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Malik.

## **10 WAY INFRA RED REMOTE CONTROL**

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**Bachelor of Mechatronic Engineering**

**May 2010**

**10 WAY INFRA RED REMOTE CONTROL**

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**A Report Submitted in Partial Fulfillment of the Requirements for the Degree of  
Bachelor of Mechatronic Engineering**

**Faculty of Electrical Engineering**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**2010**

“I hereby declare that I have read through this report entitle “10 Way Infra Red Remote Control” and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering ( Mechatronic )”

Signature :  .....

Supervisor's Name : Mohd Shahvirel Mohd Aras .....

Date : 12/5/2010 .....

“I hereby that this report entitle “10 Way Infra Red Remote Control” is the result of my own research expect as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : .....  .....

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Date : ..... 12 MAY 2010 .....

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## **ABSTRACT**

Nowadays, infra red product are become one of the top commercial product especially in our country. Most of the electronic equipment used infra red for many task such as short-range communication for mobile phone and remote controls for television and video recorder. Besides that, another reason of using infra red is because it quite easy to make and it is cheap. This project presents the design hardware and prototype for 10 way infra red remote control. There are several part of the project that must be done in way to make this project successful which is infra red transmitter, infra red decoder, infra red receiver and prototype of this project .In sending the data, integrated circuit will be used for decoding and transmit the data from the transmitter to the receiver of the infra red remote control. The prototype will be use for placing the receiver and showing the functionality of the remote control in controlling 10 channel of the infra red remote control. After all the part has successful combined, it will produce 10 Way Infra Red Remote Control project.

## ABSTRAK

Pada masa kini, produk infra red telah menjadi salah satu produk komersil yang semakin mendapat perhatian di negara kita. Kebanyakan daripada peralatan elektronik menggunakan infra red untuk perhubungan jangka pendek bagi telefon dan alat kawalan jauh untuk television dan perakam video. Di samping itu, salah satu sebab lain yang mempengaruhi faktor pemilihan infra red ialah mudah dicipta dan murah. Projek ini mempersembahkan rekabentuk barangan dan prototaip untuk alat kawalan jauh 10 siaran atau arah. Untuk menjayakan projek alat kawalan jauh, beberapa bahagian penting perlu diperhatikan dan dijayakan iaitu penghantaran infra red, penyahkod infra red, penerima infra red dan prototaip. Dalam melaksanakan proses penghantaran data, penggunaan chip pemprosesan akan dinyahkod dan penghantaran isyarat dan data akan dilakukan daripada penghantar infra red kepada penerima infra red. Penggunaan prototaip pula digunakan untuk menempatkan penerima infra red dan menunjukkan keberfungsian alat kawalan jauh infra red dalam mengawal 10 arah atau siaran. Setelah semua bahagian Berjaya digabungkan, ia akan menghasilkan projek yang mengawal 10 arah dengan menggunakan alat kawalan infra red.

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

Nowadays, infra red product are become one of the top commercial product especially in our country. Most of the electronic equipment used infra red for many task such as short-range communication for mobile phone and remote controls for television and video recorder. The technology used for controlling the equipment also has improved to the higher stage. With the implementation of the technology in our live, we can achieve more comfortable lifestyles. For example before this, if we wan to change the television channel, we need to move and push any button at the television. But nowadays, we don't need to so the things. The problem was overcome by using a remote control. However, this remote control was not same to the ordinary remote that available in the market. Even though this remote control was using the infra red signal, but it was special because providing 10 channels. This project was named as 10 Way Infra Red Remote Control.

The decision making to use the infra red as the medium of transferring the signal was influent by many reasons. One of the reason is infra red is cheap. Besides that, infra red radiation is an electromagnetic radiation that provide the longer wavelength than of visible light but shorter than of radio waves. The wavelength of the infra red radiation is between 750nanometre (nm) to 1milimetre (mm).

