ABSTRACT

*Tel-U Coffee faces significant operational challenges during peak hours, including rapid increases in order volumes, staff limitations, delivery delays, order errors, and a 15% decline in customer satisfaction. Previous efforts using first-generation food delivery robots proved inadequate due to technical limitations, such as simple user interfaces based on App Inventor and the absence of real-time monitoring systems, resulting in suboptimal handling of demand surges. This situation necessitates innovative solutions that address the technical weaknesses of previous systems while meeting the café's operational needs to maintain service quality and efficiency.This research develops an Internet of Things (IoT)-based monitoring system integrated with food delivery robots. The system consists of an Android application and web monitoring plat*form *that enables baristas to issue commands and monitor robot status in real-time, including location, battery capacity, and tray status. The technologies employed include ESP32 as the microcontroller, MQTT protocol for data communication, and MySQL as the database. The system is Designed to be easily operated without disrupting barista workFlows while providing transparency in the service process. The development methodology encompasses requirements analysis, system Design, software and hardware integration, and Testing using User Acceptance Testing (UAT).The implementation of Tel-U Interactive Food Assistant (TIFA) successfully addresses Tel-U Coffee's operational challenges during peak hours. The system proves effective in improving service efficiency through delivery automation and order monitoring, achieving user satisfaction rates of 90.73% for the Android application and 92% for web monitoring, while capable of handling order surges up to 40%. Previous system limitations have been overcome through a more responsive Android application and centralized web monitoring integration. Nevertheless, the system has limitations regarding the number of Testing respondents and untested multi-robot scenarios or POS system integration. Future development will focus on enhancing scalability, reliability, and adding interactive AI features along with multi-robot support. TIFA demonstrates significant potential as an innovative solution for improving café industry services and can serve as a model for smart technology implementation in similar sectors.*

Keywords: Food delivery robot, Internet of Things (IoT), real-time monitoring system