

**UNIVERSITI TEKNOLOGI MARA**

**REAL-TIME PERSONAL PROTECTIVE  
EQUIPMENT (PPE) COMPLIANCE  
DETECTION SYSTEM USING YOU ONLY  
LOOK ONCE VERSION 5**

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## ABSTRACT

The manufacturing and construction sectors have consistently experienced a high incidence of occupational accidents and diseases. In response, many countries, including Malaysia, have incorporated the use of Personal Protective Equipment (PPE) into their government laws and safety regulations. In Malaysia, this requirement is outlined in Standard Operation Procedure (SOP) manuals, which specify the mandatory use of seven types of PPE: hard hat, safety goggles, hi-vis vest, safety shoes, gloves, respirator, and earplugs. However, monitoring a large number of workers and ensuring consistent use of PPE can be challenging when done by human agents. Therefore, the objectives of this project involve design and implementation of a real-time PPE detection system, which aims to effectively monitor workers' safety compliance. The project utilizes the You Only Look Once (YOLO) algorithm as the detection algorithm, namely version 5. Images were collected to train the model on detecting workers wearing PPE or not. In this project, the methodology used is the modified waterfall model, which consists of four main phases excluding the maintenance phase, covering requirement analysis, design, implementation and testing. For this project, there are two types of testing were conducted: functionality testing of the performance of the entire system and metric evaluation to evaluate the accuracy of the object detection model. The object detection algorithm achieved a mean Average Precision (mAP) of 91.5% in the metric evaluation, while the accuracy testing yielded a 98.3% accuracy rate. In order for the system to easily access by the targeted users, companies in the manufacturing and construction sectors and the Occupational Safety and Health Act (OSHA), the system was developed as a web-based platform. As a recommendation for future work, enhancing the detection model for other types of PPE and make the system more reliable for every sectors.

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