Hotel Services Ordering, Delivering System based on Internet of Things

[1] Daniel Kanyarwanda, [2] Jean Bosco Ntihinyurwa, [3] Sefu Bikorimana, [4] Francois Karanguza,
[5] Jean Pierre Nzemerimana, [6] Jean D'Amour Mirembe, [7] Jacqueline Nyiransengimana,
[8] Felix Harerimana, [9] Jean Pierre Nyakuri, [10] Jean Pierre Majyambere

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] Rwanda Polytechnic IPRC-Gishari, Electrical and Electronics Engineering Department, Rwanda
Corresponding Author Email: [1] danykist2013@gmail.com, [2] ntihabos@gmail.com, [3] bikolasefu@yahoo.fr,
[4] kawizera@gmail.com, [5] nzemerapierre@gmail.com, [6] mirejdamour@gmail.com, [7] jacknyiransengimana@gmail.com,
[8] felixharerimana0@gmail.com, [9] njpindian@yahoo.fr, [10] majyambere2016@gmail.com

Abstract— Recently, most of hotel and restaurants services were extremely difficult to be accessible due to COVID-19 lockdown. Generally, the traditional way of menu ordering in hotels are done through menu provided in form of menu card. From menu card the customer has to request the item he/she prefers and then call the waiter to come and take the order to Trading post. This method demonstrates several disadvantages resulting to time consuming and requires human interactions which can speeds up covid-19 spread. Due to these reasons, this paper will discuss on effective methods to pre-ordered the menu and therefore, the delivering system will receive the ordered information and automatically go to the Trading post and deliver ordered menu to the requested client in his/her respective sitting place. In addition to that, Client in his/ her place will also track the service in progress by using menu ordering system. The menu ordering system will be a web-based application that will be accessed with help of electronic gadget like android phones, computer and tablet. Therefore, menu ordering system will communicate to the delivering system and it should be contained the location for directing the delivering system. This project is user-friendly, time saving, human error minimization and provide customer feedback.

Index Terms— Menu ordering system, Web-based application, Delivering system, Electronic gadget, Menu and Trading post.

I. INTRODUCTION

Now day, all the major centers and cities in Rwanda face the problem of increasing population day-by-day. Along with it comes the challenges of providing all these population the required basic services. The situation become worse for hotel and restaurant services because most of people works a hole day and their life rely on the cafes and restaurants for their breakfast, lunch, dinner and so on. During lunch and dinner hours some people make crowd along the que heading to beef while the others spend their time waiting the vendor to ask him/her the available item and then after make order. this traditional system become completely limited since the starting of 2020 where the crowding of people was not allowed due to COVID-19. Besides of COVID-19, to day people have limited time and they are busy at work. hence, they can't afford to lose time in just waiting their food in hotel or restaurants. Thus, this paper come up with web-based application to develop IOT hotel services ordering and delivering system which enables the customer to pre-ordered the menu through his/her android phones, computer or tablets and delivering system serves the clients in his/her sitting place as soon as possible. the Hotels services ordering and delivering system consists of an ESP32 that will control the entire activities of the system. ESP32 will makes an interface with WiFi connection and governs the entire commands of the system. Web based application is there for ordering hotel menus, MQTT broker is for providing communication between ordering system and delivering system, DC Motors are for driving the delivery and directly coupled with an integrated mechanical part, GPS is for tracking the location of delivering system, DMF audio player with speaker is for generating sounds and Servo motors are for taking and carrying delivery to the client. Delivering system will be equipped with obstacles sensors for avoiding the system to collide with clients or hotel furniture. Section II outlines related works. Section III describes system architecture system. Section IV explains flow chart. Section V presents software design. Section VI shows results and discussions in addition conclusion.

