Cafe Order Notification Tools Using Wireless with Point to Multipoint Communication Model

Arief Budi Laksono[1], Affan Bachri[1], Achmad Farhan Willyanto[1*]

[1]Universitas Islam Lamongan, Veteran Street 35A, Lamongan-East Java, 62211, INDONESIA

*Corresponding Author

Abstract:
Day by day, new technologies and devices are developed that can help improve performance because technology makes things more accessible and economical. Various tools have been developed to facilitate human work. The author uses the ESP8266 Wemos D1 Mini as the brain of all components and the Blynk application as a device controller. This project includes a charger module, push button, LED, 1.3-inch OLED LCD, buzzer, transistor, and 1000mAH Lithium Ion battery. This research also applies an Internet of Things technology. Therefore, this paper, titled Cafe Order Notification Tool Using a Wireless Communication Model With Point To Multipoint, is developed with the working principle of (i) customers make an order, (ii) customers are given a queue notification tool for this cafe order, (iii) once the order is ready, the cashier control the device using the Blynk application and send a signal to the device. Then, if the tool exceeds the range and the WiFi network is disconnected, the tool will issue an alarm sound and an indicator on the LCD "Network Disconnected" within 20 meters. With a distance of 25 meters, tool number 1 can still be reached but tool numbers 2, 3, 4, and 5 are no longer reachable, whereas when they are kept about 30 meters away, all tools cannot reach the WiFi network that has been provided.

Keywords:
Internet Of Things · Café · Wemos D1 Mini · ESP8266 · Microcontroller · Cafe Order Queue · Blynk Application

1. Introduction

The development of various information technologies is now widely used for the needs of the cafe industry, as well as for products and services. Especially in the Lamongan area, where there are lots of cafes, with customers complaining about the service being less responsive, one of the main factors is waiters have difficulty finding customers' places/tables due to being too crowded, and there is a lot of accumulation of consumers, forced to stand in line for a long time due to the accumulation of queues and the lack of responsiveness of the cafe's services.

Because of that, the author has the idea to develop technology using a tool that helps overcome this problem, namely "Cafe Order Notification Tool Using Wireless With a Point To Multipoint Communication Model". The author believes this tool can overcome the buildup of consumers because consumers do not wait too long to be cashiered until the food is ready, and waiters have no trouble finding customers to deliver food to the consumer's table so that the cafe's atmosphere becomes coordinated and orderly.

**Corresponding author: farhan.willyanto1507@gmail.com*

With this technology, the authors researched that the Cafe Order Notification Tool Technology Using Wireless With the Point To Multipoint Communication Model can increase the responsiveness of cafe services to customers, and besides that, the authors realise that the presence of this technology in cafes can also reduce operational costs, as put forward Berry (1995) that the role of information technology can reduce costs, and improve customer management.

2. Materials and Methods

To facilitate research and obtain maximum results, the materials and methods used must be in accordance with the procedures applied by the researcher. The following are the materials and methods that the researchers used.

In this study, there are components used in system design. Among others, (i) the Wemos D1 mini is a WiFi module based on ESP-8266 is a microcontroller that acts as a controlling brain of all components, (ii) module charger TP4056 used to charge the battery, (iii) rechargeable battery Polymer lithium-ion battery 1000mAh, (iv) buzzer that functions to convert electrical vibrations into sound vibrations, (v) Light Emitting Diode or often abbreviated as LED that can emit light, (vi) push button that can cut off and conduct electric current, (vii) 1.3 INCH OLED LCD is an electronic component that is used as a medium for displaying characters, (viii) the transistor functions as an amplifier, breaker, and connector (switching), voltage stabilisation, and signal modulation, and (ix) a switch that functions to disconnect or connect a control system.

Before carrying out hardware and software design, it is necessary to design a system functional block in the form of a block diagram that describes the overall working system of this tool. Overall, the functional block of the system can be seen in Figure 1.

