ABSTRACT

The increasing population growth rate in Indonesia has led to an increased consumer demand for livestock products. Breeders are required to produce a wide variety of livestock products instantly. Therefore, the author designed and implemented an IoT-based (universal) poultry egg hatchery for real-time monitoring and control. The implementation of the tool utilizes the fuzzy Mamdani method to reduce the risk of hatching failure. The system can regulate the tool's temperature through buttons available on the device and provide information on temperature, humidity, and perform egg shelf adjustments during the hatching process.

The author's designed incubator can control and monitor the temperature and humidity of eggs in real-time, connected via the internet network. The device features an LCD with a size of 16 × 2cm displaying three menu options. The first menu displays temperature and humidity information, while the second menu allows users to set the temperature using two up and down arrow buttons for room temperature control. If the device's temperature falls outside the predetermined range, the fan speed increases to stabilize the room temperature. The fan speed is regulated through Mamdani's Fuzzy logic calculations. Furthermore, the tool can be monitored through the WhatsApp application. To operate this feature, users only need to input two commands on the main menu, namely "status" and "servo." The author uses ESP8266 as a microcontroller to control the incubator, including the heater and DHT22 sensor data adjustments. Nodemcu is equipped with a WiFi module that sends temperature and humidity data to WhatsApp users via the internet network.

After conducting research, it was found that the hatching of eggs was 100% successful. Turkey eggs successfully hatched in 28 days at a temperature range of 37-39℃, while duck eggs successfully hatched in 32 days at a temperature range of 36-37℃. The average Quality of Service (QoS) of the WhatsApp delay was calculated to be 0.081s, with an average throughput of 306 kbit/s. Moreover, the manual fuzzy Mamdani calculations resulted in a value of 114.99 (Medium PWM) when the input temperature was 38℃.

Keywords—IoT, Temperature, Fuzzy mamdani, ESP8266, Delay, Throughput