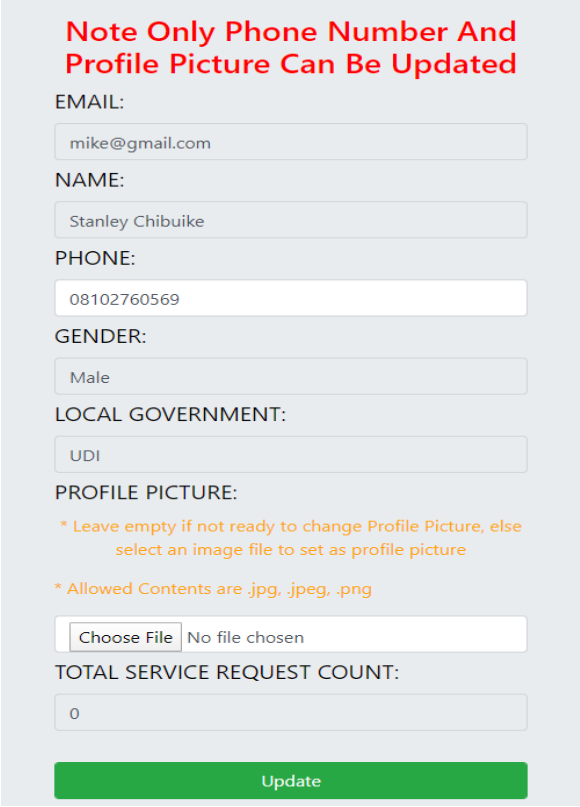

Figure 2: Customer information system

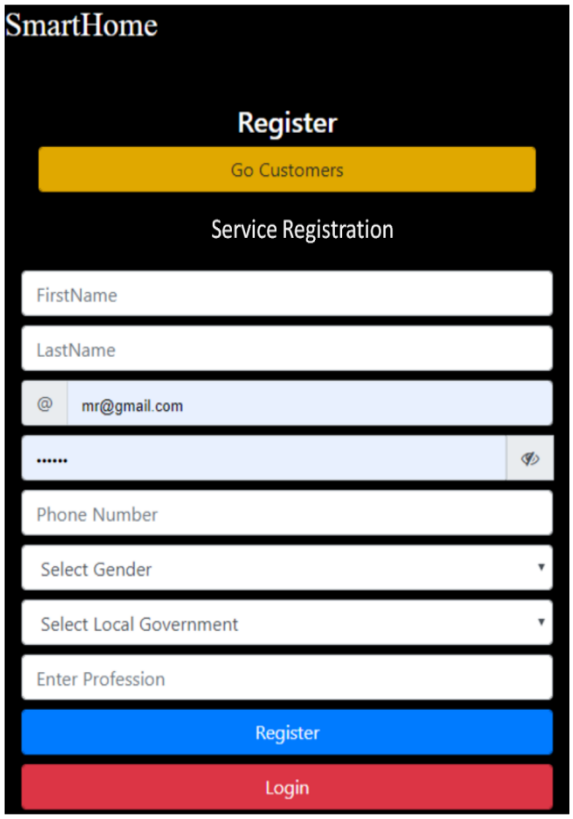

Figure 3: Service information system n

The figure 2 presented the customer information system which allows the customers to register and then get access to the HDSS through login in figure 4. Figure 3 presents the professional service information system which allow professional to register and then login in figure 5 to request for service.