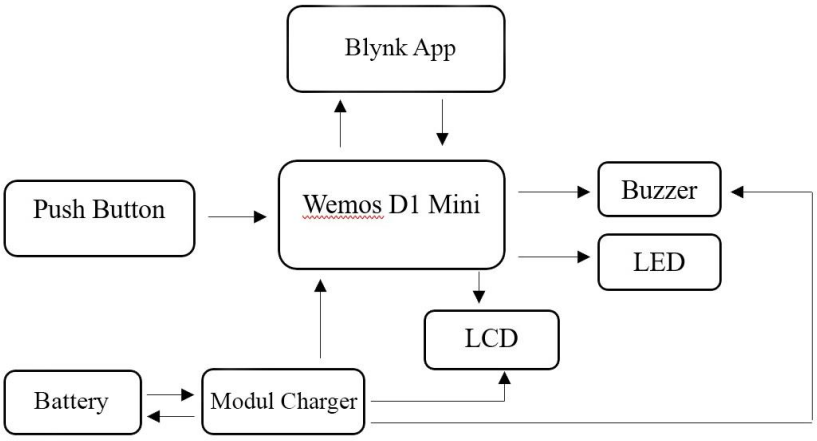


Figure 1: Circuit And System Block Diagram

While Figure 2 shows the schematic of the arrangement of the components. This study uses Wemos D1 Mini Esp8266 as the brain of all components and the Blynk application as a device controller. The Wemos Esp8266 pin is connected to the voltage source of each component. The components used are buzzers, transistors, LEDs, push buttons, LCD screens, switches, charger modules, and batteries, each of which has a pin or leg connected to the Wemos D1 Mini. The voltage source used by Wemos D1 Mini is 5V.

