

SISTEM PEMANTAUAN PENGUKURAN MODEL INTENSITAS RADIASI MATAHARI TERDISTRIBUSI MENGUNAKAN STANDAR IEC 61499

oleh

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INTISARI

Data berisi paparan intensitas radiasi matahari untuk suatu daerah adalah data kunci terkait tes kelayakan dan pembangunan Pembangkit Listrik Tenaga Surya. Penelitian ini bertujuan merancang sistem pemantauan pengukuran radiasi matahari di permukaan tanah yang terdistribusi dan memiliki kapabilitas dalam perbesaran skala yang lebih baik dari sistem tersentralisasi.

Perancangan sensor dilakukan dengan menggunakan sensor berbasis fotovoltaiik yang dikalibrasi dengan sensor radiasi Tenmars TM-206 dimana variasi intensitas radiasi dari lampu halogen 500 W digunakan sebagai variabel independen untuk membandingkan poin poin nilai data dari kedua sensor. Rancangan sistem sensor terdistribusi dimodelkan menggunakan program 4DIAC-IDE. Komunikasi antar instrumen dilakukan melalui protokol MQTT (*Message Queueing Telemetry Transport*) yang didukung oleh standar IEC 61499.

Penelitian menghasilkan bacaan sensor rangkaian menunjukkan kesamaan sebesar 93.82% dengan sensor pengkalibrasi. Data digital yang dikonversi dengan modul ADC 8-bit menunjukkan kesamaan sebesar 99.34% dengan data analog. Kode sumber akuisisi dan pengiriman data sensor dalam bentuk rangkaian blok fungsi (*resources*) diimplementasikan pada *Raspberry Pi 3B+*. Hasil bacaan sistem terdistribusi diunggah ke basis data berbasis MySQL dengan program *Node-Red dashboard*.

Kata kunci: pemantauan terdistribusi, sensor fotovoltaiik, IEC 61499.

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DISTRIBUTED SOLAR RADIATION MONITORING SYSTEM BASED ON IEC 61499 STANDARD

by

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ABSTRACT

Solar radiation data set are an important necessities when it comes to building a solar power plant and conducting feasibility test for itself. Ground-based data collection involves designing a distributed monitoring system which requires no constant maintenance and maintains performance. This thesis is aiming to design a distributed solar radiation monitoring which its flexible and scalable nature performs better than a centralized system.

The designing process is done using a photovoltaic based sensor calibrated with a Tenmars TM-206 radiation sensor where the independent variable in the form of radiation value data points are used to compare both of the sensor's output. The distributed system design is modeled using 4DIAC-IDE program. Inter-node communication is done through a MQTT (Message Queueing Telemetry Transport) which are supported by the IEC 61499 standard.

The study reveals that the calibrated sensor is capable of showing 93.82% correlation with the reference sensor. The digital output value shows correlation of 99.34% with the analog output value. The source code which programs data acquisition and transmission were written in function blocks and implemented in a Raspberry Pi 3B+. The acquired data is uploaded to a MySQL-based database through Node-Red dashboard.

Keywords: distributed monitoring, photovoltaic sensor, IEC 61499.

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