# ENERGY EFFICIENT LIGHT DRIVER CONTROLLER

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# ABSTRACT

In pursue of energy efficient technology, lighting system has been among the major concern of the global warming effect due to the high power consumption. Therefore, this study is an attempt to investigate and design a new mechanism for reducing energy consumption by targeting to the indoor lighting system. Furthermore, the study has been carried out by divided in three stages; design, simulations and implementation. Complex Programmable Logic Device (CPLD) Altera Max EPM7128SLC84-15N has been used as target device for controlling luminance and power consumption of Light Emitting Diode (LED) at design stage. On top of that, several range of duty cycle start from 6% until 93% has been designed, simulated and tested on CPLD to determine the suitable luminance range at the optimal power consumption for indoor lighting. Altera Quartus II version 11.1 has been used to construct, compile and simulate the proposed design. Meanwhile, Arduino Uno R3 has been used as an interface for the sensor at the implementation stage. The system has been successfully developed and tested using several range of inputs variables. Evidently, the optimal luminance is influenced by the range of duty cycle and numbers of LED bulb. Hence, the proposed system using 15 LEDs at 73% duty cycle produces 480 lux which approaching with the normal office illumination at 500 lux. Therefore, the proposed system is capable to reduce 27% power consumption to produce optimal standard indoor illumination.

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# CHAPTER 1

# INTRODUCTION

## 1.1 BACKGROUND OF STUDY

As LED technology discovered in early 1960's by Dr Nick Honyak, the development of the semiconductor technology has been rapidly increasing. Nowadays, LEDs are no longer used for simple indicator lights on electronic devices. Instead, advances in technology have given LEDs to be used as major practical light sources. The main benefits of using LEDs are durability, long life span and great efficiency.

LEDs can save 50% and even more in energy costs compared to conventional light of incandescent and fluorescent [1] - [6]. The replacement of fluorescent lamps, which contain highly toxic mercury, with LED proved to have good environmental value.