ABSTRACT

ANALYSIS OF A REAL-TIME HUMAN PRESENCE DETECTION SYSTEM BASED ON YOLO AND RASPBERRY PI FOR SMART ROOM AUTOMATION
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M. AKBAR TRI RAMADHANI
062140342306
BACHELOR OF APPLIED ELECTRICAL ENGINEERING
ELECTRICAL ENGINEERING DEPARTMENT
STATE POLYTECHNIC OF SRIWIJAYA

Advancements in the fields of Internet of Things (IoT) and Artificial Intelligence (AI) have driven the development of smart room automation systems. However, most existing systems still rely on conventional sensors such as PIR, which detect motion based on infrared radiation without the ability to visually identify objects. This can lead to detection errors, especially when non-human objects emit high levels of heat. In addition, users often forget to turn off electronic devices such as lights and fans, leading to energy waste and potential safety risks.
This study aims to design and analyze a real-time human presence detection system using the You Only Look Once (YOLO) algorithm implemented on a Raspberry Pi to automatically control electronic devices within a smart room.
Testing results show that the system can accurately detect humans under adequate lighting conditions, with an average response time of 6.5–6.7 seconds. Lights and fans are controlled based on human detection, room temperature, and light intensity. A webcam is used as the primary sensor, although performance decreases under low-light conditions. The system is also capable of avoiding false positives when the room is unoccupied. Future improvements may include integrating face recognition and fire/smoke detection to enhance safety in the smart room.

Keywords*: Smart Room, Raspberry Pi, YOLO, Human Detection, Automation, IoT.*