

ABSTRACT

Water quality monitoring is crucial to ensure the feasibility of domestic standards and environmental sustainability. This study aims to design a real-time water quality monitoring system prototype based on potential Hydrogen (pH) and temperature parameters. The system is controlled by an ATmega328 microcontroller integrated with a pH4502c analog sensor, a DS18B20 digital temperature sensor, and an I2C LCD Display. To ensure validity, calibration was applied during the data processing stage. The temperature sensor data was converted using linear regression, while the pH sensor utilized second-degree polynomial regression, calibrated against a mercury thermometer and a pH meter. Reliability testing was conducted at the Diponegoro Educational Reservoir and a domestic dug well. The results confirmed that the instrument operated adaptively without any malfunctions. The prototype's precision was excellent, with an average error percentage below 5%, well within the 10% maximum tolerance limit.

Keywords: *Arduino Uno, DS18B20 Sensor, Linear Regression, pH-4502C Sensor, Polynomial Regression, Water Quality.*