

15-WAY INFRA RED REMOTE CONTROL

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MEI 2008

**“I hereby declared that I have read through this report and found that it has
comply the partial fulfillment for awarding the degree of Bachelor of Electrical
Engineering (Control, Instrumentation and Automation)**

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DESIGN 15-WAY INFRA RED REMOTE CONTROL

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**This Report Is Submitted In Partial Fulfillment of Requirements for the Degree of
Bachelor In Electrical Engineering (Control, Instrumentation and Automation)**

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ACKNOWLEDGEMENT

Bismillahirrahmanirrahim.....with the name of almighty ALLAH the most merciful and with His permission I have complete my Projek Sarjana Muda II (PSM II). I sincerely would like to say a lot of thanks to my supervisor, Mr Mohd Shahrieel Bin Mohd Aras because with his help i be able to complete my PSM II. During this project, I have faced many problems but with some help from my supervisor and my friends I can complete this PSM II in time. Not to forget my parents where they always give me support from back and being my financial helper and always for my success in my life. Without help from all of them, maybe my PSM II not complete in one piece. Lastly I hope his report will be and provided some good revision to every student in the future.

ABSTRAK

Alat kawalan yang menggunakan cahaya pemancar IR (*infra red*) banyak terdapat di pasaran pada masa sekarang. Alat kawalan ini telah digunakan untuk mengawal kebanyakan alat elektronik seperti televisyen, radio, alat-alat audio dan bermacam jenis alat elektronik yang lain. Kebanyakan alat kawalan IR hanya mampu mengawal satu alat elektronik sahaja secara amnya. Projek ini adalah mengenai merekacipta alat kawalan IR yang mempunyai 15 arah. Alat kawalan ini terdiri daripada 3 fasa; penghantar IR, menyahkod IR dan penerima IR. Untuk penghantar IR saya menggunakan litar terbina HT12B mengkod sebagai alat penghantar utama di dalam litar penghantar dan litar terbina HT12D menyahkod sebagai alat penerima utama di dalam litar penerima. Apabila ketiga-tiga fasa ini berjaya digabungkan, ia akan menghasilkan satu projek, alat kawalan IR yang mempunyai 15 arah.

ABSTRACT

Infra red remote control is everywhere nowadays and easy to find and buy. It uses to control many electronic devices such as television, Radios, audio equipment and so on. This project is about to design 15-Way Infra red Remote Control. This remote control is build by three phases; that is infra red transmitter, infra red decoder and infra red receiver. For infra red transmitter it will used the IC HT12B as the main component in transmitter circuit to send the signal and for infra red receiver it will used the IC HT12D as the main component in the receiver circuit to receive the infra red signal. When all phases are successful combined, it will produce 15-Way Infra red Remote Control project.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, controlling electronic device such as television, radio, audio equipment and so on has improved to another step in the future. Before this we have to move at the device if we want to control it but now we don't have to do that. To overcome this problem one solution is using that is remote control. This remote control not like the other ordinary remote control. It used infra red as the signal even though there are many way to use as the signal but infra red is the best. Further more, this infra red remote control have 15 channels. This project called 15-Way Infra Red Remote Control.

Infra red have many benefits compare to other signal. Infra red also knows as the light below red because red being the colour of visible light with the longest wavelength. The infra red radiation is electromagnetic radiation of a wavelength longer than of visible light, but shorter than of radio waves. Infra red radiation wavelength is between 750nm and 1mm as shown in Figure 1.1.



Figure 1.1: infra red range

Besides, infra red signal very convenience and cheap and we can adjust the frequency as much as we want. This device covers all the problems before. It is low cost, have 15 channels and good precision remote. It is supply with 5 volts and it is also effective since it uses Infra Red Transmitter and Receiver that only detect 38 kHz and have coding system in this project.

1.2 Objective

Objective of this project is to design a prototype of 15-Way Infra Red Remote Control to give people flexibility to any home studio, audio and electronic equipment to control it. Infra red technology will be combined with coding system (binary system) not just rely on infrared signal only.

1.3 Scope of Project

The scope of this project is to design 15-Way Infra Red Remote Control to control electronic device and understand how infra red radiation can be used as the signal. Next is study and research about how coding system can be used to send the data and control the device.

1.4 Problem Statement

In this section, identified several problems that be prevent by doing this project. Here are the problems that been situated:

1.4.1 Wasting time, money and energy

Majority electronic device nowadays used remote control and some of them don't have remote control. So, it will make us have to switch on or off by our self. It will be easier if we just have only one remote control to control all electronic devices that we have in our home. By doing this, we can save our money by just by only one remote control for all electronic devices. We also can save our time by just seat at chair and just push the button of remote control. Doesn't have to move even an inch. Lastly we can save our energy because we just relax and don't have to move often.

