شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

IMPROVING ENERGY EFFICIENCY USING MICROCONTROLLER BASED EMBEDDED SYSTEMS

Submitted By

Ahmad Hussein Abdel Karim Mohamed

B.Sc. of Electrical Power and Machinery, Faculty of Engineering,
Menoufia University, 2004

A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Master Degree
In
Environmental Sciences

Department of Environmental Engineering Sciences
faculty of Graduate Studies and Environmental Research
Ain Shams University

2022

APPROVAL SHEET

IMPROVING ENERGY EFFICIENCY USING MICROCONTROLLER BASED EMBEDDED SYSTEMS

Submitted By

Ahmad Hussein Abdel Karim Mohamed

B.Sc. of Electrical Power and Machinery, Faculty of Engineering,
Menoufia University, 2004

A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Master Degree
In
Environmental Sciences
Department of Environmental Engineering Sciences

This thesis was discussed and approved by:

The Committee Signature

1-Prof. Dr. Mohamed ezzat abdel rahman
Prof. Department of Power and Machinery Engineering
Faculty of engineering
Ain Shams University

2-Dr. kahled fathy gaber
Assistant professor department of accounting
College of administrative sciences ,modern
University of sciences and technology

3- Prof. Dr. Mohsen abdelhamid tawfik
Prof of systems control engineering department of engineering sciences
College of graduate studies and environmental research
Ain Shams University

4-Prof. Dr. Amed farghali mohmed hassan
Prof. Cost accounting
Faculty of commerce
Ain Shams University

2022

IMPROVING ENERGY EFFICIENCY USING MICROCONTROLLER BASED EMBEDDED SYSTEMS

Submitted By

Ahmad Hussein Abdel Karim Mohamed

B.Sc. of Electrical Power and Machinery, Faculty of Engineering,
Menoufia University, 2004

A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Master Degree
In
Environmental Sciences
Department of Environmental Engineering Sciences

Under The Supervision of:

1-Prof. Dr. Mohsen Abdelhamid Tawfik
Prof of Systems Control Engineering Department of Engineering Sciences
College of Graduate Studies and Environmental Research
Ain Shams University

2-Prof. Dr. Amed Farghali Mohmed Hassan
Prof. cost accounting
Faculty of commerce
Ain Shams University

3-Dr. Ahmed Tariq Yahya Al - Awady
Department of Engineering Sciences
College of Graduate Studies and Environmental Research
Ain Shams University

2022

ACKNOWLEDGEMENT

First and foremost, I would like to thank my advisor ***Prof Mohsen Tawfik*** *for his advice, encouragement, support and patience throughout every step in the process of this thesis Thank you for support and understanding over the past five years*

A Sincere thanks go to ***Prof Ahmed Farghaly*** *for giving me support and guidance through my master degree I express my appreciation for providing constant encouragement*

I would also thank ***Dr Ahmed El Awady*** *for his efforts to help and support me to continue until standing in this place*

I would finally thank ***my Parents, brothers*** *and* ***my wife*** *who have been supporting me in all means in finishing my thesis.*

ABSTRACT

Energy Efficiency is central to achieving the interrelated economic, social and environmental goals of sustainable development. improving energy efficiency is about using technology that requires less energy to perform the same function plus the share of renewables in final energy consumption. And it goes beyond energy conservation behavior which results in the use of less energy.

The research focuses on the deployments of improving energy efficiency technologies as a basic infrastructure for smart environment. household energy management systems apply automation technologies to manage and control residential energy use and costs, also make energy reductions through energy efficiency measures more visible to customers, and extend energy management systems to Internet of things applications.

The research proposes a cost effective and power saving approach to improve energy efficiency and control home appliances using microcontroller based embedded systems with occupancy detection to detect the presence of people and light sensors to measure light intensity. The proposed system is controlled by an Atmega microcontroller. a prototype has been designed, developed and tested specifically to meet the requirements of efficient energy light system. The work includes knowledge regarding architecture of microcontroller, hardware and software considerations increase the acceptability of the work because the cost is less and other features are more useful.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AC	Alternating Current
ADC	Analog to Digital Converter
AMI	Advanced Metering Infrastructure
AMR	Automated Meter Reading
ARM	Advance RISC Machine
ASM	Assembly programing language
AVR	Advanced Virtual RISC
CBA	Cost Benefit Analysis
CMOS	Complementary Metal Oxide Semiconductor
CPU	Central Processing Unit
DAC	Digital to Analog Converters
DC	Direct current
DCCs	Data and Communications Companies
EEPROM	Electrically Erasable Programmable Read-Only Memory
EMS	Energy management system
GHG	Greenhouse Gas
GPIO	General-purpose input/output
GPS	Global Positioning System
HEMS	Home Energy Management System
HVAC	Heating, Ventilation, And Air Conditioning
IDE	Integrated Development Environment
IoT	Internet of Things
IR	Infrared Radiation
kWh	kilowatt-hour
LCD	Liquid Crystal Display
LDR	Light Dependent Resistor
MCU	Microcontroller unit