

## **ABSTRACT**

*Air Conditioner (AC) has an important role in creating a conducive learning environment, especially in educational institutions such as Telecommunication Engineering Study Program, Telkom University Purwokerto. However, manual control of air conditioners often causes energy waste and increases the risk of device damage due to inefficient operation, especially when the room is empty. This research proposes an Internet of Things (IoT)-based automatic AC control system to improve energy efficiency. The system utilizes passive infrared (PIR) sensors to detect user presence, DHT11 temperature and humidity sensors, and KY-005 infrared transmitter controlled by an ESP8266 microcontroller. The system also features a web-based interface that allows users to remotely control the air conditioner, thus improving efficiency and convenience. Test results show that the PIR sensor works optimally at detection angles up to 90° with a maximum distance of 5 meters, while the infrared transmitter provides the best performance when positioned directly facing the AC unit with a 90° coverage angle. The DHT11 sensor showed a high accuracy of 98.37%, with an average error of 1.63%. The system is able to save up to 7,68 kWh per day or 230,4 kWh per month for one 2 PK AC unit, potentially reducing electricity costs by 33,33%. This research offers a sustainable solution for classroom air conditioning management and encourages innovation in the application of IoT technology.*

**Keywords:** *Air Conditioner (AC), Internet of Things (IoT), Passive Infrared Sensor, DHT11 Sensor, IR Trasnmitter, microcontroller*