

Thesis on remote control lighting system (chapter ii and chapter iii) essay



**ASSIGN
BUSTER**

Chapter II THEORETICAL AND CONCEPTUAL FRAMEWORK This portion of the chapter presents the review of related literature and studies linked with remote controlled lighting system which will provide necessary background on the subject of the present study. The related literature was taken from articles on published journals, and electronic materials while related studies were taken from the manufacturer's overview of the related prototypes.

Review of Related Literature and Studies

Lighting is the deliberate application of light to achieve some aesthetic or practical effect. Lighting includes use of both artificial light sources such as lamps and natural illumination of interiors from daylight. Daylighting (through windows, skylights, etc) is often used as the main source of light during daytime in buildings given its low cost. Artificial lighting represents a major component of energy consumption, accounting for a significant part of all energy consumed worldwide.

Artificial lighting is most commonly provided today by electric lights, but gas lighting, candles, or oil lamps were used in the past, and still are in situation situations. Proper lighting can enhance task performance or aesthetics, while there can be energy wastage and adverse health effects of poorly designed lighting. Indoor lighting is a form of fixture or furnishing, and a key part of interior design. Lighting can also be an intrinsic component of landscaping. Energy efficient lighting uses a comprehensive approach to lighting and lighting upgrades.

It involves a combination of strategies such as relying on more natural daylight, using energy efficient light bulbs that operate at a lower wattage,

improving lighting controls, adjusting light to appropriate task levels and performing regular, basic maintenance on light fixtures to keep them running longer. Dimming controls reduce the output and energy consumption of light sources. Compared to on-off controls, they can increase energy savings, better align lighting with human needs, and extend lamp life. Unfortunately, they also add complexity and expense and may shorten lamp life under some conditions.

They should be carefully compared to simpler systems that may also produce the desired results. A variety of dimming technologies give the designer or retrofitter options which include “ Manual Dimmers” that are available for incandescent, fluorescent, and certain high-intensity discharge (HID) sources. Both step and continuous dimming are available for incandescents. Multiple dimming methods are available for both fluorescents and HIDs, though HID dimming is limited by color rendition and flicker problems. Another one is “ Photosensor-Activated Dimmers” in which daylighting control may be the most important dimming technique.

It matches the available natural daylight and lighting system output to produce consistent illuminance. Electronic or other dimming ballasts allow for control of the light level. These systems require careful integration of control systems and sensors. Another dimming technique is the use of “ Programmable Dimmers” in which lighting output is adjusted to predetermined levels set by the user. In Incandescent Dimming, the familiar 3-way lamp is the most popular manual, step-dimming product. It provides three discrete reductions in light output.

Continuous dimmers reduce energy consumption without visible flicker; the filament runs cooler, reducing color temperature and making spaces appear more yellow. Wattage does not drop linearly with light output, resulting in reduced efficacy at dimmed settings. Lamp life is usually increased in standard lamps, but may be reduced in halogen lamps. The rapid cycling of dimmed incandescent lamps may create a high-pitched hiss audible in quiet locations. In Fluorescent Dimming, dimming can be achieved for nearly all fluorescent systems, whether magnetic or electronic, rapid- or instant-start, and "dimmable" or "nondimmable". The control methods for fluorescent dimming include: "Auto-Transformers" which is the simplest controls, and is usually applied on a large scale, with one unit controlling many branch circuits. It can dim most sources, including HID, but have very restricted dimming range, typically from 100 percent to about 75 percent light output. Another one is "Branch-Circuit-Based Dimmers" that dim entire branch circuits and do not require that ballasts be changed; they are usually solid-state, employing waveform-shaping dimming circuits.

Generally dim lamps from full output to about 50 percent. At 50 percent, lamp operating characteristics can shorten lamp life. Other control methods include "Dynamic Controllers" that dim individual ballasts, or small groups; and typically use waveform-shaping electronic circuits. They do not require changing ballasts and generally dim between 30 percent and full output, and may increase lamp flicker. "Dimming Core-Coil Ballasts" dim individual lamps or lamp pairs; depending on lamp and control circuitry, can dim from 100 percent down to about 5-8 percent of full light output.

Other systems, using specific combinations of ballasts, lamps, and controllers, provide about 20 percent to full output. Dimming core-coil ballasts may increase audible hum. “Dimmable Electronic Ballasts” dim individual lamps or groups of two, three, or four lamps. Depending on the control circuit, they can provide full-range dimming (from less than 10 percent to 100 percent). The first machines to be operated by remote control were used mainly for military purposes. Radio-controlled motorboats, developed by the German navy, were used to ram enemy ships in WWI. Radio controlled bombs and other remote control weapons were used in WWII.

