

## **ABSTRACT**

This final project aims to develop a smart lock control system based on the Internet of Things (IoT), integrated with an Android application to enhance security and ease of access to doors digitally. The system features PIN and fingerprint authentication, automatic control using Bluetooth Advertising, and gesture control powered by a machine learning model using TensorFlow Lite. The application was developed using Kotlin with the Jetpack Compose framework, and Firebase Realtime Database was used for real-time synchronization of lock status. The development process included requirement analysis, UI design, application implementation, integration with ESP32 microcontroller and solenoid door lock, functionality testing, usability testing with 28 respondents, and IoT education activities at SMA Negeri 1 Bojongsoang. Testing results showed that all features functioned as expected, with an effectiveness score of 88.14%, usefulness of 85.43%, and user satisfaction of 82.14%. The machine learning model for gesture recognition achieved an accuracy of 96.80% for closed hand gestures and 96.27% for open hand gestures, with an average response time of 0.1 seconds. This system demonstrates reliable and efficient performance and has strong potential to be further developed as a mobile-based digital security solution for various practical applications.

Keywords: IoT, Android app, door control, smart lock, machine learning