

IMPLEMENTASI SISTEM PRESENSI OTOMATIS BERBASIS RFID DAN ALGORITMA YOLO UNTUK MONITORING KEHADIRAN MAHASISWA DI KELAS

Oleh:

Muhammad Ikhsan Nurhalim

1217050097

ABSTRAK

Penelitian ini bertujuan untuk mengimplementasikan sistem presensi otomatis berbasis teknologi *Radio Frequency Identification* (RFID) dan algoritma YOLOv5s (*You Only Look Once* versi 5 *small*) untuk memantau kehadiran mahasiswa secara otomatis dan akurat. Sistem dirancang untuk mengatasi kelemahan presensi manual yang lambat, rawan kesalahan, dan manipulasi. RFID digunakan untuk identifikasi otomatis mahasiswa, sedangkan YOLOv5s digunakan sebagai validasi visual melalui deteksi objek secara *real-time*. Metodologi pengembangan menggunakan pendekatan CRISP-DM, mencakup tahapan *business understanding*, *data preparation*, *modelling*, *evaluation*, dan *deployment*. Hasil implementasi menunjukkan bahwa sistem dapat mencatat kehadiran secara otomatis dengan tingkat akurasi yang baik. Evaluasi melalui Blackbox Testing menunjukkan seluruh fungsi berjalan sesuai harapan. Model YOLOv5s mencatat *precision* sebesar **0.754** dan *recall* **0.382**, sementara model YOLO-CROWD mencapai **mAP@0.5** sebesar **43,6%**, lebih tinggi dari YOLOv5s yang memperoleh **39,4%**. Sistem ini terbukti dapat meningkatkan efisiensi dan akurasi pencatatan kehadiran, serta mengurangi potensi manipulasi data. Dengan potensi integrasi ke dalam *Learning Management System* (LMS), sistem ini menjadi solusi inovatif untuk manajemen kehadiran mahasiswa di institusi pendidikan.

Kata kunci: Presensi Otomatis, RFID, YOLOv5s, Deteksi Objek, Validasi Visual, CRISP-DM.

IMPLEMENTATION OF AN AUTOMATIC ATTENDANCE SYSTEM BASED ON RFID AND THE YOLO ALGORITHM FOR MONITORING STUDENT ATTENDANCE IN CLASSROOMS

By:

Muhammad Ikhsan Nurhalim

1217050097

ABSTRACT

*This research aims to implement an automatic attendance system using Radio Frequency Identification (RFID) technology and the YOLOv5s (You Only Look Once version 5 small) algorithm to monitor student presence in the classroom accurately and efficiently. The system is designed to address the shortcomings of manual attendance methods, which are often slow, error-prone, and susceptible to manipulation. RFID is utilized for automatic student identification, while YOLOv5s serves as a visual validation mechanism through real-time object detection. The development process follows the CRISP-DM methodology, which includes business understanding, data preparation, modeling, evaluation, and deployment phases. The results show that the system can automatically record student attendance with satisfactory accuracy. Blackbox Testing confirmed that all system components functioned correctly. The YOLOv5s model achieved a precision score of **0.754** and a recall of **0.382**, while the YOLO-CROWD model recorded a **mAP@0.5** of **43.6%**, outperforming YOLOv5s, which scored **39.4%**. This system has proven effective in improving attendance recording efficiency and accuracy while reducing the risk of data manipulation. With the potential for integration into a Learning Management System (LMS), it offers an innovative solution for managing student attendance in educational institutions..*

Keywords: *Automatic Attendance, RFID, YOLOv5s, Object Detection, Visual Validation, CRISP-DM.*