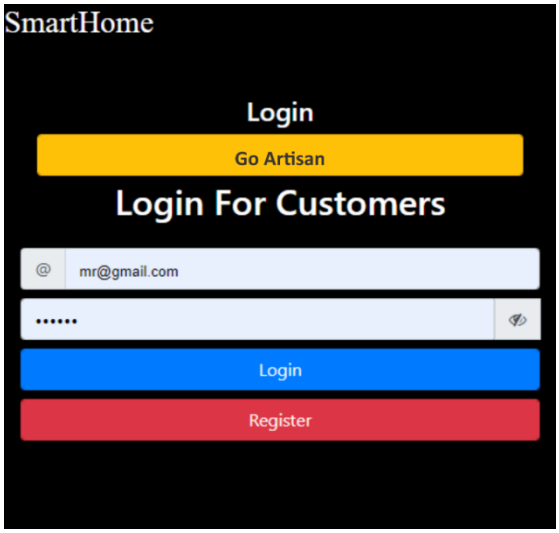

Figure 4: Login for customers

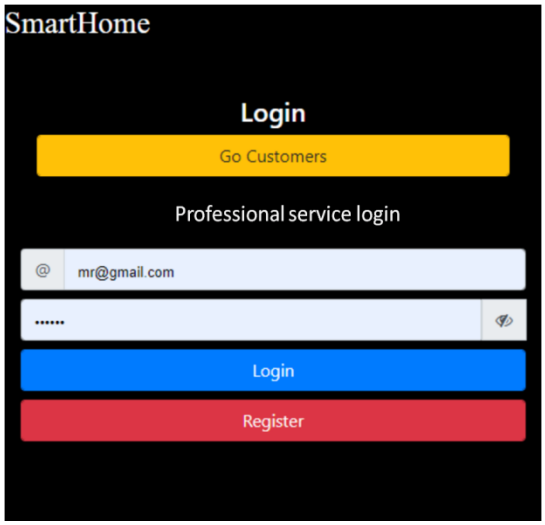

Figure 5: Login for Professional

After the customer has logged in with is name "Emmanuel Peters", service required is selected and the professional service information which can render the service is also selected for service demand as reported in this case as "Mike Ani". The figure 6 presented the result of the customer manager where the service professional is selected and then service is demanded. When this occurs, the professional immediately receives notification of the service request and also the name of the customer who demands for the service as reported in the figure 7.

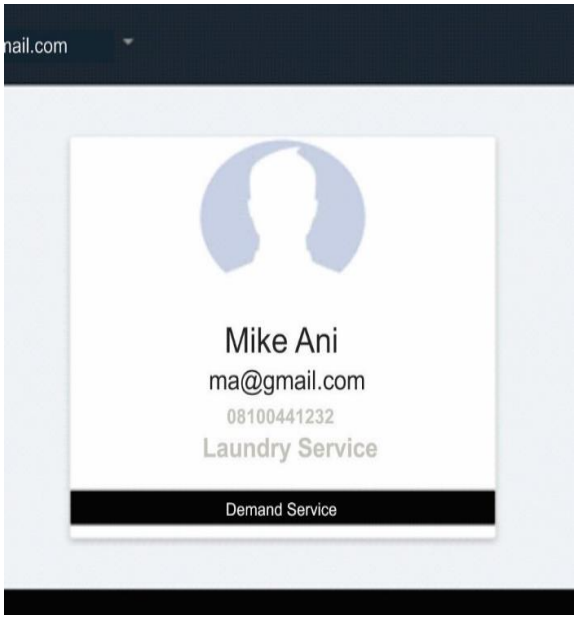

Figure 6: Customer service request

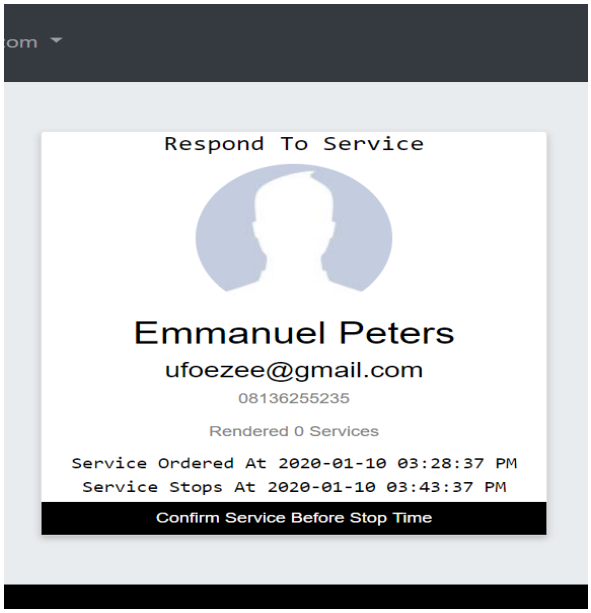

Figure 7: Service professional platform

The figure 7 presents the service professional which received the request made by the customer. When the request was made, the professional was time to 30s to accept or reject the request. However when the time is out as regulated by the rule based algorithm, which implied that the order was ignored or rejected, the customer receives feedback notification, implying that the order was not accepted as reported in the figure 8

