INTELLIGENT LIGHT CONTROL SYSTEM (ILIC)

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A thesis submitted in fulfilment of the requirements
for the award of the degree of Bachelor of Computer
Science (Computer Systems and Networking)

Faculty of Systems Computer & Software Engineering
Universiti Malaysia Pahang

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STUDENT DECLARATION

I hereby declared that this thesis which entitled “Intelligent Light Control System” is the result of my own work except as cited in references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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LIST OF ABBREVIATIONS

ABBREVIATION	TITLE
WWF	World Wide Fund for Nature
ILIC	Intelligent Light Control System
SQL	Structured Query Language
PIR	Passive Infrared
LED	Light-emitting diode
DSP	Digital Signal Processor
GUI	Graphical User Interface
LDR	Light-dependent resistor
RAD	Rapid Application Development
kWh	kilowatt
DFD	Data Flow Diagram
ERD	Entity Relationship Diagram
TNB	Tenaga Nasional Berhad
PHP	Hypertext Preprocessor
UAT	User Acceptance Test
IDLE	Integrated Development and Learning Environment

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ABSTRACT

Intelligent Light Control(ILIC) is a system that will control the light by detecting the movement in a room. The system was developed because the lamp does not have ability to detect presence of human. People need to turn off the light manually. Besides, people rarely exposed to the statistic of energy consumption. Three objectives have been achieved from this system which is to develop a system that detect movement using camera and PIR sensor, to develop a light that automatically turn off when there are no movement and to record the energy consumption and display it in the report. In this system, the light in a room will automatically turn on when there is movement and the light will automatically turn off when there is no movement. The system will always detect the movement in a room. The system also provides web application to display energy consumption information and the total price. Furthermore, the system also allows the user to update the wattage of light, rates price per kwh and set the duration of time for light turn off through web application. All the data will be saved into the database and user will able view and print the statistic of energy consumption through web application.

ABSTRAK

Sistem kawalan lampu pintar ialah sistem yang akan mengawal lampu dengan mengesan pergerakan di dalam sebuah bilik. Sistem ini telah dibangunkan kerana lampu tidak mempunyai keupayaan untuk mengesan kehadiran manusia. Seseorang itu perlu mematikan lampu secara manual. Tambahan lagi, orang jarang terdedah kepada statistik penggunaan tenaga.Di dalam sistem ini, lampu di dalam bilik akan menyala secara automatik apabila terdapat pergerakan di dalam bilik dan lampu akan automatik tertutup apabila tiada pergerakan. Tiga objektif telah dicapai daripada sistem ini iaitu untuk membangunkan satu sistem yang mengesan pergerakan menggunakan kamera dan sensor PIR, untuk membangunkan system lampu yang secara automatik mati apabila tiada pergerakan dan untuk merekodkan penggunaan tenaga dan memaparkannya dalam laporan. Sistem ini akan sentiasa mengesan pergerakan di dalam bilik. Sistem ini juga menyediakan aplikasi web untuk memaparkan maklumat penggunaan tenaga dan jumlah harga. Tambahan lagi, sistem ini membolehkan pengguna untuk mengemaskini kadar watt lampu, kadar harga per kwh dan menetapkan tempoh masa untuk lampu dimatikan melalui aplikasi web. Semua data akan disimpan ke dalam pangkalan data dan pengguna akan dapat melihat dan mencetak statistik penggunaan tenaga melalui aplikasi web.

CHAPTER 1

INTRODUCTION

1.1 Introduction

If type “Energy consumption in Malaysia” into Google, statistic of electricity consumption per capita can be seen. Year by year, energy consumption in Malaysia is increasing [1]. Light is one of energy that we use every day. Light pollution was everywhere. There are a lot of activities has been made to solve energy crisis. World Wide Fund for Nature (WWF) has been organized one event that was meaningful. The event known as is Earth Hour [2], whereas people need to switch off their lamps for one hour to show they care about the future of our planet. Even, Malaysia’s landmark Petronas Twin Towers also having their lights turned off to mark this campaign [3].

Even though there are a lot of campaigns, but people still do not aware about this problem. For example, bathroom lights are often left on for hours each day in our home even when the room is not occupied. It is often happening because the last users forget to turn lights off. This problem is even larger in numerous related institutional applications, such as hospitality industry and university.

The effective ways to avoid light pollution and reduce electric bill is, develop a system that allows light to automatic turns off when there are no people in the room. So, it is necessary to build Intelligent Light Control System (ILIC). The idea is to create a device that sense the movement in a room and respond to the situation.

Furthermore, the system also will able to record the energy consumption in a room. All data will be saved in the database using web application and XAMPP. This paper will present a method that ILIC used to monitor the light in an office. Besides, The ILIC will use raspberry pi, camera and passive infrared sensor (PIR sensor) as main device.

1.2 Problem Statement

The major problem is the lamp do not ability to detect the presence of humans. Existing system use a lot of PIR sensor in one room because the sensor only can sense the movement in limited space only [4]. It might not cover a full room. So, this project will develop lighting system that will able to sense the movement of humans in a room using module camera and PIR sensor.

Besides, there a lot of waste that comes from human's habits like light energy. People are told to turn off the lights when the lights are not in use. However, it is hard to change human habit. They need to turn off the light manually. Wasteful energy can increase the cost of electricity bills. So, its need a system that be able to turn off light automatically.

Furthermore, people rarely exposed to the statistic of energy consumption. People do not aware on energy consumption that they have been used. Besides, user need full report based on year, month and day to analyze the energy consumption in the future. The system will develop to allows users to manage and monitor the situation of light through the web application. Recorded data can be used to analyze electricity bill for each day or month.

1.3 Objective

The aim of this project is to develop an Intelligent Light Control System (ILIC). To achieve the aim of this project, three objectives must be meets. The objectives of the project are:

- To develop a prototype system that able to sense the movement of humans in a room using PIR sensor and camera.
- To develop a system that will turn off light automatically when there no movement.
- To record light usage and display the data of light usage report by date, month, or year.

1.4 Scope

In order to ensure the objective able to achieve as planned, there are scopes have been defined. The scopes are divide into four categories such as algorithm, location, hardware, and software.

- **Algorithm**

- Design to detect presence of humans.
- Compare the previous condition with new condition frames per second (fps).

- **Location**

- Suitable for indoor areas only.

- **Hardware**

- Raspberry pi to monitor the lighting and sensor.
- 1 Module Camera (5MP) to monitor the situation in the class.
- 1 PIR sensor to sense the motion in the dark. PIR sensor will be placed at the door. PIR sensor sense the movement at the door.
- 3 LED as light in a room

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