

**DESIGN AND DEVELOPMENT OF AN IoT-BASED PROTOTYPE SYSTEM
FOR MONITORING THE AMOUNT OF MONEY AND DETECTING FORCED
OPENING OF DONATION BOXES**

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ABSTRACT

A donation box is a medium used to collect donations, but the recording of donated money and the monitoring of the donation box condition are still commonly carried out manually, requiring administrators to check the donation box directly. This study aims to design and develop a prototype of an Internet of Things (IoT)-based donation box monitoring system using an ESP32 microcontroller, a TCS3200 color sensor, an SW-420 vibration sensor, and a reed switch. The system sends monitoring data to a mobile application through Firebase Realtime Database, allowing the donation balance and security status to be monitored in real time. Based on the test results, the TCS3200 color sensor achieved a success rate of 74% in an open environment, 78% in an indoor environment, and 90% in a dark environment with a light intensity of 0 lux, indicating that lighting conditions affect the sensor's reading performance. The SW-420 sensor, reed switch, buzzer, and mobile application also functioned properly in detecting security disturbances and sending notifications to the administrator. However, the system still has several limitations, including its inability to detect banknotes inserted too quickly and its tendency to continue reading a banknote when it is pulled back before the reading process is completed.

Keywords: *Internet of Things (IoT), ESP32, TCS3200, Donation Box, Monitoring.*