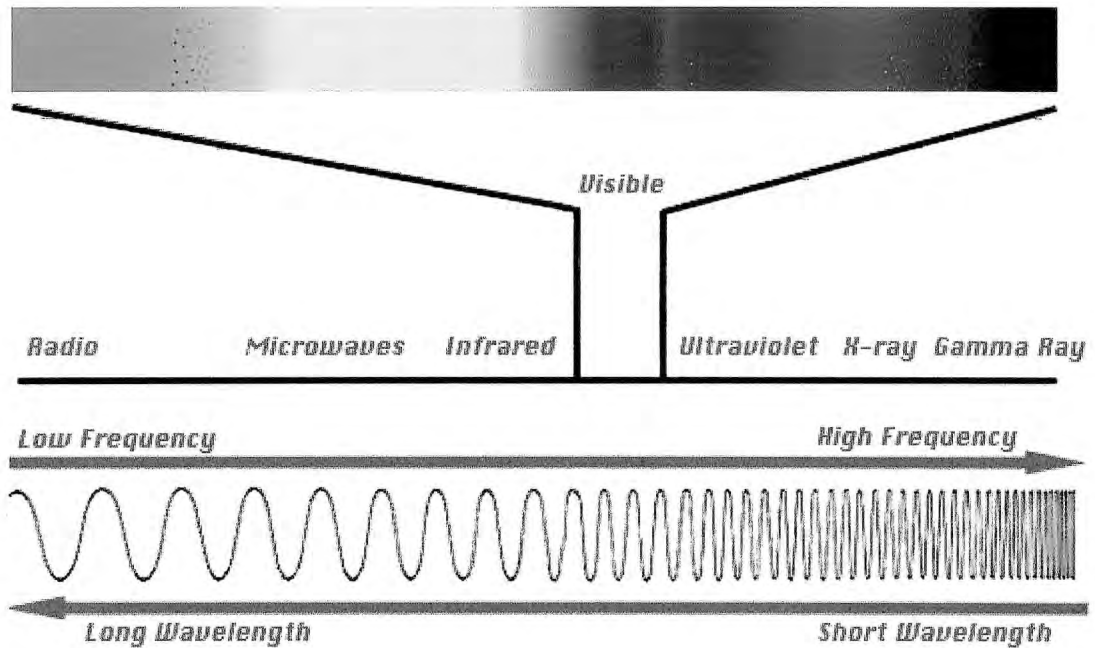


Figure 1.1 : Infra red range

Besides that, another reason of using infra red is because it quite easy to make, convenience and cheap compare to another medium. By designing this device, all the problems that occur in previously can be covers. In addition, this product is lower in cost, providing 10 channel and easier in controlling compare to other ordinary remote control.

## 1.2 Objective

Objective of this project is to design hardware and prototype of the 10 way infra red remote control and help the people easier in controlling much electrical and electronic equipment in one time.

### **1.3 Scope of Project**

The scope of this project is to design 10 way infra red remote control which use to control the electrical and electronic devices. In addition, the scope of this project also including the study and research of understanding the functionality and operation of the infra red to acts as signal through the modulation process, coding system, operation of sending data and controlling the device. Also include the designing of the suitable prototype for the 10 way infra red remote control.

### **1.4 Problem Statement**

From the previous problems, there are several problems that have been identified. There are listed as :

#### **1.4.1 Avoid the interruption from other signal that always happened in ordinary remote control.**

The ordinary remote control always been interrupted by other signals because the same of the frequency. For example when we want to switch off the television, it also turns off the radio because both of them have the same frequency. Besides that, the signal of the ordinary remote control also interrupted by the sun beam because in the sun beam also have infra red signals. Therefore, in this project we will design a remote control that have unique signal and can be detected by the receiver that we used.

#### **1.4.2 Need to remain too much types of remote control with the different use of it.**

By using this special remote control with every each of the buttons are acts as one ordinary remote control function, there was no need to remain too much types of remote control with the different use of it.



### **1.4.3 Wasting time, money and energy**

Most of the electrical and electronic nowadays need and use a remote control to controlling them. But some of them does not has the remote control. So, by using this 10 way infra red remote control, it will make our job easier because just by using one remote control we will able to control all the electrical and electronic devices in our home. By implement this product in our home, we can save our time, money and energy.

### **1.4.4 Need more space to put too much remote control**

If we use more than one remote control, so we need to reserve more spacing in our home to placing all the remote. This problem can be avoided by using this unique infra red remote control.