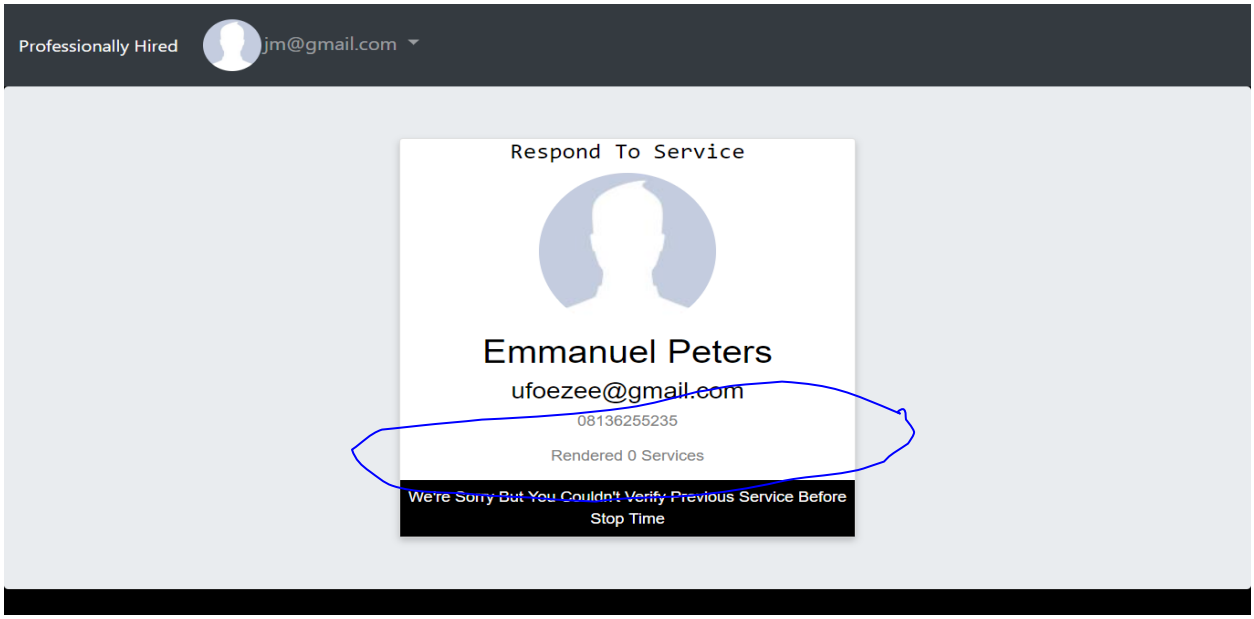

Figure 8: Cancelled order notification.

The figure 8 showed the interface which displayed the message notification that the service order was not accepted by the professional. To this end, the user requested for another professional offering similar service as in figure 9. The professional this time, accepted the request and the user was notified of the acceptance as in figure 10, so as to proceed with other discussions such as terms and conditions of the service.

