


# **ELECTRONIC CONTROLLED WASTEWATER TREATMENT SYSTEM MODEL FOR HOUSEHOLD APPLICATIONS**

**A Research Project Study Presented to the Faculty of Engineering,**

**De La Salle University – Dasmariñas**

**Dasmariñas, Cavite**



**In Partial Fulfillment  
Of the Requirements for the Degree  
Bachelor of Science in Electronics Engineering**

**CORPUZ, Aprilyn S.**

**HERNANDEZ, Aprille Arjhilynne D.**

**SARINO, Stephanie Anne S.**

**URCIA, Joanna Isabelle F.**

**ECE 52**

**March 2011**

## ABSTRACT

**Title:** Electronic Controlled Wastewater Treatment System Model for Household Applications

**Researchers:** Corpuz, Aprilyn S.  
Hernandez, AprilleArjhilynne D.  
Sarino, Stephanie Anne S.  
Urcia, Joanna Isabelle F.

**School:** De La Salle University – Dasmariñas

**College:** College of Engineering, Architecture and Technology

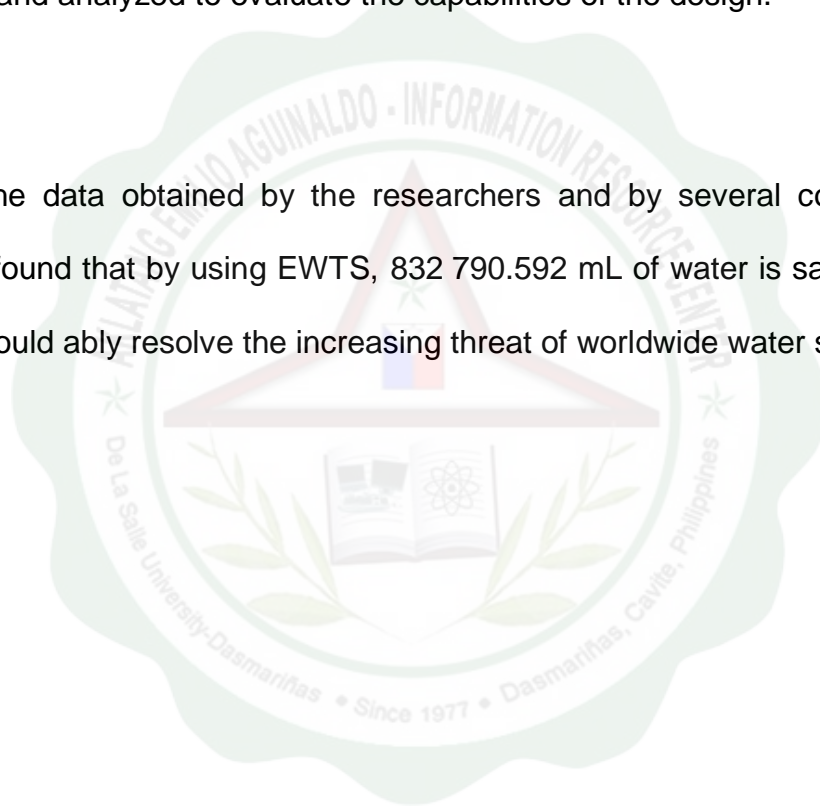
**Pages:** 142 pages

**School Year:** SY 2010 - 2011

In order to help resolve the increasing problem on water shortage, the authors had came up with the idea of recycling kitchen wastewater through their project study which is the Electronic Controlled Wastewater Treatment System Model for Household Applications (EWTS). It includes the automation of several wastewater treatment processes such as filtration and sedimentation through the use of chemical coagulant and flocculant. EWTS was designed to treat 18, 927.06 mL of kitchen wastewater per treatment process.

The project study used PIC16F84A as their main project component. It controlled all the operations necessary to complete the treatment process such as the switching on and off of certain components as determined by the time of completion per process. Experiments were performed to get the correct amount of time as well as to see if the quality of water produced after the treatment is in a good state. The circuit created and its other components had undergone a series of testing wherein a particular type of data was collected and analyzed to evaluate the capabilities of the design.

From the data obtained by the researchers and by several computation, the authors have found that by using EWTS, 832 790.592 mL of water is saved per month. The findings could ably resolve the increasing threat of worldwide water shortage.



## TABLE OF CONTENTS

Approval Sheet	i
Abstract	ii
Acknowledgement	iv
Table of Contents	vi
List of Figures	ix
List of Tables	xi
 <b>CHAPTER 1 – THE PROBLEM AND ITS BACKGROUND</b>	
Introduction	1
Background of the Study	2
Conceptual Framework	4
Statement of the Problem	6
Significance of the Study	6
Scope and Limitations of the Study	7
Definition of Terms	9
 <b>CHAPTER 2 – REVIEW OF RELATED LITERATURE AND STUDIES</b>	
Foreign Literatures	12
Foreign Studies	17
Local Literatures	21

Local Studies	23
Relevance to Present Study	27

### **CHAPTER 3 – RESEARCH METHODOLOGY**

Research Method	28
Outsourcing	29
Research Instruments	29
Data Gathering Procedure	31
System Design	33