Once the wars were over, United States scientists experimented to find non-military uses for the remote control. But preoccupations in this way existed long before wars. Thus, one of the earliest examples of remote control was developed by Nikola Tesla in 1898, and described in his patent, U. S. Patent 613809, named Method of an Apparatus for Controlling Mechanism of Moving Vehicles. In 1903, Leonardo Torres Quevado released the Telekino, for which he obtained a patent in France, Spain, Great Britain and the United States. The Telekino consisted of a robot that executed commands transmitted by electromagnetic waves.

This was the world’s first apparatus for radio control and was a pioneer in the field of remote controls. By the late 1930s, several radio manufacturers offered remote controls for some of their higher-end models. Most of these were connected to the set being controlled via wires, but the Philco Mystery Control (1939) was a battery-operated low-frequency radio transmitter, thus making it the first wireless remote control for a consumer electronics device. <https://assignbuster.com/thesis-on-remote-control-lighting-system-chapter-ii-and-chapter-iii-essay/>

In the late 1940's, automatic garage door openers were invented, and in the 1950's the first TV remote controls were used.

The first TV remote control, called “ lazy Bones,” was developed in 1950 by Zenith Electronics Corporation (then known as Zenith Radio Corporation). Lazy bones used a cable that ran from the TV set to the viewer. A motor in the TV set operated the tuner through the remote control. By pushing buttons on the remote control, viewers rotated the tuner clockwise or counterclockwise, depending on whether they wanted to change the channel to a higher or lower number. The remote control included buttons that turned the TV on and off. The first wireless TV remote came five years later, also from Zenith, thanks to one of its engineers, Eugene Polley.

Dubbed “ Flashmatic,” this remote was operated by means of four photo cells, one in each corner of the TV screen. The viewer used a highly directional flashlight to activate the four control functions, which turned the picture and sound on and off and changed channels by turning the tuner dial clockwise and counterclockwise. In 1956, Robert Adler developed the Zenith Space Command remote control which was mechanical and used ultrasound to change the channel and volume. Also referred to as a “ clicker”, the Space Command clicked and struck a bar when the user pushed a button.

Each bar emitted a different frequency and circuits in the television detected this noise. The first such remote control used four rods, each approximately 2-1/2 inches long: one for channel up, one for channel down, one for sound on and off, and one for on and off. They were very carefully cut to lengths that would generate four slightly different frequencies. They were excited by a

trigger mechanism – similar to the trigger of a gun – that stretched a spring and then released it so that a small hammer would strike the end of the aluminium rod. In the early 1960's, solid-state circuitry began to replace vacuum tubes.

Hand-held, battery-powered control units could now be designed to generate the inaudible sound electronically. In this modified form, Adler's ultrasonic remote control invention lasted through the early 1980's, a quarter century from its invention. In the 1990s, when semiconductors for emitting and receiving infrared radiation were developed, remote controls gradually switched to that technology which, as of 2005, is still widely used. Remotes using radio technologies, such as Bose Audio Systems and those based on Bluetooth technology are also to be found on the market.

On the infrared remote control, each button is assigned its own command, and is sent to the TV set in a series of signals. There is a digital code for each button, and in the TV there is a tiny sensor called a photodetector that identifies the infrared beam, and translates the code into a command. In the 1980s, Steve Wozniak of Apple was one of the people who manifested a real interest towards developing a universal remote control. And he succeeded, launching the CORE (Controller of remote Equipment), in 1987.

This remote controller was highly advantageous, as it could learn remote signals from various other devices. Not only that it had the ability to perform specific or multiple functions at various times with its built-in clock, but it could also be linked to a computer and loaded with updated software codes as needed. By the early 2000s, the number of consumer electronic devices in

most homes greatly increased, along with the number of remotes to control those devices. Now it's probably a rare situation to find only one (or more) remote control in one's home.

Only to operate a home theater you need as many as five or six remotes. Not to mention the newest trend to have remote-controlled lighting, curtains, toys and even showers. According to the published article of Middle East Economic Engineering, lighting controls play a critical role in electric lighting systems, providing the function of: turning the lights on and off using a switch; and/or adjusting light output up and down using a dimmer. In recent decades, technological development has increasingly automated these functions and allowed integration of devices into larger, more flexible systems.

