



**SAFETY SURVEILLANCE SYSTEM USING
COMPUTER VISION AND IOT DEVICES TO
DETECT INTRUDERS AND ANOMALIES**

UNDERGRADUATE THESIS
Submitted as one of the requirements to obtain
Sarjana Komputer

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FACULTY OF COMPUTING
INFORMATICS STUDY PROGRAM
CIKARANG
AUGUST, 2025

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ABSTRACT

This capstone project pr... m that integrates IoT-based sensors and computer vision to enhance environmental monitoring and anomaly detection. Traditional

Upgrade to Premium

Advanced scan

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GPTZero AI Detection Model 3.8b

human

We are highly confident this text is entirely human

①

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AI

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ABSTRACT

This capstone project presents the development of a smart surveillance and alert system that integrates IoT-based sensors and computer vision to enhance environmental monitoring and anomaly detection. Traditional surveillance systems require constant manual supervision and often fail to respond promptly to critical incidents such as fire, gas leaks, or intrusions. By leveraging ESP32-based microcontrollers, the system captures real-time data from sensors including temperature (MAX6675), gas (MQ2), motion (PIR), and distance (ultrasonic). An ESP32-CAM module is utilized for real-time video streaming and object detection using YOLOv5 via a Python Flask server. Data communication is handled using the MQTT protocol with EMQX broker support. The system features a responsive web dashboard for visualizing sensor readings and camera feeds, facilitating immediate response from security personnel. Testing confirmed that the system accurately detects anomalies and issues timely alerts, thus proving its potential as a reliable and scalable solution for modern surveillance requirements.

Keywords: IoT, ESP32, MQTT, Real-Time Monitoring, Flask, Sensor Fusion, Smart Surveillance, Gas Detection, Motion Sensor, Ultrasonic, Edge Computing.

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