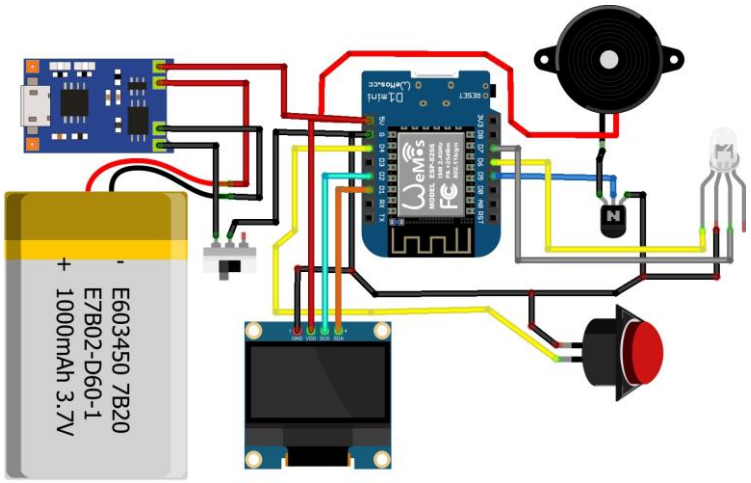


Figure 2: Image of a series of tools

2.1 Tool Holder Design

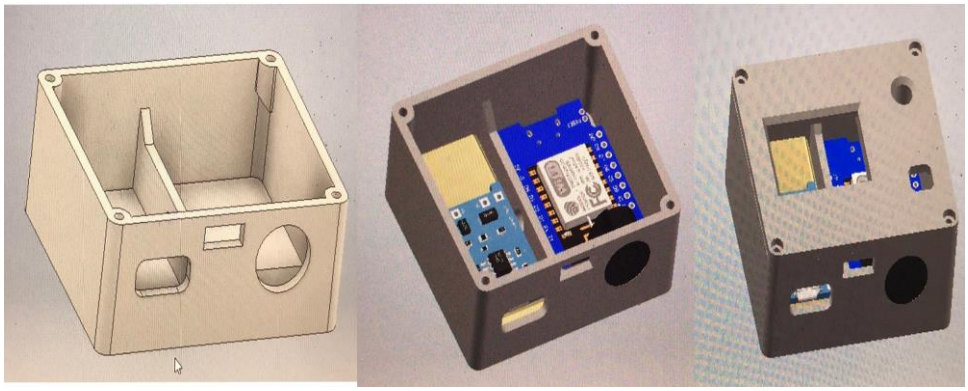


Figure 3: Tool Holder Design

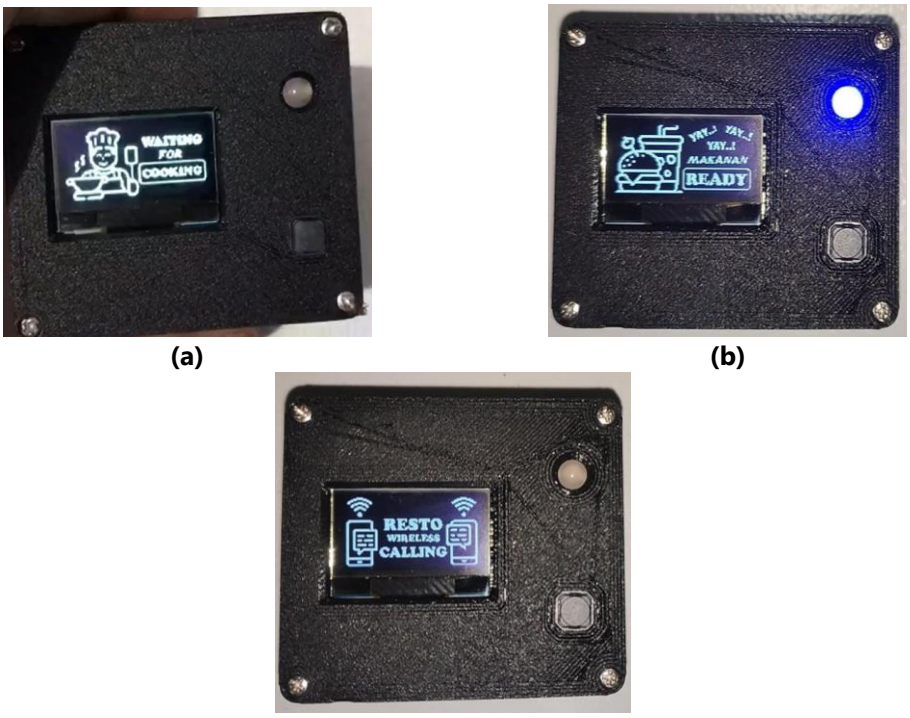
The tool holder is designed using the Autodesk Inventor application in this study as shown in Figure 3. The main goal is to protect whole components from an external damage, making the device look attractive, minimalist and elegant for consumers. Here, the author provides three holes for the buzzer, switch, and charging module and offers two spaces for placing the Wemos D1 mini, battery and charging module so that the components can run and work properly.

Moreover, another three holes for push buttons, LED lights and LCD, with adjustable size according to the size of the components, ensure all buttons and indicators on the tool can be installed and function properly. The customers can push the push button to turn off when the device sounds – which means the order is ready, while the LED and LCD indicate the tool when the tool is used and turned on.

3. Results and Discussion

In this chapter, the results and discussion of the testing of the system are projected. The test aims to determine the performance of the tool that has been designed. The test is carried out separately, one by one, for each component and then tested as a whole device.

Figure 4 shows several animated images on the 1.3 INCH OLED LCD, which is Figure 4 (a) waiting for cooking, Figure 4 (b) food is ready, and once the food is ready to be collected, Figure 4 (c) notification of calling pops up.



(a) **(b)**

(c)

Figure 4: Animated display of images on the LCD

Table 1: LCD Testing

No	LCD Display	Status		
		Opening Tool	Waiting For Cooking	Opening Tool
1	Opening Tool	Active	Not Active	Not Active
2	Waiting For Cooking	Not Active	Active	Not Active
3	Opening Tool	Not Active	Not Active	Active

From Table 1, it can be concluded that the LCD can display characters in the order that has been ordered; therefore, the LCD is declared running properly and is ready for use.

