VIETNAM AVIATION ACADEMY

Department of Telecomunication - Electronics Engineering Technology

LOCATION IN HO CHI MINH CITY

PROJECT REPORT:

"Circuit Remote Controlled Using Infrared Light"

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PREAMBLE

In this day of advancement, we are indispensable remote control to control the devices we use every day as televisions, machines air conditioners, fan, etc. So how do remote controls work? Can control other objects in the distance? Few know that the first remote control available during World War II. Initially, people use RF technology (Radio Frequency) and then catch to start applying IR (Infarred Remote) technology to the remote control. In today's life, we use both types, however control remote use infarred in more often used. Let's see the principle operation and construction of this remote control.

Auth. Nguyen Van Anh Tuan

Contents

Chapter 1

Introduction

1.1 Preliminary introduce:

With the current trend of modernization and industrialization, many modern technology devices appear to help save time. We can mention as public technology of things connected through the internet (Internet of Things) etc. But with expensive fees are not suitable for the average consumer. From there, i founded simple solutions with the same purpose and low cost.

In parallel, to supplement, to supplement the knowledge not studied in school. From there, i selected "Remote Controlled Using Infarred" for the topic.

1.2 Objectives of the study:

To help reduce costs and supplement knowledge not researched at school.

1.3 Research Methods:

Find information on internet.
Test on software.
Construction circuit.

Chapter 2

Find out theoretical related to the research

2.1 Application of remote controlled using infarred

Remote controlled now is using broadly, it use to controlled all wireless device. Remotes and televisions are the best example for application of this recieve and transmitter circuit. Or more application of this circuit. Beside that, we can see that remote controlled can use with air conditioners, fans, or even use to turn on the lights in house...etc.

2.2 Define of Infarred (IR LED)

Infarred light (infarred ray) is the light we can't see it by our eyes, they have wavelength from 700nm to 1mm. The infarred light have transmittion speed is equal to lightspeed.

The infarred can transmit many signal channels. It is widely applied in industry.

The amount of information that it can gain is 3 megabit/s. The amount of information transmit with infarred light is many times larger compared to the electromagnetic waves people still use.

Infarred rays are easily absorbed, poor penetration. In the word control far by infarred, the beam emits a narrow, directed direction, so when recieve must be in the right direction to use it.

Infarred wave have characteristics such as light (focusing through the lens, focal distance...). Normal light and infarred light differ very clearly in light through the material.

Other than emitting invisible infarred light, IR Led look like a normal led and also works like a normal Led, it means it will consume 20mA and 3 Volts.

Besides that infarred is divided by wavelength into three main regions. However, follow the US classification is divided into 5 areas as follow:

Name	Acronym	Wavelength	Frequency	Photon Energy	Featured
Near Infarred	NIR	750nm to 1.4μm	214-400THz	886-1653 meV	Determined by the absorption of water.Used in fiber optic telecomunications.
Short waves infarred	SWIR	1.4-3μm	100-214THz	413-886meV	Absorbed domestic increase significantly as of 1.45μm. Range 1.53-1.56μm is spectral region currently in use much in the far informed long road.
Medium waves infarred	MWIR	3-8μm	37-100THz	155-413meV	This band is called is thermal infarred, but it only detects slightly higher temperatures than body temperatures.
Long waves infarred	LWIR	8-15μm	20-37THz	83-155meV	This region is call "thermal infarred".
Far infarred	FIR	15-1000μm	0.3-20THz	1.2-83meV	See far infarred and far infarred laser.

Table 2.1: Classify Common of Infarred

2.3 Infarred receiver eye (TSOP-17xx)

It is an excellent line of infarred sensors for remote control applications. These infarred sensors are designed to improve shielding electric interface. These devices are designed to receive infarred rays from the infarred diode from a remote handset.

TSOP 17xx is a part of the Photomodules family of infarred sensors modules miniature with PIN photodiode and preamplification stage are placed in the shell epoxy. Its output is low and gives +5V when off. Its output is demodulation to be able to decoded directly by the microprocessor. Functions important modules include internal filter for PCM frequency capability. Compatible with TTL and CMOS, low power consumption (5V and 5mA), immune to ambient light, anti-jamming, etc....

Number	Name	Description
1	Ground	Grounding
2	Vcc	Usually connect to +5V, maybe 6V
3	Signal	Output Signal

Table 2.2: Configuration of TSOP

So, where do we use it?

