

ABSTRACT

Current dormitory security at Telkom University still relies on conventional systems like manual keys and logbooks, which are considered inadequate, vulnerable, and insecure. These limitations enable unauthorized access and increase the risk of students losing valuable belongings. To address these issues, a "Smart Dorm Key" based on the Internet of Things (IoT) has been designed. It features a two-step verification system using fingerprint and voice recognition to enhance security.

This system is developed with an ESP32 microcontroller as the central control unit. The process begins with the user registering their fingerprint and voice passphrase through a mobile application. To access the room, the user first performs a voice scan on the available application. If the voice is verified, which is confirmed via an LCD screen and a buzzer, the user then scans their fingerprint using the fingerprint sensor. The application utilizes machine learning with the Mel-Frequency Cepstral Coefficients (MFCC) method for voice feature extraction and employs a Convolutional Neural Networks (CNN) model for voice recognition. If both verifications are successful, the ESP32 will activate the solenoid door lock to open the door. The system also includes a real-time activity log feature stored in the Firebase database, a no-touch exit sensor, and a physical button for fingerprint data management.

Keywords : CNN, Dormitory Security, ESP32, Fingerprint, Internet of Things, MFCC, Smart Dorm Key, Two-Step Verification, Voice Recognition.