Table 2: Testing the range of the Blynk application and the tools that have been made

No	Distance	Status				
		Tool 1	**Tool 2**	**Tool 3**	**Tool 4**	**Tool 5**
1	10 meters	Connect	Connect	Connect	Connect	Connect
2	20 meters	Connect	Connect	Connect	Connect	Connect
3	25 meters	Connect	Not connected	Not connected	Not connected	Not connected

4	30 meters	Not connected	Not connected	Not connected	Not connected	Not connected

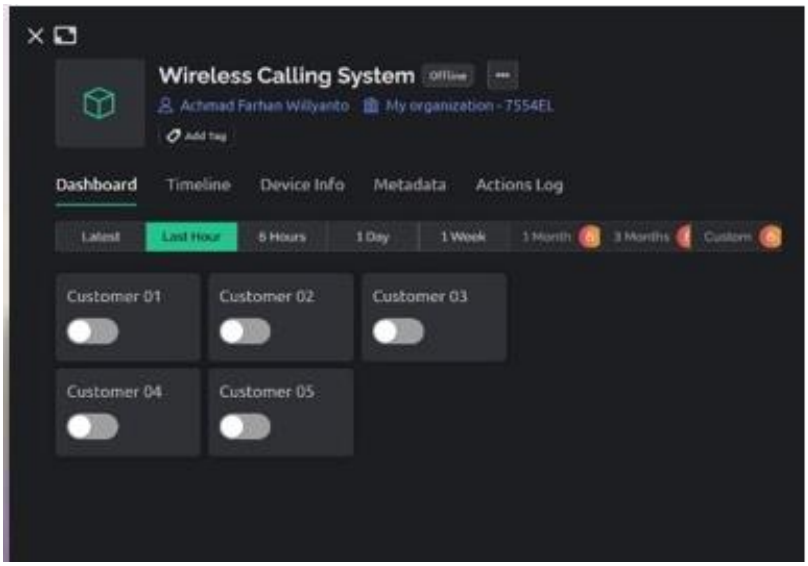


Figure 5: Blynk application visualisation

Table 2 shows that the device can reach more than 20 meters and less than 25 meters using a WiFi cellphone. Thus, the tool that the author has designed is very dependent on the range of the WiFi network connected by this tool, and it can be concluded that the tool is running well and is ready to be used. While Figure 5 shows the visualisation of the Blynk application that is used to control and monitor the tool and system.

4. Conclusions And Suggestion

The design of this cafe order notification tool uses the ESP8266 Wemos D1 Mini as the brain of all components and Blynk as the device controller, with all of the connected features successfully working. This tool can work if a WiFi network is around and connected to the device. The working principle of this tool is that when consumers come to the cafe, they receive a queue notification tool for the cafe's order. When the order is ready, the cashier controls the tool with the Blynk application using a cellphone that has been set for each address so that later, Blynk sends a signal to the tool as an indicator that the consumer's order is ready to be picked up. If the device exceeds range and the WiFi network is disconnected, the device issues an alarm sound and an indicator on the LCD "Network Disconnected". With a distance of 20 meters, this tool can work properly; with a distance of 25 meters, tool 1 can be reachable, while tool number 2, 3, 4, 5 can not be reached. Once it's about 30 meters away, all tools can not reach the WiFi network that has been provided.

To enhance the tool's functionality, some features can be added. Sensors near the cafe's exit can be used to add more advanced security systems; given a contemporary queue indicator, the tools are more elegant and minimalist, making them the major draw for customers entering the cafeteria. To make the tool even more mobile and independent of WiFi network coverage, the program was updated to include an order menu option. This option incorporated new techniques and innovations while still addressing the range issue on the smartphone.

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