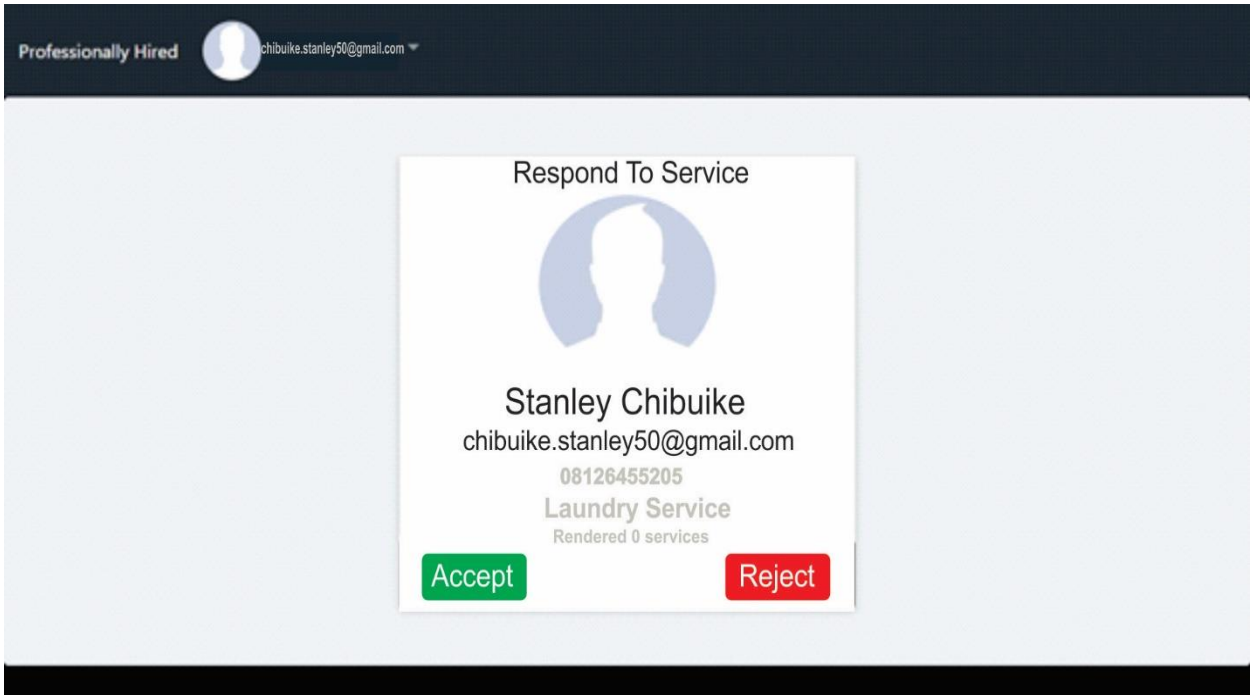

Figure 9: professional Service manager

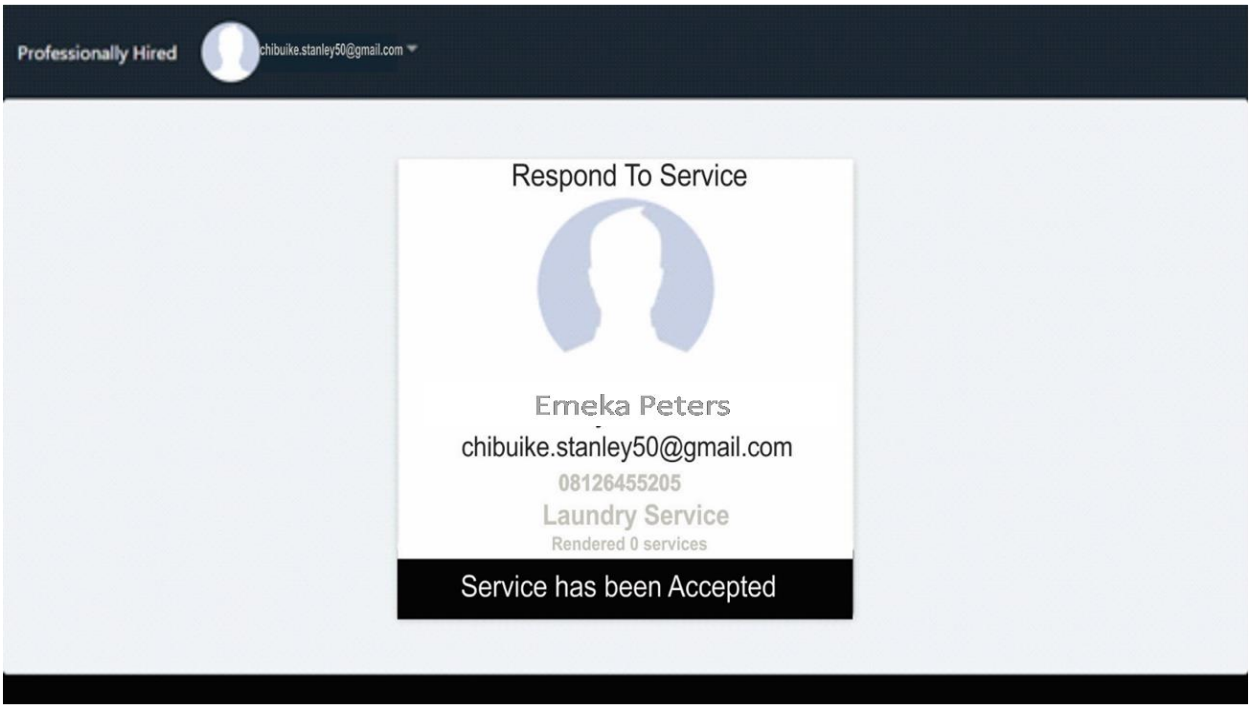

Figure 10: Customer feedback that the service has been accepted,

5. CONCLUSION AND RECOMMENDATIONS

This paper presents an intelligent HDSS. This was achieved using customer login information, professional service informations and rule based web automation algorithm to develop a HDSS which professional to provider as advert the services they render and also allows logged in use to access to this services and then request for it. To address these issues of disappointment, the rule based algorithm time service request and then notify the customer when the service requested is rejected, accepted or ignored of the outcome. The model was implemented as a web based application software using android studio and when tested, the result showed that professional services can be requested and then monitored to ensure that the service is rendered.

The limitation of the study is the availability to users who only have android enabled devices, hence excluding other potential users. The study recommends cross-platform compatibility as solution to the problem. This would allow users to access and utilize the system from various devices and operating systems, such as iOS, Windows, or web browsers, thereby expanding the user base.

REFERENCES

Azeta, A. A., Ogunlana, A. O., & Ezeh, C. O. (2010). Design and Implementation of a Mobile Express Delivery System. Proceedings of the International Conference on Software Engineering and Intelligent Systems, July 5th - 9th, 2010, Ota, Nigeria, 1, 35-42.

Campbell, A. M., & Savelsbergh, M. (2015). Incentive Schemes for Attended Home Delivery Services. Transportation Science, 49(2), 327-341. https://doi.org/10.1287/trsc.2014.0536

