PROJECT REPORT

FUZZY LOGIC CONTROLLER FOR CAPACITY MONITORING ON TRASH CAN BASED ON HEIGHT AND WEIGHT USING ULTRASONIC AND HX711 SENSOR

TJAN, DAVIN HARYANTO
17K10013

Faculty of Computer Science
Soegijapranata Catholic University
2022

HALAMAN PENGESAHAN

Judul Tugas Akhir:	:	FUZZY LOGIC CONTROLLER FOR CAPACITY MONITORING ON TRASH CAN BASED ON HEIGHT AND WEIGHT USING ULTRASONIC AND HX711 SENSOR
Diajukan oleh	:	Tjan Davin Haryanto
NIM	:	17.K1.0013
Tanggal disetujui	:	06 Januari 2022
Telah setujui oleh		
Pembimbing	:	Yonathan Purbo Santosa S.Kom., M.Sc
Penguji 1	:	Yonathan Purbo Santosa S.Kom., M.Sc
Penguji 2	:	Hironimus Leong S.Kom., M.Kom.
Penguji 3	:	Y.b. Dwi Setianto S.T., M.Cs.
Penguji 4	:	Rosita Herawati S.T., M.I.T.
Penguji 5	:	R. Setiawan Aji Nugroho S.T., MCompIT., Ph.D
Penguji 6	:	Yulianto Tejo Putranto S.T., M.T.
Ketua Program Studi	:	Rosita Herawati S.T., M.I.T.
Dekan	:	Dr. Bernardinus Harnadi S.T., M.T.

Halaman ini merupakan halaman yang sah dan dapat diverifikasi melalui alamat di bawah ini.

sintak.unika.ac.id/skripsi/verifikasi/?id=17.K1.0013

DECLARATION OF AUTHORSHIP

I, the undersigned:

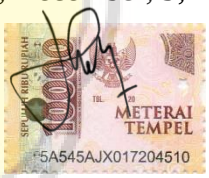
Name : TJAN, DAVIN HARYANTO

ID : 17.K1.0013

declare that this work, titled "Smart Trash Can Using Fuzzy Mamdani", and the work presented in it is my own. I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at Soegijapranata Catholic University
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
3. Where I have consulted the published work of others, this is always clearly attributed.
4. Where I have quoted from the work of others, the source is always given.
5. Except for such quotations, this work is entirely my own work.
6. I have acknowledged all main sources of help.
7. Where the work is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Semarang, December, 9, 2021



Tjan, Davin Haryanto

17K10013

APPROVAL PAGE FOR PUBLICATION OF SCIENTIFIC PAPERS FOR ACADEMIC INTEREST

The undersigned below :

Name : Tjan Davin Haryanto

Undergraduate Program : TECHNICAL INFORMATION

Faculty : COMPUTER SCIENCE

Type of work : SKRIPSI

Approved to give Non-Exclusive Royalty Free Right to Soegijapranata Catholic University Semarang for scientific work entitled "FUZZY LOGIC CONTROLLER FOR CAPACITY MONITORING ON TRASH CAN BASED ON HEIGHT AND WEIGHT USING ULTRASONIC AND HX711 SENSOR" along with the existing tools (if needed). With this Non- Exclusive Royalty Free Right Soegijapranata Catholic University has the right store, transfer data / format, manage in the form of database, maintain and publis this final project as long as I keep my name as a writer / creator and as a Copyright owner.

This statement I made in truth

Semarang, December, 9, 2021

Sincerely

Tjan Davin Haryanto

ACKNOWLEDGMENT

Firstly, I want to thankful to God Almighty for His blessings, inclusion and love from the beginning and the end of this final project. The final project is a requirement to take the Bachelor of Computer Science Exam in the Informatics Engineering Study Program at Soegijapranata Catholic University Semarang In the preparation of this final project, I had received many supported from other people beside me, I'm very glad and wanna say very thankful to :

1. My Parents who always pray and strenghten me in any condition for the continuity this final project.

2. Yonathan Purbo Santosa S.Kom., M.Sc for his patience and kindness as a Supervising Lecturer who has provided guidance and input to the author, so that the final project can ben completed properly.

3. And many other people that I can not mention one by one and have provided always support and pray for me while working in this final project.

Semarang, December, 9, 2021

Sincerely

Tjan Davin Haryanto

ABSTRACT

Until now, waste management in an environment has not been evenly distributed in various countries. In fact, poor waste management can lead to negative things such as the emergence of several diseases.

Therefore the automatic opening feature and monitoring system is a good thing to complete a trash can. Weight sensors and ultrasonic sensors can assist performance in part monitoring. The pear sensor will assist in detecting human movement, then closing the trash can will be moved with the help of a servo.

A monitoring system with the help of fuzzy logic to determine the value of the obscurity will help in this regard. These main features will certainly help in improving waste management in an environment.

Keyword: Smart Trash Can, Fuzzy Mamdani, Fuzzy logic, Load Cell, HC-SR04, PIR Sensor

TABLE OF CONTENTS

COVER ..... **i**

APPROVAL AND RATIFICATION PAGE ..... Error! Bookmark not defined.

DECLARATION OF AUTHORSHIP ..... **iii**

ACKNOWLEDGMENT ..... **v**

ABSTRACT (Abstract Title) ..... **vi**

TABLE OF CONTENTS ..... **vii**

LIST OF FIGURE **1**

LIST OF TABLE **1**

CHAPTER 1 INTRODUCTION **3**

1.1. Background 3

1.2. Problem Formulation 3

1.3. Scope 4

1.4. Objective 4

CHAPTER 2 LITERATURE STUDY **5**

CHAPTER 3 RESEARCH METHODOLOGY **12**

CHAPTER 4 ANALYSIS AND DESIGN **14**

4.1. Analysis 14

4.2. Design ..... **Error! Bookmark not defined.**

CHAPTER 5 IMPLEMENTATION AND RESULTS **26**

5.1. Implementation 26

5.2. Testing 30

CHAPTER 6 CONCLUSION **44**

REFERENCES **26**

APPENDIX ..... **a**

LIST OF FIGURE

Illustration 4.1.2: image arduino nano 14
Illustration 4.1.3: image pir motion sensor 15
Illustration 4.1.4: image ultrasonic sensor 16
Illustration 4.1.5: image load cell 16
Illustration 4.1.6: image HX-711 module 17
Illustration 4.1.7: image lcd 1602 with i2c module 18
Illustration 4.2: Flowchart 20
Illustration 4.3: Kurva Variabel Ketinggian 21
Illustration 4.4: Kurva Variabel Berat 22
Illustration 4.5 : Kurva Variabel Kapasitas 23
Illustration 4.6 : Table of Rulebase 24
Illustration 5.2 : image testing result 1 42
Illustration 5.3 : image testing result 2 42
Illustration 5.4 : image manual testing result 3 42
Illustration 5.5 : image Arduino testing result 4 43

LIST OF TABLE

Table 5.1: Table result of load cell testing 31

Table 5.2: Table result of HC-SR04 testing 32

Table 5.3: Table result of fuzzy calculation with real height and weight 40

Table 5.4: Table result of fuzzy calculation sensor measurement 41

Table 5.5: Table result of calibration testing 42