The result is significantly expanding energy-saving opportunities, flexibility, reliability and interoperability between devices from different manufacturers. Lighting control systems contain three components linked by communication wiring, which is used to transmit control signals, and power wiring, which supplies power. A lighting control system can therefore be viewed as an apparatus that receives information, decides what to do with that information, and changes the operation of the lighting system. Therefore lighting control devices can be viewed based on inputs and outputs.

In many applications, the overall purpose of the lighting control system is to eliminate waste while providing a productive visual environment. This entails providing the right amount of light, providing the light where it is needed, and providing the light when it is needed. For the right amount of light,

control systems provide the right amount of light. This lighting decision is based on the type of tasks being performed in the space. Lighting controls support this goal in two ways. Lighting controls provide flexibility in adapting the lighting system to different uses.

It also provide the ability of users to adjust light levels based on changing needs or individual preference, either through dimming or through bi - or multilevel switching. Dimming provides the greatest amount of flexibility in light level adjustment. By enabling the lighting system to deliver the right amount of light to the task, the control system can eliminate energy waste while providing a productive visual environment. In providing the light where it is needed, lighting controls support the lighting system putting light where it is needed.

This entails establishing control zones, which is a light fixture or group of fixtures controlled simultaneously as a single controller. Zones are typically established based on types of tasks to be lighted, lighting schedules, and types of lighting systems, architectural finishes/furnishings, and daylight availability. In providing the light when it is needed, an effective control system ensures that the lighting system operates and consumes energy which costs the owner money-only when it is needed.

Determining when the lighting system should be operating depends on how the space is occupied. This will entail whether a time-based or a threshold event should be the deciding factor in whether the lights should be turned on or shut off. By ensuring the lighting system provides only when it is needed, the control system can significantly reduce wasted energy and generate

utility cost savings for the owner. For energy management, according to the New Building Institute, lighting controls can reduce lighting energy consumption by 50 % in existing buildings and at least 35% in new construction.

Controls can reduce the amount of power drawn by the lighting system during operation and also the number of operating hours, thereby reducing utility energy charges. It can also reduce the amount of power drawn by the lighting system particularly during peak demand periods, or during the night, when demand charges are highest. According to the Building owners and Managers Association, energy costs by using automated lighting system run about \$2/sq. ft. in a typical commercial building while worker salaries and benefits can run to 130/sq. ft.. or more.

While reducing energy costs by a large percentage can be profitable, increasing productivity by even a very small percentage can be much more profitable. These cost savings can produce a short payback and a high rate of return for the investment of household lightings in the new controls. In new construction, the rate of return is often higher because only the premium, not the total installed cost, will be recouped before positive savings is realized. Related Studies Upon consistent research from the internet and local libraries, the researcher was able to gather similar studies to the present study.

The Study entitled “ Remote Lighting Switch” by Arevalo displays the biggest similarity in this study for they used cell phone to remotely turn on and off the light by using missed call as a signal. The study conducted by Bobis

<https://assignbuster.com/thesis-on-remote-control-lighting-system-chapter-ii-and-chapter-iii-essay/>

emphasized on “ automatic Switch ON and OFF by Voice Activation. ” This was also conducted by Basco with the concepts of enabling the relay to be energized and reenergized through its relay driver circuit and also the study done by Dug-um using transmitter which trigger the receiver in order to make the switch activated.

The undergraduate thesis entitled “ Auto Light Activated Switch” conducted by Lopez et. al, in a developmental study aimed to innovate existing device ought to switch on and off the light even if there is no one around. The study entitled “ Infrared Power Switch” an undergraduate thesis by Dug-um et. al, made use of an infrared signal triggering a switch. When the transmitter is activated, it will emit an infrared signal going to the photo transistor. The study of Abellana et al. , entitled “ Remote Light Controller with Timer (RCLT)” was designed to give convenience to the user.

The study is related to the present study since both studies gave convenience to the user of the device and tackles on the lighting system. Synthesis of the State-of-the Art The related literature and studies used in this study were carefully examined and their relationship to the present study were found in terms of principle and concepts. The study entitled “ Remote Lighting Switch” by Arevalo displays the biggest similarity in this study for they used cell phone to remotely turn on and off the lights by using missed call as a signal.

The study entitled “ Infrared Power Switch” an undergraduate thesis by Dug-um et. al, made use of an infrared signal in triggering a switch. When the transmitter is activated, it will emit an infrared signal going to the photo

transistor. The study of Abellano et. al, entitled “ Remote Light Controller with Timer (RCLT)” was designed to give convenience to the user. The study is related to the present study since both studies gave convenience to the user of the device and tackled on the lighting system.

