BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

SMART POWER MANAGEMENT SYSTEM IN AN AUDITORIUM

By

NYAIKA JONATHAN

Reg.No: BU/UG/2012/88

Email:nyaika100@gmail.com

Tel:+256777478934/+256703865580

A project Report submitted to the Department of Computer Engineering in Partial Fulfilment of the Requirements for the Award of Bachelor of Computer Engineering of Busitema University.

APRIL, 2016

DECLARATION

I Nyaika Jonathan Reg. No BU/UG/2012/88 do hereby declare that this project report is my original work except where explicit citation has been made and it has not been presented to any institution of higher learning for any academic award.

Signed……

Date: …….

APPROVAL

This is to certify that the project report entitled "**SMART POWER MANAGEMENT SYSTEM IN THE AUDITORIUM"** has been drafted under my supervision and is submitted to the board of examiners with my approval.

Supervisor: MR. Arineitwe Joshua

Department of computer engineering.

Sign ……

Date……

DEDICATION

To my dear uncle Mr. Murungi Daniel who has done his very best to ensure that I get good education and the Department of Computer Engineering for the technical advice they have given me. May the good Lord bless you.

ACKNOWLEDGMENTS

My supervisor, Mr. Arineitwe Joshua, has been a vital requirement in helping me to accomplish this project report. Thank you so much for the aid offered to me.

Also, I acknowledge all the other department lecturers who have always given me time for consultation regardless of whether they are my supervisors or not, thank you for the helping attitude.

Many fellow students have offered help in form of advice and information and such is greatly recognized.

Special thanks go to my family and Murungi Daniel for their never ending financial and advisory support. May God reward you abundantly.

Above all, I acknowledge the Almighty God for the gift of life, wisdom and guidance for without Him, I would not have been able to accomplish this project report and system implementation.

LIST OF ACRONYMS

DFD:	Data Flow Diagram
EE:	Energy Efficiency
GDP:	Gross Domestic Product
MEMD:	Ministry of Energy and Mineral Development
VAT:	Value Added Tax
ERA:	Electricity Regulatory Authority
UEB:	Uganda Electricity Board
UEGCL:	Uganda Electricity Generation Company Limited
UETCL:	Uganda Electricity Transmission Company Limited
ROM:	Read Only Memory
RAM:	Random Access Memory
IR:	Infrared
LCD:	Liquid Crystal Display
IC:	Integrated Circuit
LDR:	Light Dependent Resistor
IDP:	Integrated Development Platform
VSM:	Virtual System Modeling.
LED:	Light Emitting Diode
AC:	Air Conditioner

LIST OF FIGURES.

ABSTRACT

At the end of all meetings and other sessions in conference halls or rooms, it is the desire of managers to ensure that power is not wasted in these rooms. In this effort therefore many activities happen which need attention by workers and managers. Currently managers put workers to switch on bulbs and then fans/ACs are turned on when temperatures are high. This project involved the development of a smart power management system that can be installed in the room to help minimize on electricity bills by reducing on consumption of power automatically. When somebody enters into the room then the counter is incremented by one and the light in the room will be switched ON and when any one leaves the room then the counter is decremented by one. The system detects the number of people entering and leaving the hall/room, detects the light intensity and then turns on or off light bulbs according to the number of people in side. It also detects the temperatures and switches on or off fans/ACs according to temperatures and number of people. Finally, the system displays the temperatures and number of people in the hall/room on the liquid crystal display.

Table of contents

Contents

CHAPTER ONE:

1.0 INTRODUCTION

1.1BACKGROUND OF THE STUDY

There is significant potential for energy efficiency (EE) through improved use of power in households, industry, commercial buildings and the transport sector. Since expenditure on energy constitutes a large proportion of the country's Gross Domestic Product (GDP) and a particularly large proportion of poor household expenditure, it is necessary to emphasize the effective and efficient use of energy[1]. Efficiency of energy usage is low in most factories/auditoriums in Uganda. Up to now activities on energy conservation have been limited to preliminary energy audits done by the Ministry of Energy and Mineral Development (MEMD) in industries and commercial buildings (hotels) as well as efforts to increase awareness among all stakeholders.

One of the major problems in the most populated and developing countries like Uganda, is Energy or Power crisis. Hence, there is a pressing need to conserve power. There are many simple ways to save electricity, like using the electric and electronic gadgets whenever and wherever needed and switching them off, while not in use depending on light intensity, number of people, temperatures among other parameters[2].But in places such as large auditoriums and meeting halls, there will be bulbs and fans or Air-conditioners running when light intensity is high and temperatures are low respectively, even before the people arrive. This contributes to a considerable amount of electricity wastage.

The energy efficiency of buildings, electric equipment, and appliances in use falls far short of what is technically attainable. Energy analysts have attributed this efficiency gap to a variety of market, institutional, technical, and behavioral constraints. Electric utility energy efficiency programs have great potential to narrow this gap and achieve significant energy savings[3].