## **1.5 Advantages of project**

In doing this project, there are several advantages that can be found out. There can be listed as :

### **1.5.1 Save time, money and energy**

By using this remote control, we can save our time for searching other remote control to switch on and switch of the electrical or electronic devices. If we compare to the ordinary remote control, one remote control was used for only one device. So, if in our home have ten electronic devices, so we will have ten remote controls. So all the problem can be settle by just using 15 way infra red remote control .In addition, we also can save our money. Besides that, we can also save the energy because by sitting at same place, we can turn on and turn off the electrical or electronic devices without move from our place.

### **1.5.2 Reduce the cost**

Compare to other remote control, infra red remote control was the cheaper and easier to make. It is because infra red product was easily to find in our market and the process to make not need such a complicated step. In addition, with only small cost we can build up the good condition infra red remote control.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The process to collect and gain much information was done by searching from many resources such as books, journals, internet, thesis, papers and others. For the literature review, by comparison several previous projects, the comparison method was choosing for found out the best quality and step that can be adapted in my project. The project use as the example for literature review such as :

#### **2.2 A Versatile 12 Channel Infra red Remote Control**

This project will explain about the infra red remote control which is having 12 channels. This product was separately into two parts which is transmitter and receiver. The receiver was uses 12 channel relay board and the transmitter used 14 button remote control units.

The buttons 1 until 12 at the transmitter are used to operate to the corresponding relay on the receiver board. The relay was organized into two banks, one of eight and one of four. Each of the two banks can be independently set to operate in 'momentary' or 'toggle' mode via slide switches SW1 and SW2. In the momentary mode, the relay is energized or closed while ever the keypad buttons remains pressed. In the toggle mode, one push button closes its relay and a second push of the same button releases it. For button 13 and button 14, they are used to release all relay when the circuit is set to the 'toggle' mode. Button 13 will release

relay 1 to 8 when the button was press while button 14 releases relay 9 to 12. This project requires 12V DC 450mA power supply for the receiver board [1]. The batteries for the transmitter are 2 x AAA types. The operating current for the receiver is 35mA when all the relays off and 450 mA when all the relays toggled. The operating range that this product can act is up to 15 meters.

The remote control units use a modulated 38 kHz carrier to transmit the data. The signal was use the modulation process and this method is used in all the infra red remote control as it offer a high degree of noise immunity against interfering light sources. At the receiver, the integrated circuit will extracts the data signal from the carrier. A pre – programmed Atmel AT89C2051 semiconductor will decode the signal and sets the corresponding output low [1]. To operate a relay via an inverter chip, active LOW output has chosen. On the reset microcontroller input output ports are configurated as inputs and ‘float’ high. In this project, said that if the output was connected directly to the relay drivers, the relay would ‘flick’ on momentarily. The used of extra inverter means we can use an active LOW output to operate the relay and a HIGH to release it just right during reset. Besides that, the external 10 k ohm pull up resistor are used to ensure a ‘solid’ high level signal to turn a relay off. For the summarization, the Table 2.1 will summarize all the specification in this product. In addition, Figure 2.1 shows the circuit of 12 channel versatile infra red remote control. Several important such as transmitter and receiver were shown in Figure 2.2 and Figure 2.3.

Table 2.1: Specification for A Versatile 12 Channel Infrared Remote Control

Operating Voltage	
a) Transmitter	3V ( 2 x AAA batteries)
b) Receiver	12 V DC
Operating Current	35 mA ( all relay standby) 450 mA ( all relay toggled)
Operating range	Up to 15 meters
Relay Contact Rating	10 A / 240 V ACDC max