- The TSOP sensors is capable of reading the output signal from the remote control like TV, home theater remotely etc... All the remote controls will work with a frequency of 38KHz and this IC can pick up any processor IR signal handle them and provide output on PIN 3 (signal).
- Also, keep in mind that this TSOP-1738 series will only receive 38KHz infarred signals. So almost all the remote control in our country will work in 38KHz.

Application of TSOP-1738:

- Receiving infarred signal.
- Decode the remote signal.
- Analyze, reproduce or copy signals remotely.
- Receiver circuit for remote control.
- Remote control test circuit.

2.4 IC 4017

Firstly, IC 4017 is the decimal counting IC, counting the clock. When we take IC clock count pulse and output 10 corresponding to 1 pulse.

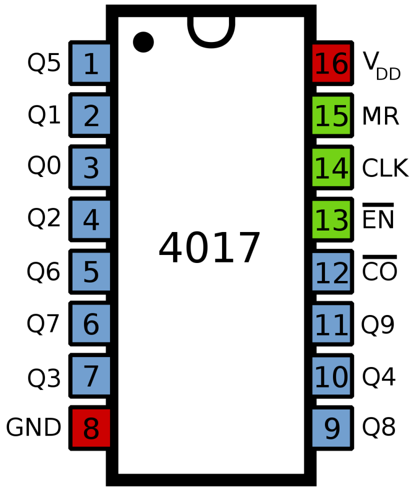

Figure 2.1: PIN chart of IC 4017

Number	Name	Description
1-7 and 9-11	Output PINS Q0 to Q9	10 output, they are not in order, so be careful when wiring
8	Vss or Ground	Grounding PIN
12	Carry out (CO)	The PIN to a high level after IC counting from 1-10. Often used to trigger another count IC.
13	Clock Enable (EN)	PIN allowed. This positive PIN is low. When EN=0, the circuit operates.
14	Clock	The counting circuit operates when there is a pulse from the Clock PIN, which is positively edge-up, usually connected to another IC555 or quartz set to generate a pulse
15	Reset	Set output status to high
16	Vcc/Vdd	Connect to the source

Table 2.3: Description of function of each IC 4017 PIN

In summary we have the characteristics of the IC 4017 as follow:

- 16-PIN CMOS decimal counter.
- Support 10 decoded outputs.
- Wide supply voltage range from 3V to 15V, usually +5V.
- Compatible with TTL (Transistor-transistor logic).
- Maximum frequency: 5,5MHz.

And what is application of IC 4017? That is:

- This IC usually use in the counter circuit, timer circuit, LED matrix, LED chaser, and almost the lost of other LED project.
- Use to make binary counter or binary decoder.
- Can be use to make splitters.
- Remote metering, cars, medical electronics.

2.5 Quickview about clock pulse

In logic techniques, people use pulse signals (high and low) to operate. This signal is called a pulse.

As you can see, the clock has an effect on the signal transmittion. Specifically, the higher frequency of the clock, the faster amount of signal transmitted.

For synchronous design systems, the clock is a global clock that allows all the components on it to communicate and control with each other.

As for the asynchronous setting system, the clock pulse is just a handshake pulse to communicate between 2 components (local clock) with each other, absolutely no clock pulse for the entire system.

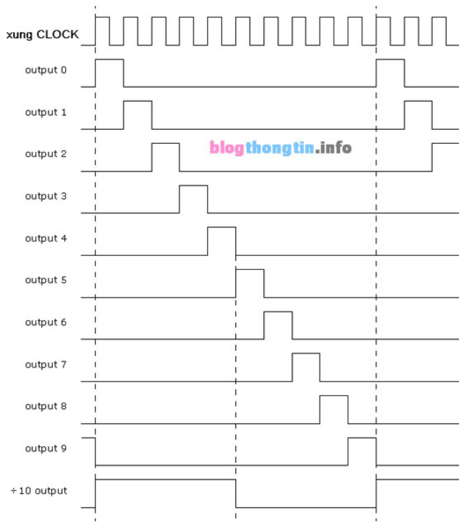

Figure 2.2: Output signal format according to pulse input signal of IC 4017

This is signal when IC is operated by an edge-up shock (the pulse from level 0 to level 1).

PIN 13 (pin E) is the PIN that allow the IC to work, to activate this pin we have to connect this pin to level 0 (also known as mass level).

