

ABSTRACT

The elderly are at high risk of falling due to decreased motor function and balance. Falls that are not immediately addressed can have fatal consequences, especially for elderly people with certain medical conditions such as stroke. To address this issue, an IoT-based fall detection system integrated with a mobile app has been developed. The system utilizes MPU6050 sensors and ESP32-C6 microcontrollers to monitor body movements in real-time.

The method involves processing accelerometer and gyroscope data through a threshold algorithm to classify three conditions: stationary, walking, and falling. Data is wirelessly transmitted to the Firebase Realtime Database and displayed in the mobile application, which shows the status and sends notifications if a fall is detected.

Based on the test results, the system showed an accuracy rate of 92% for inter-subject testing, with an average delay from the device to Firebase of less than 5 seconds. In addition, an evaluation of the application's quality through a survey showed positive responses from users, resulting in a Mean Opinion Score (MOS) of 4.3 out of 5.

The discussion of the results indicates that the system still requires further development to detect falls in the elderly, as there is still a slight gap from the ideal specification (95% accuracy). Potential future developments include the integration of machine learning to improve activity classification accuracy and reduce false positives.

Keywords: elderly, fall detection, IoT, ESP32-C6, MPU6050, accuracy, mobile app.