ABSTRACT

Helmet theft cases are common in the public sphere. Parking lots that have no helmet storage and not guarded by officers are often used by helmet thieves to carry out their actions, such as in mall parking lots, campus parking lots, or market parking lots. This is financially detrimental and infuriating for helmet owners. Nowadays, many people utilize lockers to store their helmets. Helmet storage lockers in motorcycle parking lots are usually not equipped with a security system that will make the helmet vulnerable to being stolen, switched, damaged, or wet due to rain. Therefore, innovation is needed in a locker security system to make helmets more secure so that helmet owners will feel more at ease.

Secure and reliable helmet storage is one of the important needs for motorcycle riders. This research aims to design and develop a prototype of an Android-based locker rental security system using a Raspberry Pi Pico microcontroller by using the Internet of Things (IoT). This system is designed to provide a practical and efficient solution in renting out helmet storage lockers with a rental fee of Rp 2,000 per hour for one user. The system development methodology includes design, implementation, and testing stages. In the design stage, system requirements analysis, user interface design, and security system design involving the use of Raspberry Pi Pico as the main controller are carried out. System implementation involves the development of an Android application that serves as the user interface to access the lockers. In addition, sensor modules and other components are integrated with the Raspberry Pi Pico to monitor the locker status and control user access. In the testing phase, system functionality testing, program execution testing, Quality of Service (QoS) testing, and black box testing were conducted.

From the results of system testing that has been done, it is known that the entire system on the locker can run well. In the locker delay test, the average time of the "Available" locker 1 click command is 1531.73 ms, the average time of the "Retrieve" locker 1 click command is 2185.43 ms, the average time of the "Available" locker 2 click command is 1674.73 ms, and the average time of the "Retrieve" locker 2 command is 2199.03 ms. In QoS testing on the Telyu Locker application, the average throughput value is 9111.93 bps and is categorized as

"Very Good" with an index value of 4 based on TIPHON standards. While the average delay value is obtained at 237.67 ms and is categorized as "Good" with an index value of 3 based on the ITU-T G.1010 standard.

Keywords*: Android, helmet, locker, Internet of Things (IoT), Quality of Service (QoS), Raspberry Pi Pico*