

**DESIGN AND DEVELOPMENT OF A MICROCONTROLLER-BASED
INDOOR SEED GERMINATION SYSTEM**

COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY
Department of Computer and Electronics Engineering

APPROVAL SHEET

Design Project:

JERACEL I. FUENTES
GELYN L. PACAO
REGINA D. SAULI

Undergraduate Design Project
Submitted to the Faculty of the
Cavite State University
Indang, Cavite

Title of Study:

DESIGN AND DEVELOPMENT OF A MICROCONTROLLER-
BASED INDOOR SEED GERMINATION SYSTEM

In partial fulfillment
of the requirements for the degree of
Bachelor of Science in Computer Engineering

Design Project Adviser:

Date:

Technical Critic:

Date:

AILEEN Y. ROCILLAS
Department Chairman



00001213

Design and development of a
microcontroller-based indoor seed
620.0042 F95 2004
DP-137

**JERACEL I. FUENTES
GELYN L. PACAO
REGINA D. SAULI
October 2004**

ABSTRACT

FUENTES, JERACEL I., PACAO, GELYN L. and REGINA C. SAULI. Design and Development of a Microcontroller-Based Indoor Seed Germination System. Undergraduate Design Project. Bachelor of Science in Computer Engineering. Cavite State University, Indang, Cavite. October 2004. Adviser: Ms. Florence B. Marero.

The Design and Development of a Microcontroller-Based Indoor Seed Germination System was conducted in Navarro, Gen. Trias, Cavite. The design was tested and evaluated in Alulod, Indang, Cavite.

The main objective of the study was to design and develop a microcontroller-based indoor seed germination system. Specifically, it aimed to: construct the chamber unit for the Indoor Seed Germination System; develop the microcontroller circuit of the machine; evaluate the Indoor Seed Germination System in terms of its performance in germinating test seeds and providing the proper environmental conditions such as temperature, relative humidity and light intensity; compare the performance of the Indoor Seed Germination System with the traditional way of seed germination; and conduct a cost computation of the system.

The project consisted of three parts: the microcontroller circuit; the chamber unit; and the software. The microcontroller served as the brain of the system for it controlled the system's operation. The temperature sensor and the relative humidity sensor located inside the chamber sensed the temperature and humidity of the surrounding. The sensed temperature and humidity were analyzed by the microcontroller through comparing the set temperature, which is 24°C and the set humidity which is 90% with the temperature and relative humidity of the surrounding. The system also included three rotary fans (humidity

fans) for the ventilation and regulation of humidity, and another rotary fan (temperature fan) that blew the wet cloth (wick) for the regulation of temperature.

Based on the obtained results, the authors recommend the following: display modules in all of the data being monitored to monitor actual environmental conditions in the chamber unit. These display modules are needed for monitoring and providing proper conditions such as humidity and light intensity; additional mist applicators to reach and give an even spray (irrigation) for all the seedlings in the chamber; additional holes on the chamber for proper drainage and to avoid inundation of seedlings; provide power back-up for power interruptions and continuous operation of the system.

LIST OF APPENDIX TABLES.....	xii
LIST OF PLATES.....	xiii
INTRODUCTION	1
Importance of the Study.....	2
Objectives of the Study.....	3
Type and Place of the Study.....	4
Scope and Limitation of the Study.....	4
Definition of Technical Terms.....	6
REVIEW OF RELATED LITERATURE.....	9
MATERIALS AND METHODS.....	23
Materials.....	23
Chamber unit.....	23
Microcontroller circuit.....	23
Methods.....	23

TABLE OF CONTENTS

	Page
BIOGRAPHICAL DATA.....	iii
ACKNOWLEDGMENT.....	v
ABSTRACT.....	vii
LIST OF FIGURES.....	xi
LIST OF TABLES.....	xii
LIST OF APPENDIX FIGURES.....	xiii
LIST OF APPENDIX TABLES.....	xiv
LIST OF PLATES.....	xv
INTRODUCTION.....	1
Importance of the Study.....	2
Objectives of the Study.....	3
Time and Place of the Study.....	4
Scope and Limitation of the Study.....	4
Definition of Technical Terms.....	6
REVIEW OF RELATED LITERATURE.....	9
MATERIALS AND METHODS.....	22
Materials	
Chamber unit.....	22
Microcontroller circuit.....	22
Methods	

Construction of the chamber unit.....	23
Development of the microcontroller circuit	23
Preparation of lettuce seeds.....	27
Testing.....	27
Evaluation.....	27
Cost computation.....	28
RESULTS AND DISCUSSION.....	29
Description of the Machine.....	29
Principles of Operation.....	32
The Microcontroller Circuit.....	35
Software Description.....	39
Testing.....	45
Evaluation.....	45
Cost Computation.....	49
SUMMARY, CONCLUSION AND RECOMMENDATION.....	53
Summary.....	53
Conclusion.....	54
Recommendation.....	54
BIBLIOGRAPHY.....	56
APPENDICES.....	57
PLATES.....	67
PROGRAM LISTING.....	73