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UniLOCK: A Mobile Application-Monitored Locker Kiosk for Marinduque State University Using Raspberry Pi and Arduino

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ABSTRACT

The increasing need for secure and efficient storage of items within university settings has highlighted issues related to parcel deliveries, personal item storage, and security concerns at the guardhouse of Marinduque State University (MarSU) Boac Campus. The traditional systems of managing deliveries, items left at the guards for later retrieval, and lost-and-found items create inefficiencies, security risks, and additional workload on the security guards. This study addresses the following challenges by developing a mobile application-monitored locker kiosk system to enhance security, efficiency, and user convenience. The system integrates Raspberry Pi and Arduino, including IR proximity sensors for item detection, solenoid locks for security, and a GSM module for OTP-based retrieval and real-time notifications. Key objectives of this study include evaluating the system's average execution time, accuracy in detecting the item to be stored as well as the accuracy of both the mobile application and kiosk screen in reflecting the compartment's availability, and user acceptability.

The study includes execution time analysis, accuracy testing, and user experience assessments (UEQ). The OTP notification via SMS executes within 25.7 seconds, while the system demonstrates high accuracy in item detection and effective real-time synchronization with Firebase. Performance evaluation using the mean absolute error (MAE) confirms the system's reliability in accurately displaying compartment information. Moreover, the user experience assessments (UEQ) indicate that the system significantly improves security and operational efficiency.

The findings suggest that implementing this smart locker system reduces security risks, streamlines item retrieval, and lessens the workload of on-campus security personnel. By leveraging technology to optimize campus operations, this system aligns with Marinduque State University's (MarSU) vision of becoming a smart campus.

Keywords: *locker kiosk system, storage solutions, locker, OTP-based, storage*