



**UNDERGRADUATE THESIS**

**AQUASCAPE QUALITY WATER CONTROL  
SYSTEM BASED ON INTERNET OF THINGS  
USING TYPE-2 FUZZY LOGIC METHOD**

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**FACULTY OF COMPUTER SCIENCE**

**INFORMATICS STUDY PROGRAM**

**SURABAYA**

**2026**

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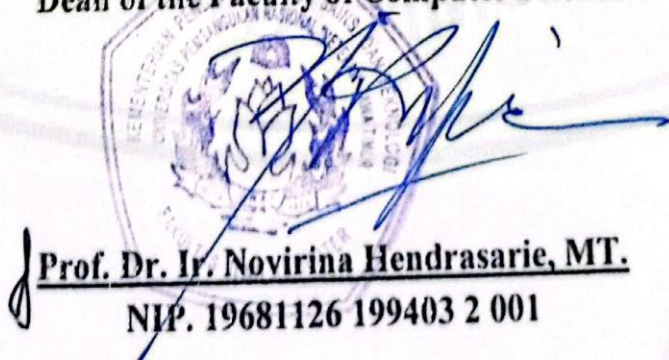
  
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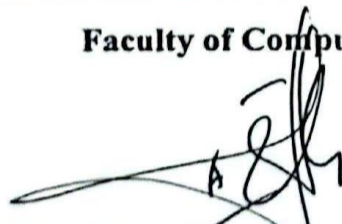
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## ABSTRACT

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*Aquascape is an aquatic ecosystem within an aquarium that requires stable water quality parameters to ensure optimal growth of plants and organisms. The main parameters affecting this balance include water temperature, light intensity, and turbidity level. Imbalance in these parameters can disrupt the ecosystem, thus requiring a control system capable of monitoring and regulating conditions automatically and in real-time. This study aims to design and implement an aquascape water quality control system based on the Internet of Things (IoT) using the Fuzzy Type-2 method with an ESP32 microcontroller. The system utilizes DS18B20, LDR, and turbidity sensors to monitor environmental conditions, and controls actuators such as a DC fan, LED strip, and buzzer. Data processing is carried out using fuzzy logic to generate control decisions that are more adaptive to environmental changes. The results show that the system is able to maintain parameters within optimal ranges, namely water temperature of 28–30°C, Light intensity suitable for aquascape plants is around 15 watts, and turbidity levels of 0–50 NTU. The system is also capable of responding to environmental changes automatically and maintaining stable conditions effectively. In addition, the system enables remote monitoring and control in real-time through an IoT platform. Therefore, the developed system can improve maintenance efficiency, reduce manual user intervention, and maintain the stability of the aquascape ecosystem sustainably.*

**Keywords:** *Aquascape, IoT, Type-2 Fuzzy Logic, ESP32, Water Quality Control*

## ACKNOWLEDGEMENT

All praise is due to Allah SWT for all His blessings, guidance, and grace bestowed upon the author, which have provided strength, patience, and ease throughout the process, so that this thesis entitled “**Internet of Things (IoT) Based Aquascape Water Quality Control System Using Type-2 Fuzzy Logic Method**” has been successfully completed.

The preparation of this thesis is one of the requirements to obtain a Bachelor's degree in the Informatics Study Program, Faculty of Computer Science, Universitas Pembangunan Nasional “Veteran” Jawa Timur. The author would like to express the highest appreciation to all parties who have provided support and contributions throughout the research process, including their time, energy, and thoughts in guiding and motivating the author in completing this thesis. The author realizes that the completion of this thesis would not have been possible without the assistance, guidance, and encouragement, both morally, spiritually, and materially, from various parties. Therefore, the author would like to express sincere gratitude to:

1. Prof. Dr. Ir. Novirina Hendrasarie, M.T., as the Dean of the Faculty of Computer Science, Universitas Pembangunan Nasional “Veteran” Jawa Timur.
2. Fetty Tri Anggraeny, S.Kom., M.Kom., as the Head of the Informatics Study Program, Faculty of Computer Science, Universitas Pembangunan Nasional “Veteran” Jawa Timur.
3. Mr. Dr. Ir. Mohammad Idhom, S.P., S.Kom., M.T., as the First Advisor, who has guided the author throughout the completion of this research.
4. Ms. Henni Endah Wahanani, S.T., M.Kom., as the Second Advisor, who has guided the author throughout the completion of this research.
5. Ms. Eva Yulia Puspaningrum, S.Kom., M.Kom., as the First Examiner, who has examined the author by providing new perspectives on this research.
6. Mr. Muhammad Muharrom Al Harromainy, S.Kom., M.Kom., as the Second Examiner, who has examined the author by providing new perspectives on this research.

7. Prof. Dr. Basuki Rahmat, S.Si., M.T., ITS-AI, as the Academic Advisor, who has guided the author throughout the academic studies and this research.
8. The author's father, mother, younger sister, and relatives, who have never ceased to pray for, encourage, and provide material support to the author throughout the course of the study.
9. Friends who have continuously provided support, encouragement, and assistance throughout the academic years and during the preparation and completion of this research.

The author realizes that there are many shortcomings in the preparation of this thesis. Therefore, constructive criticism and suggestions from all parties are highly expected for the improvement and refinement of this thesis. Finally, despite the limitations possessed by the author, it is hoped that this thesis will be beneficial to all parties in general and to the author in particular.

Surabaya, April 26, 2026

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