1.4.2 Need more space to put the remote control

When we have more than one electronic device for sure we have more than one remote control and because of that, our space at home will decrease. By doing this project, the problem have been overcome and save spaces at home.

1.4.3 Ordinary remote control always been interrupted

Ordinary remote control always been interrupted by others signal. So, when you push button to switch on television for example, it also turn on the radio because it have same frequency. In the other hand, sun beam also interrupt the signal from the remote control because in sun beam there also have infra red signal. With this project, this problem will settle because my remote control have unique signal and can be detect only with the receiver.

1.5 Advantages of Project

There are several advantages of this project that I have found while doing and complete this project. There are:

1.5.1 Save time, Money and Energy

By doing this 15-Way Infra Red Remote Control, its can save our time for searching other remote control to on or off other electronic devices. Moreover it can save our money also because we just using only one remote control to control other 15 electronic devices and besides that, it save our energy of course by just sit at one place and do not have to move to electronic device to on and off the device.

1.5.2 Cut the cost

Infra red remote control is the cheapest way to build and use because the infra red signal easily to find and nowadays the infra red LED have develop one step ahead and that makes the infra red LED easily to built and use small cost to built it.

1.6 Literature Review

Information can be getting from many resources such as books, journals and internet. From many references that been found, only one project have been chosen and it is about infra red remote control to complete this project. From their project and experience, it have help me a lots to complete this project by understand and learn about the infra red. The project that been chosen is:

1.6.1 K1615 12 Channel IR Relay Board.

By [electronickits.com](http://www.electronickits.com)

<http://www.ElectronicKits.com>

In this project it tells us about remote control which has infra red and it have 12 channels. The transmitter and receiver are different. The transmitter comes from commercial 14-button remote control unit and the receiver comes from 12 channel relay board.

For transmitter unit, buttons 1 to 12 on the remote control is used to operate the corresponding relay on the receiver board. The 12 relays are organized into 2 groups of 8 and 4. Button 13 and 14 are used to turn off each group of relays. This project requires 12V DC 500mA power supply for the receiver board. The remote control unit requires 2 x AAA batteries. This infra red remote control operates at voltage 12 VDC and its operating current is 35mA when all relays off and 395mA when all relays turn on. Its operating range is up to 18 meter and relay contact rating is 10A/240V AC/DC max.

The remote control unit uses a modulated 38 kHz carrier to transmit data. This method is used in all IR remote control s as it offers a high degree of noise immunity against interfering light sources. At the receiver end the Waitrony IR receive module extracts the data signal from the carrier. A pre-programmed Atmel 89C2051 microcontroller decodes this signal and sets the corresponding output low. This active LOW output is used to operate a relay via an inverter chip. On reset the microcontroller's I/O ports are configured as inputs and "float" high. In this project it says if the output were connected directly to the relay drivers the relays would "flick" on momentarily. By using extra inverter, we can use an active LOW output to operate the relay and HIGH to release it.

In this project, it also tells us about momentary mode and toggling mode. Momentary mode means the relay is operated (on) while the corresponding button on the remote is being pressed. Releasing the button releases the relay (off). Toggling mode means that separate key presses are needed to turn the relay on. The relays stay on when the button is released. Pressing the button again turn the relay off. Each button press ‘toggles’ the state of the relay.

The specification:

Table 1.1: specification of CK1615 12 Channel IR Relay Board

Operating Voltage:	
a) remote control	3V (2 x AAA batteries)
b) Receiver	12VDC
Operating Current	35mA (all relays off) 395mA (all relays on) (approx. 30mA/relay)
Operating Range	Up to 18 meters
Relay Contact Rating	10A/240V ACDC max

