

**DESIGN AND IMPLEMENTATION OF A CONTROL SYSTEM FOR
TEMPERATURE AND DRUM ROTATION SPEED IN A BIOMASS-HEATED
ROTARY DRYER IN SAGO STARCH PROCESSING**

By

Dwi Surya Dharma

22452050

MASTER'S DEGREE
in

MASTER OF MECHANICAL ENGINEERING – MECHATRONICS
FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY



SWISS GERMAN UNIVERSITY
The Prominence Tower
Jalan Jalur Sutera Barat No. 15, Alam Sutera
Tangerang, Banten 15143 - Indonesia

Revision after the Thesis Defense On February 6, 2026

STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.



Dwi Surya Dharma

16 February 2026

Date

Student

Approved by:

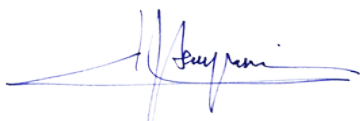


Dr. Maulahikmah Galinium, S.Kom, M.Sc

16 Feb 2026

Thesis Advisor

Date



Dr. Ir. Henry Nasution, M.T, IPP

16 Feb 2026

Thesis Co-Advisor

Date



Dr. Maulahikmah Galinium, S.Kom, M.Sc

16 Feb 2026

Dean

Date

ABSTRACT

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By

Dwi Surya Dharma

Dr. Maulahikmah Galinium, S.Kom, M.Sc., Advisor

Dr. Ir. Henry Nasution, M.T., IPP, Co-Advisor

SWISS GERMAN UNIVERSITY

This research develops and implements an automated fuzzy logic control system for a biomass-heated rotary dryer used in sago starch production to achieve Indonesian National Standard (SNI) compliance. The study addresses two critical challenges: temperature instability caused by biomass combustion variability and inadequate control of drum rotation speed, which resulted in sago starch moisture content exceeding the SNI maximum threshold of 13%. A Mamdani fuzzy inference system with two inputs (inlet and outlet temperature) and two outputs (drum motor speed and blower control) was designed and implemented on an Arduino Uno microcontroller. Experimental validation demonstrated that the fuzzy logic controller maintained stable temperature control ($\pm 2^{\circ}\text{C}$) and consistently achieved SNI-compliant moisture content (11.8%–13.4%) across multiple test runs at 80°C , compared to manual control achieving 11.2%–14.4% with higher variability. The system successfully preserved sago starch quality, maintaining white color appearance and neutral odor. This work validates the feasibility of implementing advanced fuzzy control systems on resource-constrained embedded platforms for agricultural processing equipment in small-scale and medium-scale enterprises.

Keywords: fuzzy logic control, sago starch drying, microcontroller, biomass combustion, SNI compliance



DEDICATION

This research is dedicated to myself, and to my beloved wife and family, whose support and dedication in its completion.



ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my thesis advisor, Dr. Maulahikmah Galinium, S.Kom, M.Sc., for his unwavering support throughout this research journey, as well as for his thoughtful insights, meticulous review of manuscript drafts, and continuous encouragement during the challenging phases of this research.

I also extend my appreciation to my co-advisor, Dr. Ir. Henry Nasution, M.T., IPP, for his expertise in fuzzy logic control systems and mechatronics engineering, which has been instrumental in shaping the technical direction and rigor of this work. I am grateful for his invaluable guidance and constructive feedback throughout this research.

I am thankful to the Head of the Master of Mechanical Engineering Program, Dr. Ir. Gembong Baskoro, M.Sc., for providing the institutional support, research facilities, and academic environment necessary to conduct this research.

My deepest gratitude extends to my wife and family members, whose patience, encouragement, and unwavering emotional support have been the cornerstone of my ability to pursue this advanced degree while managing professional responsibilities.

Special thanks are extended to the laboratory staff and technical personnel at Politeknik Caltex Riau who provided essential support in equipment maintenance, experimental setup, and data collection procedures. Their dedication to maintaining high-quality research infrastructure enabled systematic experimental validation of the proposed control system.

Finally, I express my appreciation to all colleagues within the Master of Mechanical Engineering program whose collaborative spirit, academic discussions, and shared experiences created an intellectually stimulating environment conducive to rigorous research. This thesis represents not merely individual effort but also the collective knowledge-sharing culture within our academic community.

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