ABSTRACT

This research aims to develop a tool that can measure soil contents such as moisture, temperature, pH, and NPK (Nitrogen, Phosphorus, Potassium). This tool can help farmers in providing information about soil conditions in managing their agricultural land. The design of this tool uses several sensors to measure the contents in the soil, namely SEN0193 sensor, DS18B20 sensor, soil pH sensor and NPK sensor. These sensors detect the nutrient content in the soil and display it in real time on the LCD and send it to the cloud for remote monitoring in real time. Calibration of each sensor in this tool is performed to ensure the level of measurement accuracy and produces an R2 value close to 1, indicating that the regression model used has considerable effectiveness. The RMSE calculation value for the SEN0193 humidity sensor shows a value of 0.82356. Then, for the DS18B20 sensor, the RMSE calculation result is 2.1. In addition, the soil pH sensor has an RMSE of 0.2. The reading of the nitrogen level in the NPK sensor has an R2 value of 0.9988, while the reading of the phosphorus level has an RMSE value of 0.9997. Then the reading of potassium levels has an R2 value of 0.9985. The test process on this tool shows that the sensor is responsive in reading when measuring the content in the soil. The information obtained from the tool is expected to help farmers and the community to make wise decisions in managing agricultural land.

Keywords: *Quality of Soil, Root Mean Square Error, NPK Sensor, SEN0193 Sensor, DS18B20 Sensor*