

ABSTRACT

Anaerobic fermentation of Arabica coffee is a promising post-harvest method for enhancing flavor complexity. However, this process is often carried out without accurate monitoring of temperature and pH, increasing the risk of quality degradation and fermentation failure. This study aims to design and implement a monitoring system based on the Internet of Things (IoT) and Artificial Intelligence (AI) to optimize the fermentation process. The system utilizes a NodeMCU ESP8266, DS18B20 temperature sensor, pH 4502C sensor, and DHT22 humidity sensor, integrated with the Blynk application for remote monitoring via smartphone. It also includes a solenoid valve and buzzer controlled automatically using AI-based threshold logic. Test results show the system can monitor temperature within the ideal fermentation range, detect pH reduction from 6.0 to 3.7, and record ambient humidity between 76–87%. When pH drops below 3, the solenoid valve activates automatically to regulate fermentation conditions. Data transmission to the Blynk app occurs in real-time without disruption. Sensory evaluation shows that 95% of panelists preferred coffee fermented using the automated system. This research demonstrates that an IoT-AI-based system can significantly improve consistency and quality in Arabica coffee fermentation.

Keywords: Arabica coffee, anaerobic fermentation, Internet of Things (IoT), temperature, pH