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Manufacturing a Water Turffity Measuring Equipment Using the AB209 Module Sensor Based on the ATMega328 Microcontroller

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Abstract

The development of electronic technology in the era of globalization is very rapid. Utilizing this technology as a means to monitor water clarity, especially the condition of the water, whether it is clean or there are other materials mixed with the water (turbid), to find optimal water conditions, optimal monitoring is needed. This research will create a system that can detect water turbidity. The tool comprises a Turbidity Sensor Module AB209 sensor, ADC, and ATMega328 microcontroller. The AB209 Turbidity Sensor Module functions to detect water turbidity. The function of the ADC is to change the amount of electrical voltage resulting from the AB209 Turbidity Sensor Module into a digital quantity which is then transmitted to the ATMega328 microcontroller to be processed into a digital display on the LCD. The results of the research are that a water turbidity measurement tool can be made with a good level of accuracy, namely 99.98%.

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1 Introduction

Water has a very important role in human life, most activities carried out by humans require water, for example for bathing, washing, cleaning rooms, cooking food, drinking, and other purposes (Suliyani et al., 2021). Seeing the many uses of water and how much it is needed by humans. Clean water must meet both physical and chemical parameters, one of which is the level of turbidity (Suliyani et al., 2021). Cloudy water indicates that there are other substances in the water. Water like this can harm the health of the human body, and can even cause disease (Sutrisno et al., 2004).

Turbidity is an optical property of a fluid that causes the absorption of light passing through it and can also be refracted (Kadir, 2013). The unit of turbidity is expressed in Nephelometric units, Turbidity Units (NTU), and is measured using a standard measuring instrument, namely a turbidimeter (Parra et al., 2018; Muthuraman & Sasikala, 2014). Turbidimeter equipment is only owned by certain parties, so its development is carried out using electronic circuits (Sharma et al., 2023).

2 Materials and Methods

This research will create a water turbidity measurement tool using the AB209 Module sensor based on the ATmega328 Microcontroller. In this research, the components of the water turbidity level will be observed (Monica, 2021; Rachmansyah et al., 2014). The working process of this tool, in general, is that the AB209 sensor module is placed near the water whose turbidity will be measured, this sensor will provide information on the turbidity of the water, and the results of this information will be passed on to the ADC to be converted to digital voltage, the conversion results from the ADC are processed in the ATMega328 microcontroller, the results The process carried out by the ATMega328 microcontroller will display the results on the LCD (Nuzula, 2013; Supardi et al., 2018).

3 Results and Discussions

The results obtained from this research are a water turbidity measurement tool using the AB209 Module sensor based on the ATmega328 Microcontroller (Gravina et al., 2017; Simon et al., 2001). This measuring instrument, which consists of the main parts, is shown in Fig.1

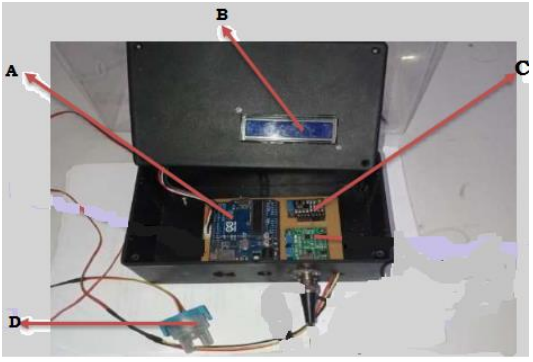

Figure 1. The main parts of the research tool

A brief explanation of the function of each main part of the tool shown in Figure 4.1 is as follows: A. Arduino functions to process incoming data from sensors and control the system; B. The 16x2 LCD functions to display water turbidity data from AB209 sensor readings; C. Turbidity Sensor Module; and D. The AB209 Turbidity

Sensor functions to measure water turbidity. After the design is complete, the next step is to calibrate the tool that has been made using a comparison tool (Fisher & Kebede, 2010; Rosiek & Batlles, 2008; Frankowiak et al., 2005). The results of the calibration of the design tool with the comparison tool are shown in Figure 2.

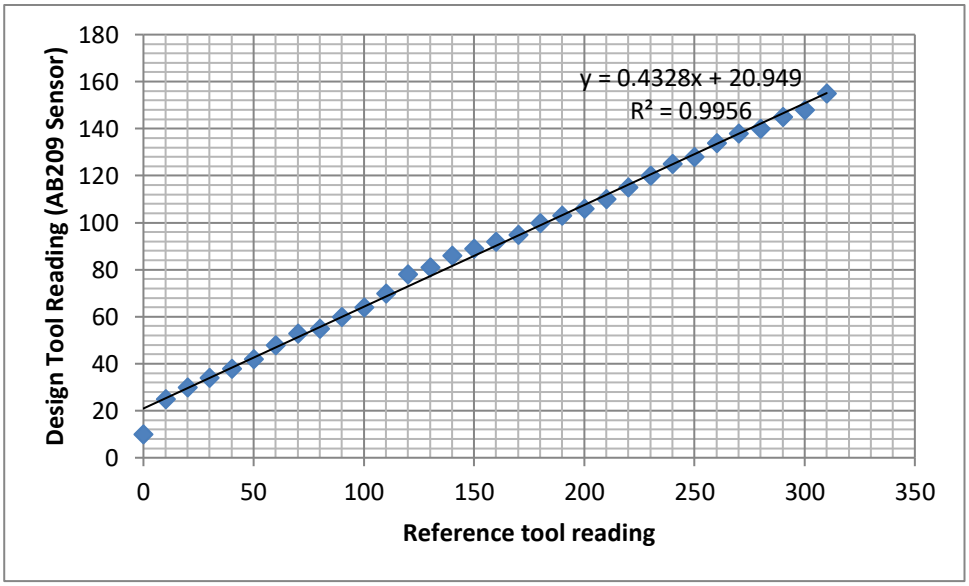

Figure 2. Graph of water turbidity data for comparison tool vs AB209 sensor

Fig. 2 shows that the change in the output voltage response of the comparator with the AB209 sensor increases as the level of water turbidity measured increases. So, the AB209 sensor response to water turbidity when collecting data is almost the same as the comparison tool. Linear graph of turbidity measurement results measured by the AB209 sensor with a comparison tool (Faisal et al., 2016; Fahril et al., 2022). The coefficient of determination obtained from the results of the analysis of design tool testing data is 0.9956. This coefficient states that the conformity of the AB209 sensor with the comparison tool is 99.56%, while the remainder is a mismatch (Yoo et al., 2022; Yang et al., 2021). The discrepancy that occurs in the measurement results may be caused by the response to turbidity captured by the AB209 sensor which is different from the comparison tool (Putri & Harmadi, 2018).

4 Conclusion

The conclusions from the research that has been carried out are as follows: 1. A water turbidity measurement tool can be made using the ModuleAB209 sensor based on the ATmega328 microcontroller. 2. Can produce water turbidity measurement tools with a good level of accuracy, namely 99.56%.

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