

## ABSTRACT

*Renewable energy is currently growing rapidly, especially biogas energy, the majority of which is methane gas. All gases produced in biogas have their respective concentrations, including a composition of about 55-75% methane gas (CH<sub>4</sub>), about 25-45% carbon dioxide gas (CO<sub>2</sub>) and a small proportion of other gases. Since methane gas is the most dominant gas in biogas, it will be dangerous if there is a methane gas leak. Therefore, supervision is needed in its use in the community, because methane gas is a flammable gas due to its flammable nature. One form of supervision is the existence of a tool to detect methane gas levels around the biodigester.*

*Therefore, a device will be made that will monitor methane gas levels using an MQ-4 gas sensor, which then the data is processed in the NodeMCU ESP8266 and sent to Firebase RTDB (Real-Time Database) so that the data can be accessed in real-time to a smartphone so that users can access biogas level data easily and quickly. The monitoring device can be placed around the biodigester or carried as a detector because of its compact shape and does not always require power from PLN because it is equipped with a battery. This system is also equipped with a voltage sensor that is useful for monitoring the voltage of the battery, so that users can know when the right time to charge so that the lifetime of the battery and this system can be longer. Based on our tests, our system can measure methane gas ranging from 5.62 PPM to 10157 PPM. For the battery sub-system, it has an accuracy of 96.35%.*

**Keywords:** *Methane Gas Monitoring Tool, MQ-4 Sensor, Firebase RTD*