

ABSTRACT

The food and beverage industry is one of the strategic sectors that significantly contributes to the national Gross Domestic Product (GDP). According to the Indonesian Food and Beverage Business Association (GAPMMI), the sector was projected to grow by 7% by the end of 2022, indicating strong potential for culinary businesses such as restaurants and cafés. However, during peak hours like lunch time and weekends, restaurants often face challenges in providing fast and responsive service, leading to decreased customer satisfaction. This research aims to design and implement a waitress calling system based on the NodeMCU ESP32 microcontroller using wireless communication via the MQTT protocol. The system consists of three main buttons Call, Bill, and Reset used by customers to send requests directly to waitstaff. Data is transmitted in JSON format through a cloud-based MQTT broker and displayed in real-time on an OLED display, the Blynk application, and a Node-RED dashboard. Testing was conducted at various distances under two conditions Line of Sight (LOS) and Non-Line of Sight (NLOS) to evaluate network quality based on Quality of Service (QoS) parameters. The results showed an average throughput of 1254.44 bit/s (LOS) and 723.54 bit/s (NLOS), categorized as “Very Good” according to TIPHON standards. Packet loss was recorded at 20.65% (LOS) and 54.85% (NLOS), with average delay of 993.55 ms (LOS) and 848.1 ms (NLOS), and jitter of 6.39 ms (LOS) and 180.86 ms (NLOS). The implementation of this system has proven effective in speeding up service processes, reducing customer waiting time, and improving operational efficiency. Using an Internet of Things approach, this system supports digital transformation in the restaurant service sector.

Keywords: *Waitress Calling System, Wireless Sensor Network, Internet of Things, NodeMCU ESP32, Quality of Service, MQTT*