

ABSTRAK

Keselamatan dan kesehatan kerja (K3) merupakan aspek penting yang wajib diperhatikan dalam industri konstruksi yang memiliki tingkat risiko tinggi. Salah satu upaya pencegahan kecelakaan adalah melalui penggunaan Alat Pelindung Diri (APD), seperti helm, rompi, sarung tangan, dan sepatu pelindung. Namun, rendahnya kedisiplinan pekerja dalam mengenakan APD menimbulkan perlunya sistem berbasis teknologi yang mampu mendukung proses pengawasan secara otomatis. Penelitian ini bertujuan untuk mengimplementasikan metode *You Only Look Once* versi 8 (YOLOv8) yang dikombinasikan dengan algoritma pelacakan DeepSORT dan Re-Identification (ReID) guna mendeteksi sekaligus melacak pekerja konstruksi beserta atribut keselamatan yang digunakan. Dataset penelitian diperoleh dari Roboflow dengan kelas objek meliputi *person*, helm, rompi, sarung tangan, dan sepatu pelindung. Sistem dikembangkan menggunakan bahasa Python dan framework Streamlit, kemudian diuji melalui pengunggahan video maupun deteksi secara real-time. Hasil pengujian menunjukkan bahwa sistem yang dibangun telah berjalan sesuai kebutuhan fungsional, mampu mendeteksi serta melacak objek pekerja konstruksi secara langsung, dan dapat mengidentifikasi ulang pekerja meskipun terjadi perubahan posisi atau occlusion. Selain itu, sistem juga dapat menampilkan status penggunaan APD sehingga memudahkan proses pemantauan keselamatan kerja. Berdasarkan hasil tersebut, dapat disimpulkan bahwa integrasi YOLOv8, DeepSORT, dan ReID berhasil meningkatkan akurasi serta reliabilitas deteksi APD pada lingkungan konstruksi yang dinamis.

Kata Kunci: Keselamatan kerja, Alat Pelindung Diri, YOLOv8, DeepSORT, ReID

ABSTRACT

Occupational health and safety (OHS) is a crucial aspect that must be prioritized in the construction industry, which is categorized as high-risk. One preventive measure to reduce accidents is the proper use of Personal Protective Equipment (PPE), such as helmets, vests, gloves, and safety boots. However, low compliance among workers in wearing PPE highlights the need for a technology-based system that can support automatic supervision. This research aims to implement the *You Only Look Once* version 8 (YOLOv8) method combined with DeepSORT and Re-Identification (ReID) algorithms to detect and track construction workers along with their safety attributes. The dataset was obtained from Roboflow with object classes including *person*, helmet, vest, gloves, and safety boots. The system was developed using Python and the Streamlit framework, and tested through video uploads as well as real-time detection. The experimental results show that the developed system has met the functional requirements, successfully detecting and tracking construction workers in real time, and re-identifying them even under position changes or occlusion. In addition, the system is able to display PPE usage status, thereby facilitating safety monitoring. Based on these findings, it can be concluded that the integration of YOLOv8, DeepSORT, and ReID has improved the accuracy and reliability of PPE detection in dynamic construction environments.

Keywords: *Occupational safety, Personal Protective Equipment, YOLOv8, DeepSORT, ReID*