ABSTRACT

Traditional methods for evaluating meat freshness generally rely on visual inspection and manual olfactory assessment, which tend to be subjective, inefficient, and not always accurate. To address this issue, an innovative device called E-Sniffer has been developed—an Internet of Things (IoT)-based tool for automatically analyzing meat freshness through odor detection. This system integrates SGP40, MQ-137, and DHT22 sensors to detect decomposition gases such as Total Volatile Organic Compounds (TVOC), Ammonia (NH3), Hydrogen Sulfide (H2S), and Trimethylamine (TMA), as well as environmental parameters like temperature and humidity. The collected data is processed by an ESP32 microcontroller using the Mamdani fuzzy logic algorithm, which classifies meat freshness into three categories: Fresh, Slightly Rotten, and Rotten. The analysis results are displayed via a Nextion Touch Display and transmitted wirelessly through Bluetooth to a mobile device integrated with a Flutter-based application. Experimental results show that E-Sniffer can detect meat freshness conditions with an accuracy of up to 80 and an average response time of only 10 seconds. This innovation is expected to provide an objective, fast, and portable solution for assessing meat quality, making it highly valuable for consumers, food businesses, and the food industry in enhancing food safety and product quality.

Keywords: *Meat Freshness, IoT, Fuzzy Logic, Gas Sensor, E-Sniffer*