



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DESIGN OF AN INTELLIGENT ENERGY SAVING BUILDING
CONCEPT USING PID APPROACH FOR INDOOR GALLERY**

This report submitted in accordance with requirement of the Universiti Teknikal
Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology
(Automation Industry & Robotics) (Hons.)

by

AHMAD NIZAM BIN MAZLAN

B071210574

910121-14-5023

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This report is submitted to Faculty of Engineering Technology of UTeM as a partial fulfilment of the requirement for the degree of Bachelor of Electrical Engineering Technology (Industrial Application & Robotics) with Honors. The member of the supervisory committee is as follow:

.....
(EN.AHMAD MUZAFFAR BIN ABDUL KADIR)

(Project supervisor)

ABSTRAK

Penggunaan tenaga di bangunan komersial adalah sangat banyak, oleh itu mengakibatkan kos kewangan yang besar dan pembaziran sumber semula jadi. rekabentuk sistem kos rendah yang berfungsi untuk mencapai matlamat penjimatan tenaga dalam masa yang sama tidak memaksa orang untuk berkompromi. Keselesaan yang bijak adalah penting untuk pembangunan komersial di masa hadapan. Tindakan proaktif dengan penjimatan tenaga dengan cara mengawal tenaga tersebut daripada penggunaan yg berlebihan dalam bangunan adalah kunci untuk mencapai matlamat ini. Kertas kerja ini juga membentangkan satu sistem penjimatan tenaga, yang memanfaatkan pengguna melalui komunikasi sosial . Dengan itu penjimatan tenaga daripada pengguna adalah satu sistem kawalan maklum balas berdasarkan penderiaan , sistem mengurangkan tenaga bekerja dan meningkatkan pemahaman keutamaan pengguna.

ABSTRACT

Energy consumption in commercial buildings is tremendous, resulting in significant monetary cost and waste of natural resources. Designing a low-cost system that serves the goal of saving energy while not forcing people to compromise their personal comfort is important for future smart commercial buildings. Proactive energy saving actions by automatic controller from users in the buildings are the key to achieving this goal. In this paper, we present an energy saving system, which leverages users through social gaming. By incentivizing energy saving actions from end users with a sensing-based feedback control system, the system reduces installation needs and improves understanding of the user's preferences.

DEDICATION

Special dedicated to my family, love both of you with all my heart. I hope I will make both of you happy.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Energy saving building concept is a system that has been used at home and modern building in the age of technology now. This system is implemented to control the rate of electrical energy such as lighting, fan, and air conditioning. This chapter will explained about the introduction of this project, the problem statement, objective of this project and the scope of this project. Nowadays, electric consumption by humans much damned to wastage. All genius members have generated the projects that reduce electricity consumption. Such as Greenhouse, Solar Energy, Hybrid systems, and others. Therefore this project is to implemented policies to increase the level of reduction of the electrical system by controlling the temperature of the air conditioning and also control the light that is devoted to the building.

1.2 Background

Home system that is automatically adapting between comfortability of the visitor with the minimum use of electrical energy. The project covers control strategies such as P, PI, or PID algorithm for its output. This system will be apply on the gallery to make the temperature and lighting on the some space operated automatically. Besides that, this project that using PID that can control the environment gallery to make energy saving.

This energy home/gallery concept design by using model of art gallery. The project working associated with using PID control lighting and temperature of the

painting gallery. This project contains two functions that will be installed as the lighting control system and the temperature control system of air conditioning.

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1.3 PROBLEM STATEMENT

The problem that can many of us notice with this circumstances is lights in addition to air cooling that is certainly often open even when there are simply no visitor. So that, the target is likely to make comfortability pertaining to visitor to see your skill together with total lights also to strengthen your temperatures regarding several living space in addition to be sure to management this system pertaining to electricity saving. Also, Important electrical power wastage involving Malaysians currently might be contained should the user greater get pleasure from electrical power in addition to agree to your subsidy with electrical power is decreased throughout periods.

1.4 OBJECTIVE

The objective of this project is:-

- a) To control the brightness of the lamp for the painting when brighter light from outside is present in gallery.
- b) To control the temperature of the gallery when the temperature exceeds the original temperature setting.
- c) To reduce electrical energy when the gallery temperature and light are controlled automatically.

So that, visitor can see the art with full lighting and the temperature stabilized of some space and make sure to control this system for energy saving. In addition, significant electricity wastage among Malaysians currently can be contained if the user better appreciate electricity and accept the subsidy on electricity is reduced in stages.

1.5 WORK SCOPE

The scope of this project is to control the temperature in a space such as a gallery of painting and also control the brightness of the light on the artwork and to reduce electricity consumption.

This project involves several parts including:-

- a) Microcontroller
 - The part of system will connected to the microcontroller for the operation
 - The coding will burn into the microcontroller chip.
 - Using microcontroller Arduino Uno
- b) LDR sensor
 - This is the type of light sensor that will be use.
 - This component will sent the feedback to microcontroller when detect the light and give the signal to change position at dimmed light
- c) Temperature sensor
 - This sensor will detect the temperature, thus sent the signal to Microcontroller to overcome and control the temperature of the gallery by settings fixed.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, all information and component that involve in the intelligent energy saving building concept using PID approach for indoor gallery are described. This project is all about providing optimum condition for temperature and lighting controlled by Arduino Uno. The system flow is based on reviews made from previous and existing project. Furthermore, in this chapter will reviews existing project created to get an about the project design, conception, specification and any information that related to this project.

