ABSTRAK

Stabilitas suhu dan kelembapan di ruang radiologi merupakan faktor penting yang secara langsung memengaruhi performa operasional alat CT-Scan. Perubahan kondisi lingkungan di luar batas toleransi operasional dapat memicu mekanisme *lock system* secara otomatis sebagai bentuk proteksi terhadap potensi kegagalan fungsi. Aktivasi sistem pengaman ini berdampak langsung pada terhentinya proses pencitraan, sehingga mengganggu kontinuitas diagnosa dan dapat menurunkan efisiensi layanan medis. Untuk mengatasi hal tersebut, dirancang sistem pemantauan dan perekaman suhu kelembapan (SIPEKA) berbasis *Internet of Things* (IoT) yang mampu melakukan pemantauan secara *real-time* dan terintegrasi. Sistem terdiri atas dua *node* sensor DHT22 yang masing-masing dikendalikan oleh mikrokontroler ESP32, serta satu unit penerima yang mengelola data dari kedua *node* melalui komunikasi ESP-NOW. Data ditampilkan secara lokal melalui LCD I2C 20x4 dan dikirim ke Google Sheets secara otomatis menggunakan Google Apps Script. Selanjutnya, data divisualisasikan dalam *dashboard web* interaktif yang menampilkan pembacaan terkini, grafik tren, dan riwayat pengukuran. Pengujian sistem dilakukan selama 24 jam untuk mensimulasikan kondisi ruang radiologi. Berdasarkan data hasil perhitungan, akurasi pengukuran suhu pada *node* 1 mencapai 98,4% dan kelembapan 95,1%, sementara pada *node* 2 diperoleh akurasi sebesar 98,6% untuk suhu dan 95,1% untuk kelembapan. Sistem ini terbukti andal untuk mendukung upaya preventif dalam menjaga kestabilan lingkungan ruang CT-Scan, serta memberikan kemudahan pemantauan bagi operator secara lokal maupun daring.

Kata kunci: IoT, ESP32, DHT22, suhu, kelembapan, ruang CT-Scan, Google Sheets, *dashboard web*

ABSTRACT

Temperature and humidity stability in the radiology room are important factors that directly affect the operational performance of CT-Scan equipment. Changes in environmental conditions beyond operational tolerance limits can trigger the lock system mechanism automatically as a form of protection against potential malfunctions. The activation of this safety system directly halts the imaging process, disrupting diagnostic continuity and potentially reducing medical service efficiency. To address this, an Internet of Things (IoT)-based temperature and humidity monitoring and recording system (SIPEKA) has been designed to enable real-time, integrated monitoring. The system consists of two DHT22 sensor nodes, each controlled by an ESP32 microcontroller, and one receiver unit that manages data from both nodes via ESP-NOW communication. Data is displayed locally via a 20x4 I2C LCD and automatically sent to Google Sheets using Google Apps Script. Furthermore, the data is visualized in an interactive web dashboard that displays current readings, trend graphs, and measurement history. The system was tested for 24 hours to simulate radiology room conditions. Based on the calculated data, the accuracy of temperature measurements at Node 1 reached 98.4% and humidity 95.1%, while at Node 2, the accuracy was 98.6% for temperature and 95.1% for humidity. This system has proven reliable in supporting preventive efforts to maintain the stability of the CT-Scan room environment, as well as providing ease of monitoring for operators both locally and remotely.

Keywords: IoT, ESP32, DHT22, *temperature, humidity*, CT-Scan, Google Sheets, *dashboard web*