

ABSTRAK

**PERANGKAT KERAS SISTEM PROTOTIPE DETEKSI GANGGUAN
PADA *POINT OF PRESENCE* MENGGUNAKAN MODUL
RASPBERRY PI BERBASIS KECERDASAN BUATAN**

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Ruang server seperti *Point of Presence* (PoP) merupakan aspek penting dalam menjaga kontinuitas layanan jaringan telekomunikasi sehingga memerlukan sistem keamanan. *Uptime Institute Global Data Center Survey 2024* menyebutkan sebanyak 54% organisasi melaporkan bahwa insiden *outage* menyebabkan kerugian lebih dari Rp1,81 miliar. Gangguan yang sering terjadi berupa ancaman seperti asap, korsleting listrik, dan keberadaan objek di area PoP. Penelitian bertujuan mengembangkan prototipe sistem deteksi gangguan berbasis Raspberry Pi yang terintegrasi dengan *Internet of Things* (IoT) dan *Artificial Intelligence* (AI) yang akan diimplementasikan pada ruang PoP. Sistem memanfaatkan sensor ultrasonik, sensor MQ-2 dan *AI Camera*, sedangkan data dikirim menggunakan protokol MQTT dan ditampilkan secara *real-time* pada dashboard Node-RED. Sistem juga dilengkapi buzzer sebagai alarm ketika terdeteksi gangguan. Metode yang dilakukan yaitu metode observasi, literasi dan konsultasi. Hasil pengujian menunjukkan bahwa sensor ultrasonik mampu mendeteksi objek pada jarak 20–100 cm dengan selisih pengukuran 1–3 cm, sedangkan sensor MQ-2 berhasil mendeteksi asap rokok, gas korek, asap plastik, dan asap kertas, serta tidak mendeteksi asap maupun gas pada kondisi udara normal. Sehingga sistem mampu melakukan pemantauan dan deteksi gangguan secara *real-time*.

Kata kunci: *Point of Presence* (PoP), Raspberry Pi, *Internet of Things* (IoT), kecerdasan buatan, Node-RED.

**HARDWARE FOR A PROTOTYPE SYSTEM FOR DETECTING
DISRUPTIONS AT POINTS OF PRESENCE USING A RASPBERRY PI MODULE
BASED ON ARTIFICIAL INTELLIGENCE**

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Server rooms such as Points of Presence (PoP) are a critical component in maintaining the continuity of telecommunications network services and therefore require security systems. The Uptime Institute's 2024 Global Data Center Survey noted that 54% of organizations reported that outage incidents resulted in losses exceeding Rp1.81 billion. Common disruptions include threats such as smoke, electrical short circuits, and the presence of objects within the PoP area. This study aims to develop a prototype of a Raspberry Pi-based disruption detection system integrated with the Internet of Things (IoT) and Artificial Intelligence (AI) for implementation in PoP rooms. The system utilizes ultrasonic sensors, MQ-2 sensors, and an AI camera, while data is transmitted using the MQTT protocol and displayed in real-time on a Node-RED dashboard. The system is also equipped with a buzzer that sounds an alarm when a disturbance is detected. The methods employed include observation, literature review, and consultation. Test results show that the ultrasonic sensor is capable of detecting objects at a distance of 20–100 cm with a measurement margin of error of 1–3 cm, while the MQ-2 sensor successfully detected cigarette smoke, lighter gas, plastic smoke, and paper smoke, and did not detect smoke or gas under normal air conditions. Thus, the system is capable of real-time monitoring and disturbance detection.

Keywords: *Point of Presence (PoP), Raspberry Pi, Internet of Things (IoT), Artificial Intelligence, Node-RED*