

ABSTRAK

SISTEM PEMANTAUAN KEKERINGAN TANAH DENGAN METODE *FUZZY LOGIC* TERINTEGRASI *INTERNET OF THINGS*

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Peristiwa kebakaran hutan adalah suatu momen buruk oleh nyala api yang memusnahkan properti dan vegetasi. Salah satu faktor penyebabnya adalah kondisi tanah yang mengering akibat terik matahari membuat vegetasi bersifat mudah terbakar. Hal tersebut mendorong peneliti untuk merancang *prototype* sistem pemantauan kekeringan tanah dengan metode *fuzzy logic* dalam memberikan peringatan potensi kebakaran yang telah terintegrasi *Internet of Things*. Dalam penelitian ini, *prototype* akan memantau nilai suhu tanah, kondisi tanah, api, keluaran *fuzzy logic* dan status peringatan menggunakan *Dashboard* Node-Red yang dikendalikan oleh Mappi32. Data hasil pembacaan suhu tanah didapatkan dari sensor DS18B20, kondisi tanah didapatkan dari sensor *soil moisture* dan nilai api didapatkan dari sensor *flame*. Ketiga data sensor tersebut akan diolah dan dijadikan masukan dalam metode *fuzzy logic* untuk mengetahui keluaran status peringatan yang diantaranya aman, waspada, dan bahaya. Status peringatan diiringi dengan kontrol bunyi buzzer. Dari hasil pengujian, didapatkan bahwa prototipe sistem pemantauan kekeringan tanah mampu membaca suhu tanah dengan galat 0,36% dan akurasi 99,64%, dapat membaca kelengasan tanah dengan galat 4,01% dan akurasi senilai 95,99%, mendeteksi api sejauh 200 cm dan hasil keputusan *fuzzy logic* terhadap keluaran status peringatan dengan akurasi senilai 99,9%.

Kata Kunci: *fuzzy logic*, sensor, *Internet of Things*, Node-Red

ABSTRACT

SOIL DROUGHT MONITORING SYSTEM USING FUZZY LOGIC METHOD INTEGRATED WITH INTERNET OF THINGS

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A forest fire is a devastating event in which flames destroy property and vegetation. One of the contributing factors is the dry condition of the soil, which is caused by the scorching sun and makes the vegetation highly flammable. This has prompted researchers to develop a prototype for a soil dryness monitoring system using the fuzzy logic method to provide warnings about potential fires. This system has been integrated with the Internet of Things. The prototype monitors soil temperature values, soil conditions, fire occurrences, and fuzzy logic output, and warning status using the Node-Red Dashboard controlled by Mappi32. The soil temperature readings are obtained from the DS18B20 sensor, soil conditions are obtained from the soil moisture sensor, and fire occurrences are detected using the flame sensor. The data from these three sensors is processed and used as input in the fuzzy logic method to determine the warning status output, which includes safe, alert, and danger. The warning status is accompanied by a buzzer sound control. Test results have shown that the prototype is capable of reading soil temperature with an error of 0.36% and an accuracy of 99.64%, reading soil moisture with an error of 4.01% and an accuracy of 95.99%, and detecting fires up to a distance of 200 cm. The fuzzy logic decisions for warning status output have shown an accuracy of 99.9%.

Keywords: fuzzy logic, sensor, Internet of Things, Node-Red