

DEVELOPMENT OF A MICROCONTROLLER BASED SELF-MAINTAINING AQUARIUM SYSTEM

Undergraduate Design Project
Submitted to the Faculty of the
College of Engineering and Information Technology
Cavite State University
Indang, Cavite

In partial fulfilment
of the requirements for the degree
Bachelor of Science in Electronics Engineering

BENJO L. MANGANA
ELDRIN JAMES OLAES
December 2018

ABSTRACT

OLAES, ELDRIN JAMES and MANGANA, BENJO L. Development of Microcontroller-Based Self Maintaining Aquarium. Undergraduate Design Project. Bachelor of Science in Electronics Engineering. Cavite State University, Indang, Cavite. December 2018. Adviser: Engr. Michael T. Costa.

The study aimed to develop a microcontroller-based self-maintaining aquarium. The design project displays all the parameters being controlled by the system through a LCD module. It shows the real-time clock for feed dispensing, number of fish inside the aquarium, set and real-time pH level, set and real-time temperature, and water level of the aquarium. All data gathered by the device will be stored in a memory card. The pH level and temperature of the automated and manual aquarium were compared and recorded. The system was able to perform its functions to control the pH level, temperature, and feeding time set by the user. The temperature and pH sensors from the device was also able to gather accurate data when compared to the manual obtaining of temperature and pH level. Based on the results of the evaluation, the design project was able to meet its objectives and prove its accuracy, control, and functionality.

TABLE OF CONTENTS

	Page
BIOGRAPHICAL DATA.....	iii
ACKNOWLEDGMENT.....	v
ABSTRACT.....	viii
LIST OF TABLES.....	xi
LIST OF FIGURES.....	xii
LIST OF APPENDIX TABLES.....	xiv
LIST OF APPENDIX FIGURES.....	xv
LIST OF APPENDICES.....	xvi
INTRODUCTION.....	1
Statement of the Problem.....	2
Objectives of the Study.....	2
Significance of the Study.....	3
Time and Place of the Study.....	3
Scope and Limitations of the Study.....	3
Definition of Terms.....	5
REVIEW OF RELATED LITERATURE.....	7
METHODOLOGY.....	21
Materials.....	21
Methods.....	24
System Overview.....	24

Design of the microcontroller circuit of the system	27
Design of the Self-Maintaining Aquarium	27
Design and Fabrication of the Aquarium	28
Construction of the Feeding System.....	28
Design of the Filter System.....	29
Water Replacement System.....	30
Temperature Sensing and Control System.....	33
Expected Output.....	35
Construction of the Aquarium System Program.....	37
Testing and Evaluation.....	40
Cost Computation.....	41
Cost Analysis.....	43
RESULTS AND DISCUSSION.....	44
Principle of Operation.....	44
Design and Analysis of the Aquarium System.....	45
The Aquarium System Program.....	50
Testing and Evaluation.....	56
SUMMARY, CONCLUSION, AND RECOMMENDATIONS.....	65
Summary.....	65
Conclusion.....	66
Recommendations.....	68
REFERENCES.....	69
APPENDICES.....	71