

RANCANG BANGUN SISTEM MONITORING KELEMBABAN TANAH MENGGUNAKAN *WIRELESS SENSOR* BERBASIS ARDUINO UNO

ABSTRAK

Telah dilakukan rancang bangun monitoring kelembaban tanah menggunakan *wireless sensor* berbasis Arduino Uno. Rancangan perangkat keras sistem ini terdiri dari satu unit *transmitter* yang dilengkapi oleh sensor *soil moisture* SEN0114 V2 dan satu unit *receiver*. Semua unit dikendalikan dengan menggunakan Arduino Uno. Data kelembaban tanah dikirim oleh unit *transmitter* ke unit *receiver* menggunakan *transceiver* nRF24L01+ yang memanfaatkan gelombang radio sebagai media pengiriman. Hasil deteksi nilai kelembaban tanah pada sensor ditampilkan oleh LCD 2x16 karakter. Hasil pengujian, sensor kelembaban tanah memperlihatkan bahwa hubungan antara tegangan keluaran sensor dengan kelembaban tanah pada *Moisture Meter* adalah linear dengan nilai regresi sebesar 0,9758. Berdasarkan pengujian *transceiver*, jarak terjauh pengiriman data yang dapat diterima oleh *receiver* di luar ruangan tanpa ada penghalang adalah 200,1 m. Pada pengujian variasi sudut pengiriman, data dapat diterima oleh unit *receiver* pada sudut $\geq 26,56^{\circ}$. Apabila sudut lebih kecil dari $26,56^{\circ}$ data masih dapat diterima dengan adanya *delay* hingga sudut $11,31^{\circ}$.

Kata kunci: sensor *soil moisture*, kelembaban tanah, *wireless*, gelombang radio, nRF24L01+



DESIGN OF SOIL MOISTURE MONITORING SYSTEM USING WIRELESS SENSOR BASED ON ARDUINO UNO

ABSTRACT

Design of soil moisture monitoring system using wireless sensor based on Arduino Uno has been conducted. The hardware system consists of a transmitter unit which was equipped with soil moisture sensor SEN0114 V2 and a receiver unit. All of units are controlled by using Arduino Uno. Soil moisture data was sent by transmitter unit to receiver unit using nRF24L01+ that used radio waves as transmission medium. Soil moisture value was displayed on LCD 2x16 character. Sensor soil moisture calibration showed that correlation between sensor output voltage with soil moisture on moisture meter was linear with increasing water volume with regression value is 0,9758. Based on transceiver test, the longest distance of transmission data can be transmitted to receiver unit is 200,1 m at outdoor without any barriers. On angle transmission test, data can be received by receiver at angle $\geq 26,56^{\circ}$, if the angle is smaller than $26,56^{\circ}$ data can still received up to $11,31^{\circ}$ with delay.

Keywords: soil moisture sensor, soil moisture, wireless, radio waves, nRF24L01+

