



**UNDERGRADUATE THESIS**

**REAL-TIME MONITORING SYSTEM FOR  
MOISTURE CONTENT OF PRE-ROASTED  
GREEN COFFEE BEANS USING IOT-BASED  
ANFIS METHOD**

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2026**

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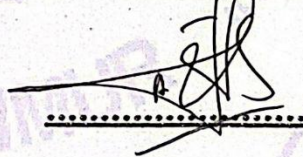
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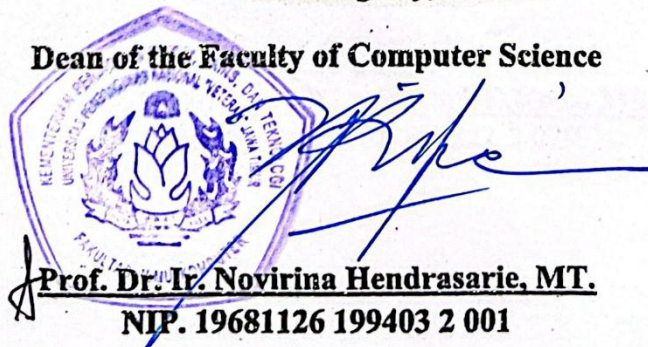
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Hereby declares that this undergraduate thesis contains no part of any other scientific work that has been submitted to obtain an academic degree at any higher education institution. Furthermore, it does not contain any work or opinions previously written or published by others, except for those which are explicitly cited in this thesis and listed completely in references.

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## ABSTRACT

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Thesis Title: Real-Time Monitoring System For Moisture Content Of Pre-Roasted Green Coffee Beans Using Iot-Based Anfis Method  
Supervisor: 1. Dr. Ir. Mohammad Idhom, S.P., S.Kom., M.T.  
2. Hendra Maulana, S.Kom, M.Kom.

This study develops a real-time monitoring system for the moisture content of green coffee beans (pre-roasting) using an Internet of Things (IoT) approach based on the Adaptive Neuro-Fuzzy Inference System (ANFIS) method. The system is built using an ESP32 microcontroller integrated with SHT31 sensors (temperature and relative humidity), an MH-Z19 sensor (CO<sub>2</sub>), and a capacitive moisture sensor as environmental data inputs. Data are transmitted via the MQTT protocol to a monitoring dashboard, which is equipped with alert features such as LEDs, a buzzer, and Telegram notifications. The ANFIS model is employed to predict moisture content in a non-destructive manner and to detect indications of potential fungal growth. Validation is carried out using the oven drying method in accordance with the SNI 01-2907-2008 standard. The experimental results show that the moisture content prediction model achieves an accuracy of 98.082%, while the fungal indication detection model reaches an accuracy of 96.97%. All functional and non-functional testing results indicate that the system operates in a stable and responsive manner. This system offers an effective, efficient, and affordable solution as an alternative to conventional measurement tools, contributing to the improvement of coffee quality in Indonesia.

**Keywords:** Moisture Content, Green Beans, IoT, ANFIS, ESP32, Real-Time Monitoring, Pre-Roasting

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Surabaya, April 17<sup>th</sup> 2026

Author

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