CK1615 12 CHANNEL IR RELAY BOARD

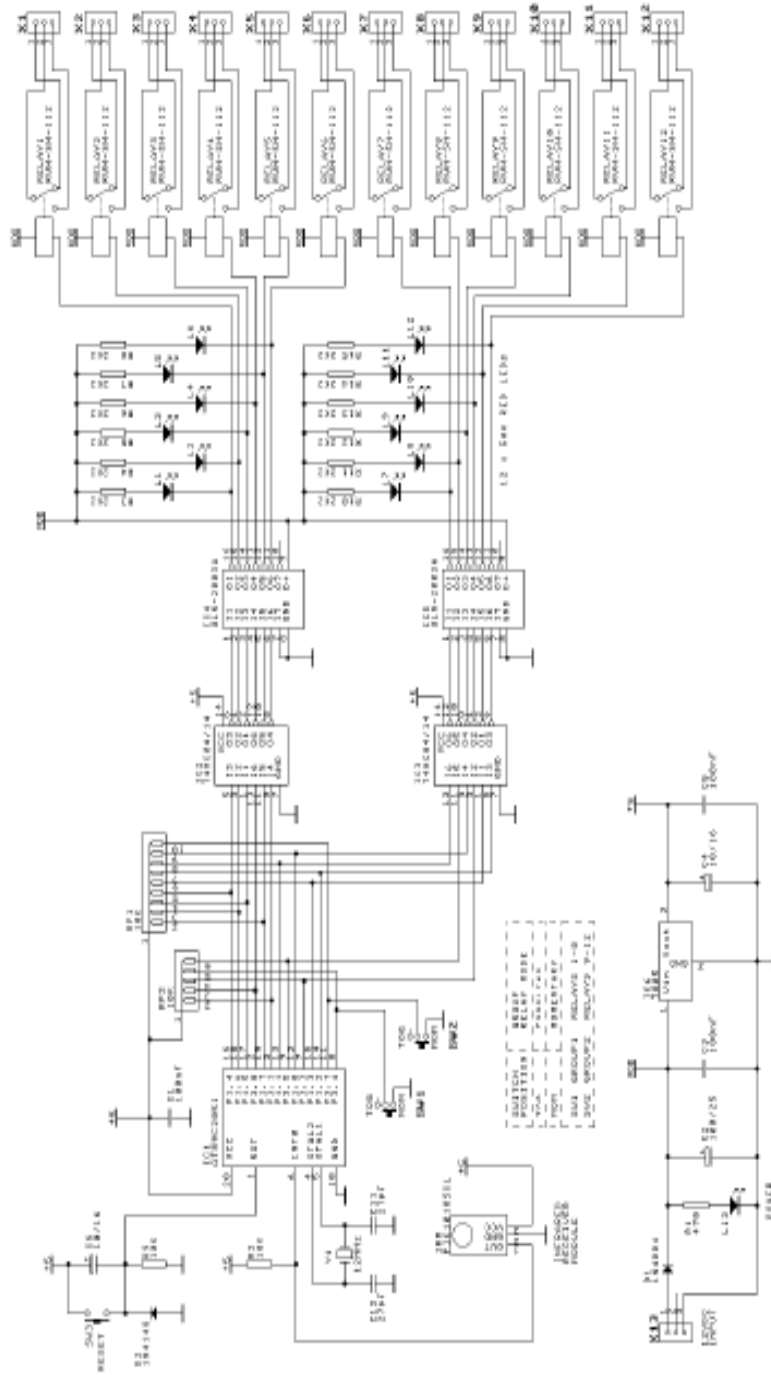


Figure 1.2: circuit of CK1615 12 Channel IR Relay Board



Figure 1.3: commercial 14-button remote control (transmitter)

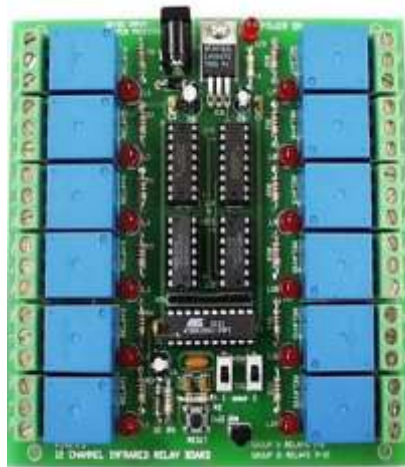


Figure 1.4: 12 channel relay board (receiver)

1.7 Methodology

Methodology project is the way how to complete a project by follow the specification which been provided. The main methods is flow chart which includes project approached, data gaining method and also project analysis and project processing. The purpose of flow chart is to give good vision about the project and the work that must to do in a project. Each steps and flows in the methodology is depends on the planning of the project before a project start.

1.7.1 Flow Chart

Flow chart is a method that been used to give initial prospect about what will be done by follow the specification which been provided. If we don't follow the specification while doing this project, it might affect the quality and productivity of a product. In flow chat, every step has been arranged depends on its own level. I have distributed this project draft into something that can be easily understood. Firstly, for Projek Sarjana Muda 1 some researches about infra red remote control have been done. Many references and information has been gained from internet about infra red and remote control. Besides that, after done researching at the library more knowledge about infra red remote control will be gain.

After that, next stage is to design the circuit. We have studied more than one circuit to make our understanding about transmitter and receiver infra red circuit will be at the top. Next is research and analysis about component that will be used in this project have been done. Some of the components are IC (Integrated Circuit), transistor, encoder, and decoder and so on.