

ABSTRAK

Rizky Yuli Andreanto. 2026. Sistem *Tracking* Dosen Berbasis *Face Recognition* Menggunakan *Yolov26* Dan *Arcface* Dengan Fitur Pelacakan Lokasi Real-Time Serta Notifikasi Otomatis Melalui *Bot* Telegram. Program Studi Teknik Informatika, Fakultas Teknik, Universitas PGRI Madiun. Pembimbing (I) Yessi Yunitasari, S.Kom., M.Cs, Pembimbing (II) Yoga Prisma Yuda, S.Kom., M.Kom.

Penelitian ini bertujuan merancang, mengimplementasikan, dan menguji sistem Dosen *Tracker* berbasis *edge computing* dan pengenalan wajah untuk menyediakan informasi zona serta waktu terakhir dosen terdeteksi. Sistem dikembangkan menggunakan metode *Extreme Programming* (XP) dan dimodelkan dengan *Unified Modeling Language* (UML). Sistem mengintegrasikan Kiosk/Edge Node, *backend* asinkron FastAPI, SQLite, ReactJS, WebSocket, dan *bot* Telegram. Pemrosesan citra dilakukan secara sekuensial menggunakan YOLOv26 Nano untuk deteksi wajah, MiniFASNetV2 untuk pemeriksaan *liveness*, dan ArcFace Buffalo_SC untuk pengenalan identitas. Status dosen dikelola menggunakan NIP sebagai identitas tetap, algoritma FILO, dan transisi zona virtual untuk membedakan peristiwa MASUK dan KELUAR. Pengujian meliputi *black-box testing*, *white-box testing* dengan teknik basis *path testing* dan Pytest, serta evaluasi ketiga model kecerdasan buatan. Hasil *black-box testing* menunjukkan fungsi utama berjalan sesuai skenario pada lingkungan pengembangan. Sebanyak 35 kasus *white-box testing* terhadap lima logika utama *backend* dinyatakan lulus. YOLOv26 Nano menghasilkan *precision* 89,31%, *recall* 78,94%, dan *mAP@0,5* sebesar 87,94%. ArcFace mencapai akurasi 99,88% pada 820 pasangan citra dari enam identitas. MiniFASNetV2 mencapai akurasi 90,00% pada CelebA-Spoof, tetapi menurun menjadi 66,04% dengan ACER 42,58% pada data independen berbasis media daring. Seluruh komponen berhasil diintegrasikan sebagai sistem, tetapi kelayakan operasional di lingkungan kampus masih memerlukan *enrollment* langsung, UAT, dan pengujian lapangan pada perangkat target.

Kata Kunci: Dosen *Tracker*, *Edge Computing*, Pengenalan Wajah, Transisi Zona *Virtual*, *Extreme Programming*

ABSTRACT

Rizky Yuli Andreanto. 2026. *Lecturer Tracking System Based On Face Recognition Using Yolov26 And Arcface With Real-Time Location Tracking And Automatic Notifications Via Telegram Bot*. Program Studi Teknik Informatika, Fakultas Teknik, Universitas PGRI Madiun. Pembimbing (I) Yessi Yunitasari, S.Kom., M.Cs, Pembimbing (II) Yoga Prisma Yuda, S.Kom., M.Kom.

This study aims to design, implement, and evaluate a Dosen Tracker system based on edge computing and face recognition to provide information on a lecturer's zone and last detected time. The system was developed using Extreme Programming (XP) and modeled with the Unified Modeling Language (UML). It integrates a Kiosk/Edge Node, an asynchronous FastAPI backend, SQLite, ReactJS, WebSocket, and a Telegram bot. Image processing is performed sequentially using YOLOv26 Nano for face detection, MiniFASNetV2 for liveness checking, and ArcFace Buffalo_SC for identity recognition. Lecturer status is managed using NIP as a persistent identity, a FILO algorithm, and virtual zone transitions to distinguish ENTER and EXIT events. Testing included black-box testing, white-box testing with basis path testing and Pytest, and evaluation of the three artificial intelligence models. Black-box testing results show that the main functions performed as expected in the development environment. A total of 35 white-box test cases covering five core backend logics all passed. YOLOv26 Nano achieved a precision of 89.31%, a recall of 78.94%, and an mAP@0.5 of 87.94%. ArcFace reached an accuracy of 99.88% on 820 image pairs from six identities. MiniFASNetV2 achieved 90.00% accuracy on CelebA-Spoof, but dropped to 66.04% with an ACER of 42.58% on independent online-media-based data. All components were successfully integrated into a complete system; however, operational feasibility in a campus environment still requires direct enrollment, UAT, and field testing on the target devices..

Keywords: *Dosen Tracker, Edge Computing, Face Recognition, Virtual Zone Transition, Extreme Programming*