II. RELATED WORKS

Technology has made human labor more flexible in all areas. Even the hotel industry is in need of it. The hotel's efforts are aimed at increasing the satisfaction of customer[1]. However, there are areas on the service provider side where automation need to be added. Like, Service ordering and delivery in the hotel. The introduction of this system allows you to remove the physical burden from the staff of large hotels. Consequently, they can focus more on added value. However, a convenient graphical interface based on the Virtual Instrument Engineering Workbench 2010 [2]Lab Platform [3] does not exclude the server from working in this task. The user-friendly graphical interface is easy to understand. Also, the server does not require extensive knowledge to work with the Graphical User Interface (GUI), so the GUI allows you to control and monitor the status of the entire food delivery system. Here,

when receiving a signal, the mobile device follows the virtual path provided by the Arduino controller [4]. The wireless network, unlike Zigbee, includes an affordable WIR-1186865MHz wireless counting module[3], [5]. Therefore, the cost is lower than that of a wireless network [3]. The main goal of the system presented [6] in this research was to develop a fully automatic restaurant menu system using touch screens and LCD color graphic display to provide a user-friendly environment thereby using ZigBee module that is based on the the system ordering using wireless.[7] presented different ways available in ordering such as QORDER, paper-based menu card, self-service food ordering KIOSK technology and Computerized ordering system Out of this we can notice. [8] developed a system that used a food ordering system based on touch screen to replace the existed ordering traditional system. In [9] presented a technology of web service with the hotel integration management system. This system consisted of Ordering System Kitchen Order Ticket, Billing System, Customer Relationship Management system (CRM) together to increase the quality and speed in service delivery.

III. SYSTEM ARCHITECTURE

3.1 Block Diagram

From the block diagram shown above, the hotel ordering system is made of three main parts: the ordering section, delivering section, the clouding and MQTT broker. The ordering section is a web-based application that is installed on android phones / tablets for helping the customer to get services that are provided by the hotel. Therefore, it is placed on the customer's table and allows him/her to order. Delivering system is a robotic system done by using ESP 32 Wi-Fi-based microcontroller, obstacles sensors, power supply legs of delivering section, DTMF audio player and hands delivering section. Delivering section communicates with the ordering section over Wi-Fi through clouding and MQTT broker. The ESP 32 gets signals from sensors or from MQTT clouding and MQTT broker, then it controls the legs of delivering section and the hands of delivering section.It signifies that the legs delivering section are four DC motors integrated with the mechanical system while the hands of delivering system are servo motors coupled to a mechanical system. Furthermore, obstacles sensors prevent the delivery section to collide with customer and hotel furnitures. The Fig.1 shows the block diagram of hotel ordering delivery system.
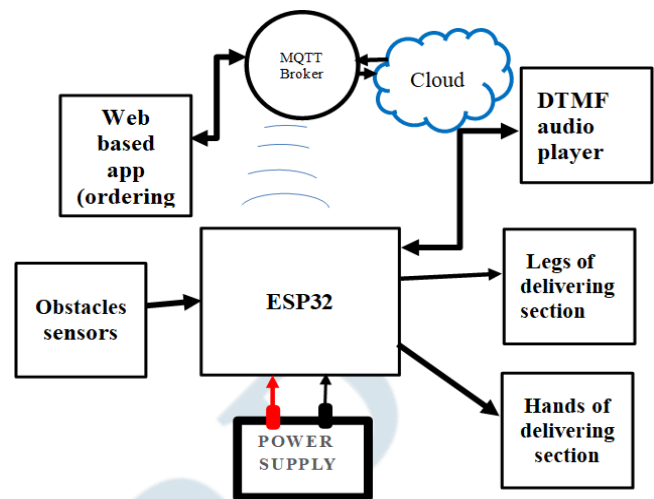

Figure 1. Block diagram of Hotel Ordering-delivery system

IV. FLOW CHART

The hotel service ordering-delivering system has operated in the flowing steps:

Step1: Configure the hotel service ordering app to Wifi connection.

Step2: Connect the hotel service ordering section to the cloud system over a Wi-Fi connection.

Step3: Configure ESP32 of delivering section to Wi-Fi connection

Step4: ESP32 of delivering system gets sensor data.

Step5: ESP32 of the hotel delivering section sent the sensors data to clouds via the webserver.

Step6: If the ask service button of the ordering section is clicked, then, the ordering section prints the hotel menus.

Step7: While the client/customer chooses a service, then, the ordering section prints the requested service with the price.

Step8: Ordering section prints a message asking to press order if you want to ask for the service or return to the previous button.

Step9: if the order button is chosen, then, the ordering section sent information to the MQTT broker and the Hotel delivery section gets the published information by subscribing to ESP32.

Step10: ESP gets the requested order and encrypts the received message for tracking the seat of the customer.

