

ABSTRAK

OPTIMALISASI SISTEM PENGAWASAN RUMAH BERBASIS YOLO V8 & IoT

([2025 : 70Halaman] + [27 Gambar] + [11 Tabel] + [Daftar Pustaka] + [Lampiran])

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Tingkat kejahatan seperti pencurian di lingkungan rumah masih menjadi permasalahan serius yang memerlukan sistem keamanan yang lebih cerdas dan responsif. Tugas Akhir ini bertujuan untuk merancang serta menerapkan sistem pengawasan rumah berbasis Deep Learning dan Internet of Things (IoT). Sistem dikendalikan oleh Raspberry Pi 4 sebagai unit pemroses utama, dilengkapi dengan kamera webcam untuk pengambilan gambar, sensor magnetik pada pintu sebagai pendeteksi gangguan, dan buzzer sebagai alarm peringatan. Teknologi You Only Look Once versi 8 (YOLOv8) digunakan untuk dua fungsi utama, yakni mendeteksi keberadaan orang (model YOLOv8n) dan mengenali identitas wajah (model YOLOv8s-face). Model ini dilatih menggunakan dataset buatan sendiri dan dievaluasi menggunakan metrik performa standar. Hasil pengujian menunjukkan bahwa model deteksi orang mencapai nilai mean Average Precision (mAP50) sebesar 0,514 dengan recall sebesar 0,756, sementara sistem pengenalan wajah berhasil mencapai akurasi 97%. Tingkat kesalahan dalam mengenali orang yang tidak dikenal (FAR) tercatat sebesar 2%, dan kesalahan menolak orang yang dikenal (FRR) sebesar 4%. Sistem mampu mengirimkan notifikasi ke pengguna melalui Telegram dengan waktu rata-rata 3,7 detik, serta mengaktifkan alarm lokal dalam 1,5 detik. Berdasarkan hasil tersebut, sistem ini terbukti efektif sebagai solusi keamanan rumah yang modern, otomatis, dan mampu melakukan pemantauan jarak jauh secara real-time.

KATA KUNCI: YOLOv8, Internet of Things (IoT), Pengenalan Wajah, Raspberry Pi, Telegram Bot, *Deep Learning*.

ABSTRACT

OPTIMIZATION OF HOME SURVEILLANCE SYSTEM BASED ON YOLOV8 AND IoT

([2025 : 70 Pages] + [27 Pictures] + [11Tables] + [References] + [attachment])

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The increasing rate of crimes such as burglary in residential areas remains a serious concern, requiring a smarter and more responsive security system. This Final Project aims to design and implement a home surveillance system based on Deep Learning and the Internet of Things (IoT). The system is powered by a Raspberry Pi 4 as the main processing unit, equipped with a webcam for image capture, a magnetic sensor on the door for intrusion detection, and a buzzer as an alarm indicator. The You Only Look Once version 8 (YOLOv8) technology is employed for two main tasks: detecting human presence (using the YOLOv8n model) and recognizing facial identities (using the YOLOv8s-face model). The models were trained using a custom-built dataset and evaluated with standard performance metrics. Experimental results show that the person detection model achieved a mean Average Precision (mAP50) of 0.514 with a recall of 0.756, while the face recognition system reached an accuracy of 97%. The False Acceptance Rate (FAR) was recorded at 2%, and the False Rejection Rate (FRR) at 4%. The system successfully sent notifications to users via Telegram with an average delay of 3.7 seconds, and activated the local alarm within 1.5 seconds. These results demonstrate that the proposed system is effective as a modern, automated, and real-time remote home security solution.

Keywords: YOLOv8, Internet of Things (IoT), Face Recognition, Raspberry Pi, Telegram Bot, Deep Learning.