

## ABSTRAK

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### **PERANCANGAN SISTEM *MONITORING* KADAR CO<sub>2</sub> DI UDARA PADA *STEEL CALENDAR ROOM* MENGGUNAKAN *MACHINE LEARNING* DENGAN METODE K-NN BERBASIS IOT DI PT X**

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(xiv + 48 halaman; 39 Gambar; 4 Tabel; 7 lampiran)

PT X merupakan perusahaan manufaktur yang memproduksi ban sebagai komoditas penjualan utamanya. Dalam proses pembuatan ban yaitu proses pelapisan antara struktur kawat dan *compound* terjadi proses pemanasan di suatu mesin *calendar* yang menimbulkan bau yang menyengat dan berindikasi memiliki kadar polutan yang dapat membahayakan pekerja. Dalam skripsi ini dirancang dan dibuat sistem monitoring kadar CO<sub>2</sub> berbasis IoT dengan menggunakan beberapa sensor yang keluarannya diolah dengan algoritma *machine learning* K-NN. Pengujian sistem dilakukan pada *chamber* dengan men-*trigger* kelima sensor tersebut dengan gas dari *steel calendar*. Kemudian mikrokontroler akan memproses gas tersebut dengan algoritma k-NN. Output dari algoritma k-NN tersebut akan ditampilkan pada LCD 16x2 yang secara bersamaan juga akan menampilkan safety status antara “*safe*” atau “*warning*”. Selain ke LCD output data juga akan terekam di *database* dan tertampil di *dashboard* Blynk. Proses pengambilan data dilakukan dengan kadar ppm gas yang berbeda-beda, yaitu 25 sampai dengan 200 ppm. Setiap kadar gas dilakukan test pembacaan sebanyak 10 kali untuk setiap masing-masing kadar gas. Berdasarkan pengujian tersebut maka didapatkan bahwa hasil pengujian *blackbox* untuk sistem *monitoring* mencapai tingkat keberhasilan 100% terhadap uji fungsionalitas dari pembacaan sensor, kalkulasi nilai sensor, algoritma k-NN, komunikasi serial dari mikrokontroler ke modul komunikasi, menampilkan hasil ke *display* LCD 16x2, *dashboard* Blynk, *database Google sheets*, dan *pilot lamp*, serta menyimpan dan menambah data di *database Google sheets*. Hasil tes kadar gas dari ruangan *steel calendar* dari kadar 25 ppm sampai dengan 200 ppm, dinyatakan aman bagi pekerja. Hasil tes akurasi menunjukkan bahwa hasil ukur antara alat *air quality detector* KKMOON JSM-131 komersial dengan sistem *monitoring* yang dibangun memiliki kecocokan yang baik, dengan tingkat akurasi sebesar 99.61%.

Kata Kunci : Kadar CO<sub>2</sub>, Sensor MQ, Arduino Mega 2560, Algoritma k-NN, NodeMCU ESP8266, *Google sheets*, Blynk

Referensi : 9 (2009-2022)

## ABSTRACT

Aditya Samratna Putra (01035200005)

### **DESIGN OF A MONITORING SYSTEM OF CO<sub>2</sub> LEVELS IN THE AIR OF STEEL CALENDAR ROOM USING MACHINE LEARNING WITH IOT-BASED K-NN METHOD AT PT X**

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(xiv + 48 pages; 39 figures; 4 Tabels; 7 appendices)

PT X is a manufacturing company that produces tires as its main sales commodity. In the tire manufacturing process, namely the coating process between wire structure and compound, a heating process occurs in a calendar machine which causes a smelly air indicating that it has pollutant levels that can endanger workers. In this thesis we report the designed and construction of IoT-based CO<sub>2</sub> level monitoring system using several sensors which output is processed with a K-NN machine learning algorithm. The results of the gas extraction were tested in the monitoring system chamber with the k-NN algorithm processing so to detect on the amount of CO<sub>2</sub> gas levels in ppm in the steel calendar room. System testing is carried out in the chamber by triggering the five sensors with gas from a steel calendar. Then the microcontroller processed the results with the k-NN algorithm. The output of the k-NN algorithm were displayed on a 16x2 LCD which will simultaneously display a safety status between "safe" or "warning". In addition to the LCD, the output will also be recorded in the database and displayed on the Blynk dashboard. The data collection process was carried out with different levels of gas, namely 25 to 200 ppm. Each gas content was tested for readings 10 times. Based on these tests, the blackbox testing results for the monitoring system achieved a 100% success rate on functionality tests from sensor readings, sensor value calculations, k-NN algorithms, serial communication from the microcontroller to the communication module, displaying results to a 16x2 LCD display, Blynk dashboard, Google sheets database, pilot lamp, store and add data to the Google sheets database. The results of the gas level test from the steel calendar room, from 25 ppm to 200 ppm, were declared safe for workers. The accuracy test show that the results of commercial air quality detector KKMOON JSM-131 and the developed monitoring system has a good agreement with an accuracy rate of 99.61%.

Keywords : CO<sub>2</sub> Level, MQ Sensor, Arduino Mega 2560 k-NN Algorithm, NodeMCU ESP8266, Google sheets, Blynk

Reference : 9 (2009-2022)