Step11: ESP32 actuates DC motors to go to the store/ to the kitchen for bringing the order.

Step12: If delivering section reaches there at the store/ kitchen, then delivering system asks for service.

Step13: The hand of delivering system picks the delivery by using a servo motor and delivers the order to the s customer.

Step14: Else if the customer chooses the track delivery button, then he /she will get the location of delivering section.

Step15: Else if the requested order is not available, then, the delivery section will send an alert to the ordering section for noticing the customer.

Step16: Else if the customer selects the return button if he/she doesn't want to order any hotel service, then the ordering section returns/prints the hotel menus.

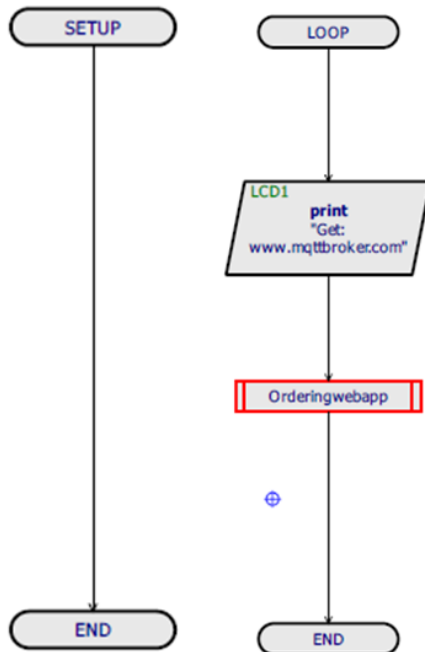Step17: Else, the ordering section prints the homepage.
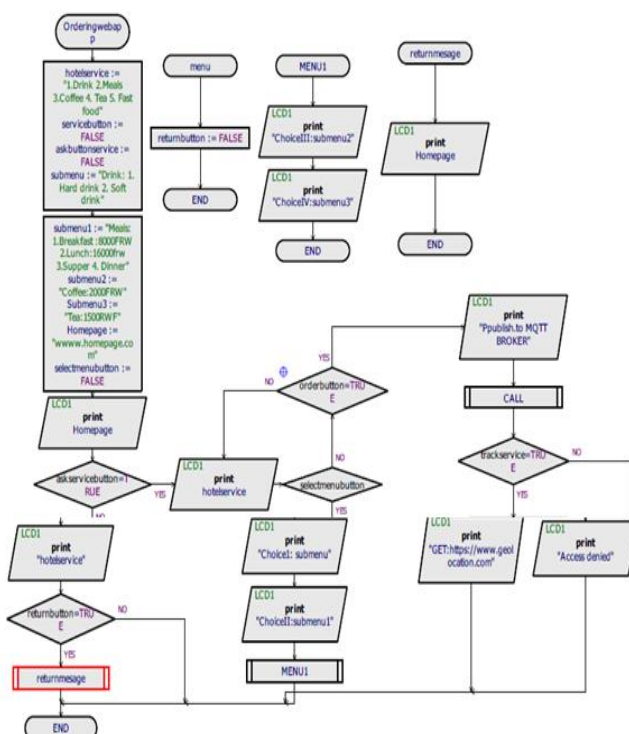

Figure 2. Flowchart of the system

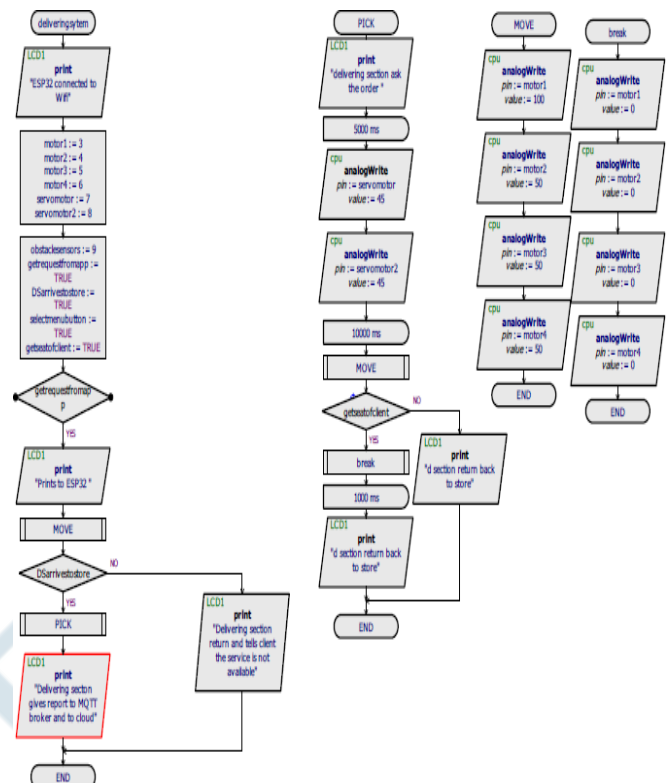**Figure 3.** Flowchart of ordering section (Web-based application)