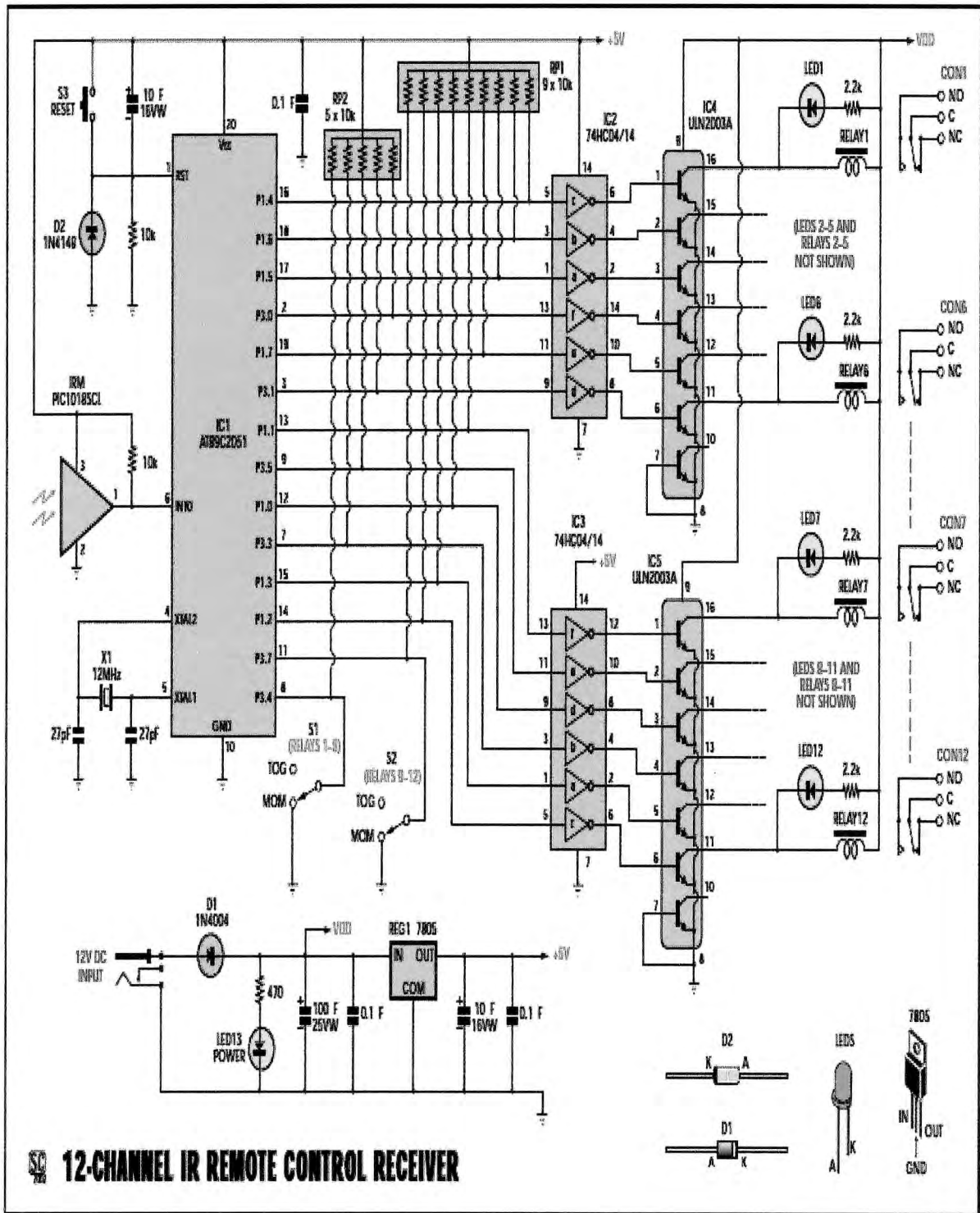


Figure 2.1: Circuit for a Versatile 12 Channel Infra red Remote Control

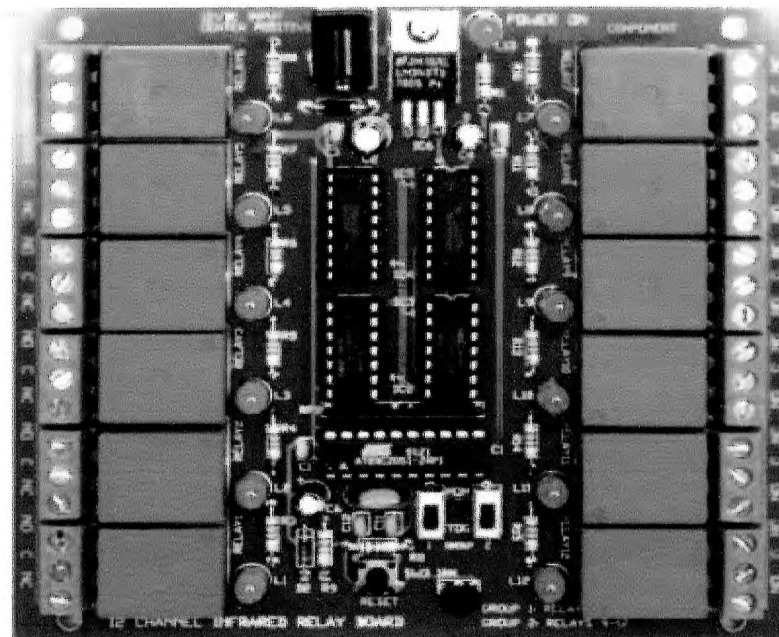


Figure 2.2 : 12 Channel Relay Board



Figure 2.3: Transmitter

### 2.3 CK1615 12 Channel Infra red Relay Board

This product was shown about 12 channels infra red remote control. This product was divided into two parts which is transmitter and receiver. This transmitter and receiver also have physical specification such as a versatile 12 channel infra red remote control from siliconchip.com.

For transmitter unit, button 1 to 12 will operate corresponding to the relay on the receiver board. The relays already divided into two groups of eight and four. The button 13 and 14 was used for turn on and turn off each group of the relay. For the receiver, to make the receiver function the supply needed is 12 V DC with 500mA. The remote control transmitter 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. This product can be operated in range around 18 meters and the maximum rating of relay contact is 10 A/240V AC/DC [2].

