

ABSTRACT

Kombucha tea is the result of fermentation of sweet tea by a symbiotic culture of bacteria and yeast (SCOBY) that produces by-products such as alcohol, organic acids and carbon dioxide gas. The alcohol content needs to be monitored to stay below the safe threshold of <1% ABV. This research develops a kombucha fermentation monitoring system designed using ESP32 and pH-4502C, MQ-3, and DHT22 sensors. Data on pH, alcohol, and temperature parameters were sent in real time to Firebase and visualized on the Streamlit dashboard. The results showed a decrease in pH to 5.23, alcohol content increased to 0.8%, and temperature stabilized between 28.2°C-29.3°C. The pH-4502C, MQ-3, and DHT22 sensors have an accuracy of 97.5%, 98.33%, and 99.03%, respectively. The dashboard provides graphs, tables, and data export features. The system supports accurate and efficient fermentation monitoring based on the Internet of Things. Thus, the system enables producers to monitor the quality of kombucha fermentation practically and accurately.

Keywords: *Kombucha Tea, Sensor MQ-3, DHT22, pH-4502C ESP32, Fermentation, Internet of Things, Alcohol.*