

ABSTRACT

A promising solution for generating renewable energy is biogas production from organic waste. However, this process often faces challenges such as the need for regular monitoring of temperature, humidity, and gas production. To avoid pollution and odor, large-scale organic waste management also requires proper management. Additionally, predicting the availability of organic waste raw materials is not easy. In such situations, the Internet of Things (IoT) can better monitor and manage fermentation conditions and the availability of organic waste.

To address these issues, various IoT-based solutions have been proposed. Although there are costs and data integration issues, IoT sensors can be used to monitor temperature, humidity, and the quality of the gas produced. However, automating the biogas production process with IoT sensor data is not always feasible. Advanced data analysis can also detect patterns not visible to humans but requires strong hardware and data analysis skills. By understanding the limitations of existing solutions, the authors can make new contributions or better innovations for biogas production from organic waste.

Testing was conducted to ensure sensors and automatic stirrers functioned properly, the Telegram bot sent timely warning messages, and biogas production proceeded correctly. Over seven days, tests included the Telegram bot menu, environmental monitoring and adjustment, and notification message delay testing. The test results showed successful hardware and software integration, but challenges such as the need for continuous power and regular maintenance were encountered. Due to incorrect potentiometer settings, the MQ4 sensor could not detect methane gas, and the BMP180 air pressure sensor and DHT22 temperature sensor had issues with resolution and measurement accuracy. Overall, while the main research objectives were achieved, further optimization is needed to improve system performance and efficiency.

Keywords : Telegram Bot, Methane detection, Internet of Things (IoT), Organic waste, Sensor monitoring, System testing, Biogas production.