ABSTRACT

The university landmark tower basement parking lot is an important facility for professors and employees. At present, however, parking management presents a challenge as to the efficiency and availability of quickly accessible parking spots. To address the problem, we propose an innovative IoT (Internet of Things) solution. It aims to integrate sensor technology, ESP32 devices, and mobile applications to create sophisticated smart parking systems. In this system, each parking lot will be equipped with real-time parking sensors. The sensor will detect the presence of a vehicle and transmit information about available space to the ESP32 device, which will then transmit that data to the server via the Wi-Fi network.

The server will manage and store the status data of the parking lot, including information about availability, the duration of parking time, and the time it takes to detect and process data. This data is then accessible to the user through mobile applications that provide real-time information about parking Spaces available in the user preferred areas. With more effective and real-time parking management, professors and employees can save time in search of parking. System performance will be analyzed based on parameters such as delay in detection and the response speed of mobile applications.

In the testing process conducted when the prototype was fully implemented, the results showed that the sensor could detect vehicles within a range of 2 to 13 cm with an accuracy rate of 95.04% and classify them into several vehicle categories. Additionally, the throughput obtained after testing was 64,3 bps, which falls into the medium category. The delay testing yielded a value of 38,665 ms, packet loss testing resulted in 0%, and signal strength measurement was -49 dBm, all of which are categorized as excellent.In addition, the potential for further development such as navigation systems or parking lots expansion will also be evaluated. We hope it will accelerate the digital transformation of Telkom University landmark tower, overcome conventional parking constraints, and create a more efficient and comfortable environment. The system not only provides practical solutions to parking problems but also demonstrates university's telkom commitment to adopting the latest technology to increase comfort and efficiency in colleges. With successful implementation, the system has the potential to model for other institutions in modern and effective parking management.

Keywords: Basement parking, Smart parking system, Internet of Things, Mobile Application