The use of radio frequency is a also variable factor for this study because as compared to other signals that can be transmitted, radio frequency can be transmitted anywhere inside its radio wave unlike infrared that must be directed to its receiver to send the signal. Dimmer is also a good application for it can control the illumination of the light for more efficient use inside the household and other facilities. The world’s first remote controls were radio-frequency devices that directed German naval vessels to crash into Allied boats during WWII.

In WWII, remote controls detonated bombs for the first time. The end of the great wars left scientists with a brilliant technology and nowhere to apply it. Sixty years later, some of us spend an hour looking for the remote before we remember there are buttons on the TV. Gap Bridged by the Study All the studies provided variety of application in terms of concepts and principles implemented in the development of the present device. The remote-controlled lighting system is different from the previous studies in terms of the output and design.

The previous studies used cell phones, infrared, and voice sensor to remotely control the device. This study focuses on using radio frequency as signal to remotely control the device. This study also features using dimmer to make more innovation in terms of its function. That is the difference of this

research to the previous studies. **Theoretical Framework** The research has utilized the theoretical knowledge and concepts that led to the development and conceptualization of the Remote Controlled Lighting System. The following theories were conducted to supply bosses for the realization present study.

Another theory used in the study is the “ Theory of Combination” by Osborn. This theory deals with systematic convergence of one or more items, ideas or designs in an attempt to come up with a new functional project. It brought advantage in terms of applications because in the present, all possible ideas, concepts and materials were combined to make the device a reality. The study also applied the “ Theory of creativity” by Helper and Wallach. This theory states that creativity involves the ability to create mental images or arrangement and forms which are not yet visible.

But that imagination when put to work will become realities, this theory then boosted the interest and creativity of the researcher to widen the scope of their creative minds in order to come up with the realization of effective device. The “ Theory of Design” by Nathan Shedroff, states that one important skill for almost everyone in the most decades and beyond will be those that allow us to create valuable, compelling, and empowering experiences for others. This theory serves as a fundamental factor in which the researcher considered in creating the research problem.

Conceptual Framework The conceptual framework explains and guides the development of the remote Controlled Lighting System by conceptualizing the general theories used. The conceptual framework is composed of input,

throughput, output and the feedback which is shown in the conceptual paradigm in Figure 2. The input of the study is composed of concepts, theories, principles and ideas gathered from published and unpublished materials such as books, dictionaries, magazines, undergraduate thesis, and other related reading materials.

The throughput of the study is the application of all the information that are gathered in the input wherein the outcome of all the process in the design and construction of the Remote Controlled Lighting System. The feedback is the return of the output process to the input, especially to control the performance of the system process. Also, feedback mechanism was used to determine if there is a need for further modification and improvement of the device.

Innovation of the device is very important to achieve and insure the function acceptability of the device. Chapter III RESEARCH DESIGN AND METHODOLOGY This chapter is a presentation of the research design and methods used in this study as the sources of data and the development research process being followed to achieve the device as being the main concern of this study. Research Design The purpose of this study is to find out and determine the functional characteristics that will allow the device to operate through the use of a remote control.

To be able to achieve this purpose, the developmental method of research applying the switching theory and dimming effects was employed in this study. Through this method, the researcher conducted an experiment and used theoretical analysis and observation so the evidences, proofs and data

will be generated in order to attain the kind of application that is suitable to this study of Remote Controlled Lighting System. Sources of Data Vital information was gathered by the researcher through intensive research, which served as the guide in making the prototype.

The data in this study came from two sources: the primary sources came from an informal interview of an electronic specialist and secondary sources were derived from books, encyclopedias, magazines, undergraduate theses and the internet. Developmental Research Process The research study followed the following steps and has able to realize the new device called the “ Remote Controlled Lighting System. ” Step 1 Design and Planning – the researcher planned and designed the different parts of the device such as (a) Printed Circuit Board (PCB), (b) electronic and electrical assembly and (c) the casing.

Step 2 Preparation – in order to ensure orderliness, the supplies and materials, tools and equipment used are prepared first before constructing the device. Step 3 Construction – based on the design, the researcher assembled materials to construct the different part specified in the plan. Step 4 Pre-Testing – in order to ensure safety and its functionality, the prototype is tested before its final operation. Step 5 Modification and Revision – based on the findings on step 4, modification and revisions were made.