### **CHAPTER 4 - ELECTRONIC CONTROLLED WASTEWATER TREATMENT SYSTEM MODEL FOR HOUSEHOLD APPLICATIONS**

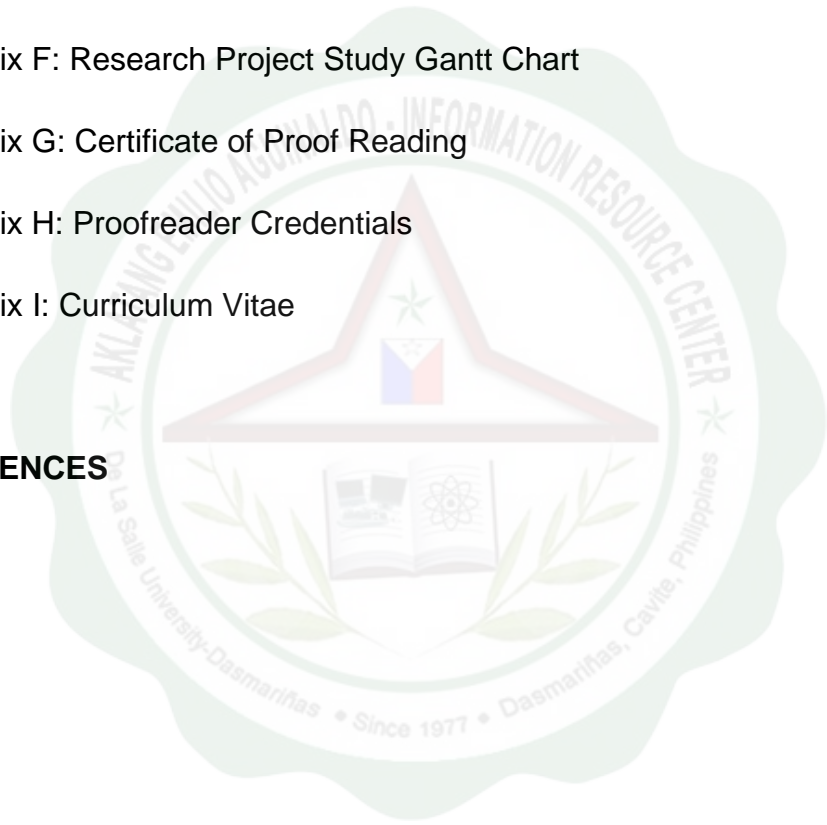
Prototype Assembly	56
Prototype Testing	61
Project Benefit Analysis	69

### **CHAPTER 5 – SUMMARY, CONCLUSION AND RECOMMENDATIONS**

Summary	77
Conclusion	79
Recommendation	80

## **APPENDICES**

Appendix A: Component Specification Sheets	84
Appendix B: Treatment Chemical Specification Sheets	96
Appendix C: Power Consumption Computation	100
Appendix D: Saved Water Computation	101
Appendix E: Proof of Billing Materials	106
Appendix F: Research Project Study Gantt Chart	109
Appendix G: Certificate of Proof Reading	110
Appendix H: Proofreader Credentials	111
Appendix I: Curriculum Vitae	116
<b>REFERENCES</b>	<b>129</b>



## LIST OF FIGURES

Figure 1.1. Research Paradigm	4
Figure 2.1. Home Sewage Treatment Plant	16
Figure 3.1. System Block Diagram	35
Figure 3.2. First Design Layout	39
Figure 3.3. Second Design Layout	40
Figure 3.4. Third Design Layout	41
Figure 3.5. Final Design Layout	42
Figure 3.6. Waste water going to Tank 1	43
Figure 3.7. Filtered water going to treatment tank	44
Figure 3.8. Treatment tank	44
Figure 3.9. Treated water going to pressure tank	45
Figure 3.10. EWTS Wiring Diagram	46
Figure 3.11. PIC Microcontroller Circuit	48
Figure 3.12. 12 Vdc Regulator Circuit	49
Figure 3.13. 12 Vdc Regulator Printed Circuit Board Layout	49
Figure 3.14. 5 Vdc Regulator Circuit	50
Figure 3.15. 5 Vdc Regulator Printed Circuit Board Layout	50
Figure 3.16. 2n2222 Switching Transistor Circuit	51
Figure 3.17. 2n2222 Switching Transistor Printed Circuit Board Layout	51

Figure 3.18. Relay Driver Circuit	52
Figure 3.19. Relay Driver Printed Circuit Board Layout	52
Figure 4.1. Pre-assembled circuitry and connection to other system components	58
Figure 4.2. Mechanical Part Construction	59
Figure 4.3. Assembled Prototype	60
Figure 4.4. Water testing Results	64
Figure 4.5. Using the treated waste water to gardening and cleaning purposes	65





## LIST OF TABLES

Table 2.1. Typical Distribution of Interior Water for Residential Use	15
Table 2.2. Percentage Removal of Virus by Some Wastewater Treatment Processes	17
Table 4.1. Water Test Results	62
Table 4.2. System Test Results	67
Table 4.3. Final Test Results	68
Table 4.4. Electronic Part Costing	70
Table 4.5. Treatment Component Costing	71
Table 4.6. Survey Results	73