Chen, M., Hsu, C., & Lee, Y. (2012). Applying Quality Function Development to Develop the Home Delivery Service Model for Specialty Foods in Traditional Market. IEEE

International Conference on Industrial Engineering and Engineering Management, 1741-1745. https://doi.org/10.1109/1EEM.2012.6838045

Chibuike, K. (2021). Improving home demand services using web-based android application (Master's project). Enugu State University of Science and Technology, Nigeria.

Hwang, T., Park, H., & Chung, J. W. (2016). Design and Implementation of the Home Service Delivery and Management System Based on OSGI Service Platform. In International Conference on Consumer Electronics, 2016 (ICCE '16) (pp. 189-190). IEEE.

Larry, D., & Chunka, M. (2018). Unleashing killer app, digital strategy for market dominance. Harvard Business School Press.

Nwobodo, N., & Chibueze, K. (2021). Improving home request services with web-based android application. Journal of Experimental Research, 9(1), 61-66. https://doi.org/10.2502/0524-2502.9.1.61

Ponsignon, F., Smart, P. A., & Maul, R. S. (2010). Service Delivery System Design: Characteristics and Contingencies. Centre for International Service Research (ISR), University of Exeter Business School, Exeter, UK.

Shaharia, A. (2018). Challenges for on-Demand Technology and the Unseen Opportunities. International Journal of Business, Humanities and Technology, 6(3), 51-60.

Shrikant, S. (2019). A Peek into the Flourishing On-Demand Home Services App Market. Retrieved from Appinventiv. https://appinventiv.com/blog/on-demand-home-services-app-market/

Tull, K. I. (2018). Designing and Implementing Health Management Information Systems. Retrieved from Semantic Scholar. https://www.semanticscholar.org/paper/Designing-and-Implementing-Health-Management-Tull/a7a4ddc27057c997c0bcf85cc6ffe5b3b26cd799