The design of smart power management system can handle controlling of electrical, electronic devices and appliances automatically. Through this system there is a smart way to control the power consumption and power saving in Auditoriums, Shopping malls and Theatres, since in most cities we have shopping malls, theatres and auditoriums.

According to research there is need to monitor, control and conserve energy in large buildings like auditoriums and it is the basis of this project.

1.2 PROBLEM STATEMENT.

Wastage of power due to low energy efficiency in most large buildings in Uganda such as auditoriums has led to increased cost of electricity. Since energy is a fundamental service for human development and economic growth, the demand for it is constantly on the rise worldwide. Electricity is the modern man's most convenient and useful form of energy without which the present social infrastructure would not be feasible. Lighting makes a significant contribution to the total energy consumption of buildings. In auditoriums light bulbs and fans or air conditioners are controlled manually when there are people or even when there are no people and it leads to wastage of power leading to increased costs of electricity bills. There is need for a system to reduce on the consumption of power automatically.

1.3 OBJECTIVES

1.3.1 Main Objective

To design and implement a smart power management system for an auditorium.

1.3.2 Specific Objectives

I. To gather and analyze requirements for the smart power management system.

II. To design the counter, switching and display subsystems using the analyzed requirements for the entire system.

III. To test and validate all the subsystems of the smart power management system.

IV. To implement a smart power management system.

1.4 JUSTIFICATION

Since electric lighting can typically account for 30 to 50 percent of auditorium's electric power consumption, the efficiency of a facility's lighting system significantly impacts on a facility's operating budget. As a result, even modest efficiency improvements to the existing lighting system can mean substantial savings in electricity costs[5].

In auditorium, home and office appliances like light bulbs and fans or air conditioners are controlled manually when there are people or even when there are no people and it leads to wastage of power leading to increased costs of electricity bills, it is evident that a smart power management system is required in Uganda.

With the system in place, electronic devices like light bulbs, fans or air conditioners in auditoriums are controlled automatically with less human efforts and wastage of power is reduced. With research from Ugandan auditoriums losses are incurred in paying high electricity bills and this system was designed to reduce on electricity bills and ensure energy efficiency. This system has a lot of other advantages such as simple structure, small size, low power consumption, low cost and stability.

1.5 SCOPE

1.5.1 Content Scope

The system has been designed to switch on or off the light bulbs and the fans/air conditioners depending on the number of people, light intensity and temperatures in the building and display the results on the liquid crystal display.

1.5.2 Time scope

The system has been designed and implemented for a period of six months.

1.6 LIMITATIONS.

Because the system uses electricity, it does not work when there is power outage. The counter cannot detect when two people enter at the same time

REFERENCES.

[1] T. H. E. Policy, G. Is, T. O. Meet, T. H. E. Energy, E. Development, I. N. An, and E. S. Manner, "Ministry of Energy and Mineral Development THE ENERGY POLICY FOR UGANDA THE POLICY GOAL IS TO MEET THE ENERGY NEEDS OF UGANDA ' S POPULATION FOR SOCIAL AND ECONOMIC DEVELOPMENT IN AN," no. September, 2002.

[2] Venkatesh K and Sarath Kumar P, "Automatic Real Time Auditorium Power Supply\nControl using Image Processing," Int. Conf. Inf. Technol. Signal Image Process., p. 6, 2013.

[3] J. Mawejje, E. Munyambonera, and L. Bategeka, "Powering Ahead: The Reform of the Electricity Sector in Uganda," Energy Environ. Res., vol. 3, no. 2, pp. 126–138, 2013.

[4] L. Unit, P. Bhusal, and L. Unit, ENERGY-EFFICIENT ELECTRIC LIGHTING FOR BUILDINGS IN DEVELOPED AND DEVELOPING. 2009.

[5] S. I. X. Key, W. To, R. Auditorium, and O. Costs, "MACTON ® Turntable Divisible Auditoriums SIX KEY WAYS TO REDUCE AUDITORIUM," pp. 1–7.

[6] E. Agency, "SAVING ELECTRICITY."

[7] R. Kaki, V. Sarparapu, and K. Kumar, "DESIGN SMART POWER SAVINGSYSTEM IN AUDITORIUM BY USING ATMEL AT89S52 MICROCONTROLLERS," vol. 8354, no. 4, pp. 1–9, 2015.

[8] R. Mishra and P. Kumar, "DEVELOPMENT OF AUTOMATIC PERSON

DETECTION SYSTEM TO CONTROL AC," vol. 2, no. 3, pp. 587–589, 2013.

[9] " Automatic bidirectional visitor counter for controlling room light microcontroller (AT89S52)" using 8051, no. 46. .

[10] A. Engineering, "ISSN 2320 – 3927 Original Article Design of Smart Power Controlling and Saving System in Auditorium by using," vol. 3, no. 1, pp. 5–9, 2013.

[11] Y. H. Khattak, T. Mahmood, K. Alam, T. Sarwar, I. Ullah, and H. Ullah, "Smart energy management system for utility source and photovoltaic power system using FPGA and ZigBee," vol. 3, no. 5, pp. 86–94, 2014.