2.2 Type of bulb for lighting

This project is to control the lighting in the gallery arts optimization via PID algorithm, the type of lighting component used is:

- a) LED light Bulb
- b) Halogen light

2.2.1 LED light bulb



Figure 1: LED bulb

Based on the several review, there is many type of LED light bulb such as Philips LED 425264, Cree 9.5-watt, G7 power incline, Feit 13.5-watt and so on. This type of LED bulb has their own specification. The Energy Star certified Philips LED generates enough lumens with 11 watts to be comparable to a 60-watt incandescent bulb. This makes it easier to replace the gallery's light bulbs without losing the current level of brightness. Because it provides plenty of light, this LED light is ideal for our kitchen, bedroom or living room and the bulbs are available in daylight and soft white [1].

That GUIDED mild gives a comfortable, it built yellow-colored sculpt to the space that is designed for living area or master bedroom. Daylight light sources provide mild in which simulates an all-natural daylight, as well as making us all to discover the true colorings as well as facts definitely.

2.2.2 Halogen light



Figure 2: Halogen bulb

By reviewing this halogen light, the pure white light emit makes the ideal for certain fixtures and situations. It provided bright light to reduce eyestrain for reading and other exacting task. Intended for screen lighting, such as spotlight art, images, crystal or maybe architectural functions, this whitened focused mild creates hues show up a lot more vivid. This particular mild granted pinpoint target. Using common lights regarding common lighting within the same space enhances the issue connected with halogens even more..[2]

2.3 Application of lighting system

2.3.1 Lighting of space

To get the proper lighting in a room, it is necessary to correct the lighting system according to their needs. The lighting system in the room, including the workspace. Based on the researcher, there is five type of lighting which is

Table 1 : Type of lighting and their specification

Direct lighting	90 to 100 % of the lighting effects is actually aimed straight away to the object which should be lit up. This system is considered the most effective pertaining to lighting effects, although there is a chance involving triggering glare weak point.
Semi direct lighting	60-90 % with the mild guided straight from what should be lighted, while the remainder is usually reflected towards the limit and also surfaces.
General diffus lighting	On this method, a few 40-60 % from the gentle provided to the item to get lighted. This product like the method regarding strong - indirect gentle emitting half along with the relax about.
Semi indirect lighting	60-90 % in the light aimed towards roof and also upper surfaces, while rest can be aimed towards bottom part. the thing is practically absolutely no shadow and also glare may be lowered.
Indirect lighting	90-100 % with the lighting focused on the ceiling in addition to second wall space after that mirrored to be able to light the complete room. The advantage of this system is just not to build shadows in addition to glare.

For this project semi indirect lighting has been selected. It is because as the explanation 60-90 % in the light aimed towards roof and also upper surfaces, while rest can be aimed towards bottom part. the thing is practically absolutely no shadow and also glare may be lowered.

2.3.2 Suitable Intensity light for Art

2.3.2.1 Amount of light

Bright light is needed to see the excitement on the artwork, but not so much that the art work is harmed by the light. Most picture taking art colors (silver halide as well as "giclee" through a great ink jet printer) may be quickly harmed previously mentioned

150 lux (at the particular art surface), generally simply by ultraviolet light (UV)..[3]. Based on comparison between two researcher “50 to 100 lux should be enough to pleasantly view most photographs. According to internet researched. The National Gallery in London has a policy of lighting most paintings at 200 lux, with a yearly limit of 600,000 lux-hours. “100 lux is roughly the light outside on a "very dark overcast day"; 50 lux is roughly the amount of light in a "family living room"[4,7].

2.3.2.2 Spread of light

It is very important hold the lighting propagate the suitable quantity. Too slim and part of the graphics is unlit. If you should make a choice from as well broad or as well slim, I favor a little bit as well broad to ensure the framework is simply hardly lit up.[4]

2.3.2.3 Bare or Diffused

Incandescent lighting for the most part get brutal or perhaps sharpened perimeters on the smashing items in the mild ft . shaped perception along with directing cases from your globule inside the focus in the mild pool. Both of these change from your art work. Diffusers may mollify both of these problems. Innovative art galleries work with diffusers on the lighting.

2.4 Characteristic Recognition

This intelligent energy saving building concept system approach for indoor gallery are functions to make a comfortable for visitor enjoyable seeing the artwork. This gallery of paintings temperature control in a crowd.By using several sensors equipment, the presence of many visitors resulting in a relatively high temperature in a some cubical space. Therefore this system will serve to increase the temperature at a comfortable level. If the normal cold temperature conditions in the room cubical are 20-

25⁰ C, the temperature control will be enhanced to levels that are more suitable. In addition to the advantages of this painting gallery also control the intensity of light by light entering from the outside gallery.

According to the research, “most fluorescent lamps do not give adequate color renditions though some believe they are sufficient for viewing black and white photography. The CRI (Color rendition index) is a poor indicator of light value and can generally be ignored. It can roughly tell you how close to full white light a lamp gives. 100 lux is best, lower than 90 lux is lacking” [3].

Table 2 : Rating of type of lamps

Xenon	Best
LED	Very good (expensive)
Halogen	Good
Incandescent	OK
Fluorescent	Avoid

2.4.1 Saving Energy

Generally the excellent temperatures are always to set mid-air treatment in order to close to per day 25⁰ C in summertime and 19⁰ C in winter months.

“In order to save substantially about the quantity of electricity ingested for every single 10⁰C of cooling or heating, maybe heat that any of us perform or maybe without, By way of example whenever it’s 35⁰C outside, environment our own conditioner in order to close to 30⁰ C, rather than say, 22⁰ C, can certainly preserve a substantial level of electricity without our bodies operating continuously. Stability concerning ease and efficiency in the system” [6]

For the lighting effects tools with this venture utilized, the energy keeping light bulb much less energy watt and resilient usage.