Figure 4. Flowchart of delivering

V. SOFTWARE DESIGN

Web-based application /hotel ordering section was developed by using HTML, PHP, CSS, and JavaScript language. HTML language was used to mark up the home page, CSS is for styling the home page and PHP is for displaying information on the hotel service page from the database. Java script was used for connecting the screen1, hotel service, and Geolocation page. Therefore, java scripts help to move from one screen1 to another through declared buttons. The web-based was linked with an MQTT broker via the cloud for communicating with the delivery section. Fig. 5 Home of Web application, (b)Hotel service.
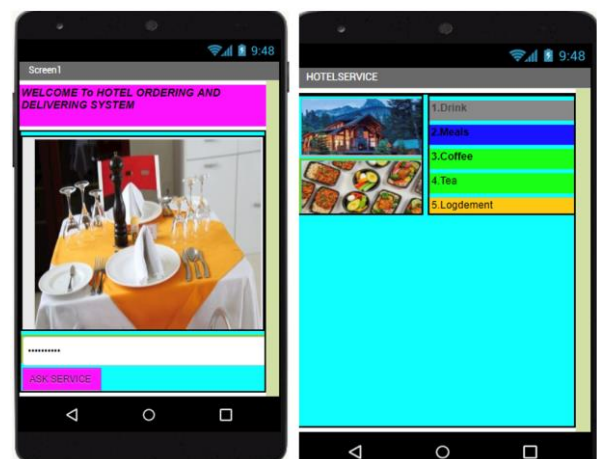

Fig.5 (a)   **Fig.5 (b)**

Figure 5. (a) Home of Web application, (b)Hotel service

A customer can track the location of delivering section by pressing track delivery and the app directs him /her to delivery progress. Location is displayed by using google earth location web and it is displayed in a visual way. It signifies that the visual way means to watch delivering section. Otherwise, the customers can return to the home page. As described in Fig.6.
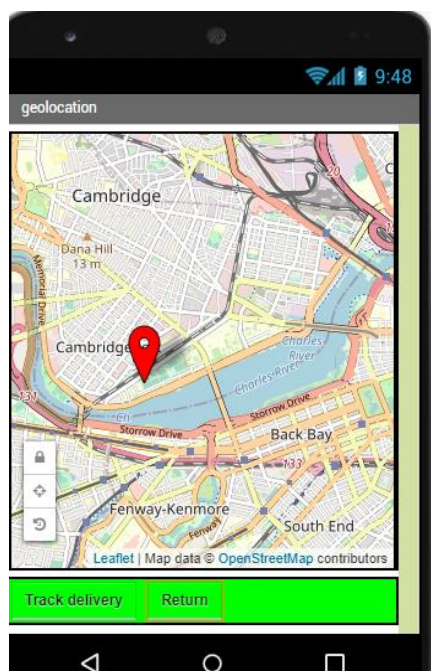

Figure 6. Delivering section of geolocation

VI. RESULTS AND DISCUSSION

In this way, the system proposed, It simplified life in hotel for both customers and owners of hotel. The customers are able to both order and get service from hotel. He/ she can find the available service. As the system is based on geolocation, the customers is able to track his/her order. All available services in the hotel are displayed on the web system.

VII. CONCLUSION

In this research paper, a hotel ordering –delivering system was developed and used to order the hotel services through a web-based application and get the delivery through a developed system without the intervention of waiters or waitresses. Ordering web-based application was done by using HyperText markup language (HTML), PHP, CSS, and JavaScript. The results showed that the system is reliable, secured and faster in providing the service by the hotel. Furthermore, the system communicates over the internet.

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