This remote control also transmits the signal through the modulation process. The frequency is about 38 kHz. The pre-programmed Atmel 89C2051 microcontroller will decode the signal and sets to the corresponding output low. This active low output used to operate a relay via an inverter chip. In this project, it says if the output were connected directly to the relay drivers that relays would flick on momentarily [2]. By using extra inverter, we can use an active low output to operate the relay and high to release it. Table 2.2 will explain the specification for this product. Figure 2.4 shows 12 Channel Relay Board while Figure 2.5 shows schematic circuit for CK1615 12 Channel Infra Red Relay Board.

Table 2.2 : Specification of CK1615 12 Channel Infra red Relay Board

Operating Voltage	
a) Transmitter	3V ( 2 x AAA batteries)
b) Receiver	12 V DC
Operating Current	35 mA ( all relay standby) 395 mA ( all relay toggled)
Operating range	Up to 18 meters
Relay Contact Rating	10 A / 240 V ACDC max

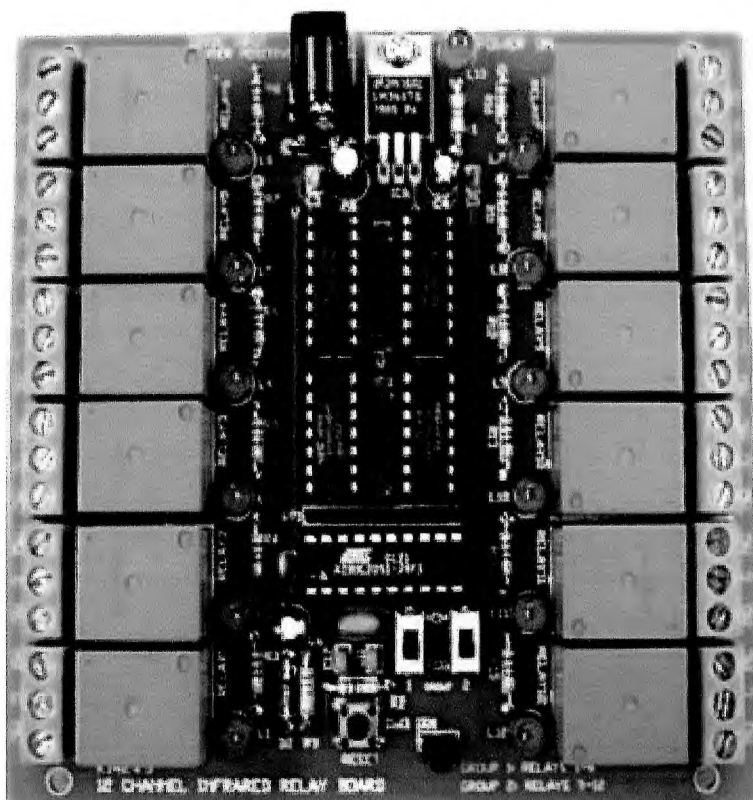


Figure 2.4 : 12 Channel Relay Board