DESIGN AND CONSTRUCTION OF BABY INCUBATOR PROTOTYPE USING FUZZY LOGIC BASED ON IOT

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ABSTRACT

Premature babies require intensive care such as the use of an incubator to maintain their body temperature. The normal range of incubator temperature is 33°C -35°C with relative humidity between 40% -60%. However, the cost of imported incubators is very high, with a price range of IDR 17 million to IDR 150 million, while local incubator options are more affordable with a price range of IDR 1.5 million to IDR 3 million but still use a manual control system. The use of manual control can cause fatigue and data reading errors. Therefore, this study aims to create a baby incubator that is able to maintain temperature stability with a range of 31°C-35°C and humidity of 40%-60%, and can detect the baby's weight and body temperature with IoT monitoring using the Blynk application. This study uses Mamdani fuzzy logic as its temperature and humidity control system. The main components used are ESP32, DHT22 sensor, load cell sensor, MlX90614 sensor, D4148 mosfet driver, heater, and fan. Based on the test results, the DHT22 sensor shows a temperature reading with an error of 0.54% and an accuracy of 99.46%, and a humidity reading with an error of 1.82% and an accuracy of 98.18%. The load cell sensor shows a weight reading with an error of 0.09% and an accuracy of 99.91%, while the MLX90614 sensor shows an object temperature reading with an error of 0.23% and an accuracy of 99.77%. While testing the entire system for 1 full day, the Mamdani fuzzy logic control managed to maintain the temperature in the range of 34°C-35°C with an overshoot of around 0.1°C and stable humidity in the range of 57% RH-60% RH with an overshoot of around 1.5%.

Keywords: baby incubator, temperature, humidity, fuzzy logic, Blynk application