

***A SOFT REAL-TIME ATTENDANCE SYSTEM BASED ON FACE
RECOGNITION USING THE ARCFACE ALGORITHM
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ABSTRACT

Attendance systems are an important component in supporting the effectiveness of the learning process. However, manual attendance methods still cause various problems such as inefficiency, recording errors, and potential fraud such as proxy attendance. Therefore, an automated attendance system that is more accurate and efficient is required. This research aims to design and develop a face recognition-based attendance system that operates in a soft real-time environment using the ArcFace method with cosine similarity on a Raspberry Pi 5. The system is developed by integrating face registration, embedding extraction using a deep learning-based model (InsightFace), and face matching for user identification. The experimental results show that the system achieves an accuracy of 97.50%, with a False Acceptance Rate (FAR) of 0.08% and a False Rejection Rate (FRR) of 2.50%. In real-time implementation, the system produces an average similarity score of 60%–80%. In terms of performance, the buffalo_l model achieves 0.5–0.6 FPS, while the buffalo_s model reaches 1.83–2.40 FPS under multi-face conditions. Based on these results, the developed system operates within the soft real-time category on resource-constrained devices and can improve the efficiency and accuracy of attendance systems in school environments.

Keywords: *Attendance System, Face recognition, ArcFace, Cosine similarity, Raspberry Pi 5, Soft real-time*