MR pin or can be understood as Reset pin, when we give it a voltage of 1 (5V), the output Q will be reset, the output Q0 is default at 1, the remaining outputs are at 0 if we do not need to use the MR pin, we should connect this PIN to the mass. The diagram above we use MR pin to control the 4th counting so we connect MR to Q4 pin.

CO pin used to connect with other IC 4017 depending on the design needs of each person, for example when we need more counting of IC 4017 then we will use this pin (just connect the CO pin of this 4017 to the CLK pin of the next IC 4017).

As shown in the picture we see when the output pulse of the IC is simulated to a high level (level 1) so continuously until the output of the IC and will return to the beginning and so on, if it granted, it will be run continuously.

2.6 IC NE555

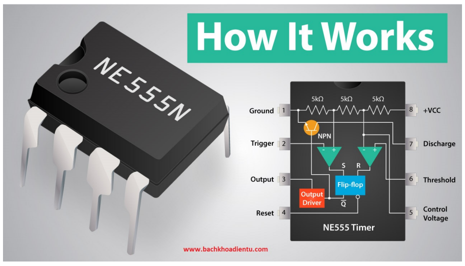

Figure 2.3: Image and structure of IC NE555

NE555 Timer IC is an intergrated circuit (chip) used in a variety of timer, pulse generation, and application oscillators. NE555 can be used to provide time lags, like an oscillators and as a flip-flop element.

IC NE555 has been in 1972 by Signetics Corporation with 2 product lines SE555/NE555 and is called time machine and is also the first available. It provides electronic circuit designers with relatively cheap, stable cost.

Its structure is composed of OP-AMP comparing voltage, flip circuit and transistor for discharging electricity like a image down here:

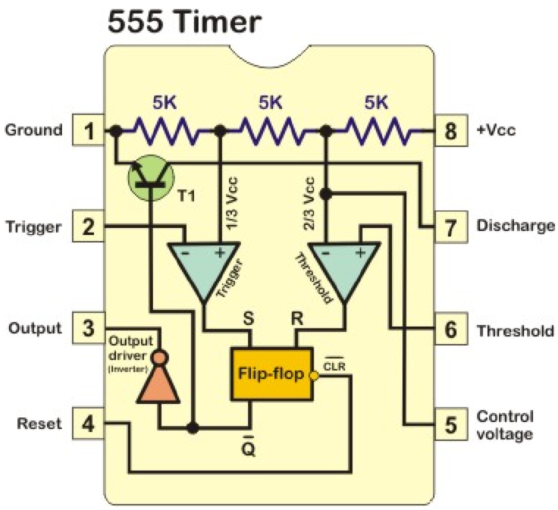

Figure 2.4: Structure inside of NE555

Depending on the manufacturer, NE555 has a different structure. Typically, the standard NE555 include 25 transistors, 2 diodes, and 15 resistors on silicon processors installed in the 8-pin dual package (DIP-8). Variations include 556 (one DIP-14 combining tow complete 555s on one chip), and 558/559 (both DIP-16 incorporating four reduced function timers on one chip).

NE555 parts are temperature range from 0°C to 70°C and NE555 parts are assigned the best temperature range from -55°C to 125°.

Low-power CMOS types of NE555 are also available, such as Intersil ICM7555 and Texas LM555, TLC555, TLC551. The CMOS timer uses less power than the bipolar timer. The CMOS timer also causes less noise than the dipole type when the output transitions.

PIN	PIN Name	PIN direction	PIN purpose
1	GND	Ground	Supply voltage: 0V
2	TRIG	Input	Activate: when the voltage at this PIN decrease 1/2 of battery voltage CONT (1/3 Vcc unless CONT have activate by outside signal).
3	OUT	Output	This is a push-pull output that is led to a low or high state (positive supply on the Vcc PIN minus about 1.7).
4	Reset	Reset	The time interval can be reset by bringing this PIN to GND, but the time does not start again until this PIN rises to about 0.7V. This PIN overrides TRIG and Threshold. This PIN is not used much, so it is often connected to Vcc to prevent electrical noise from causing repetition.
5	CTRL	Input	This PIN provides access to internal voltage (2/3 Vcc by default). Apply this voltage to CONT, we can change the time characteristics of the device.
6	THRES	Input	Threshold: when this voltage at PIN is greater than the voltage at the CONT PIN (2/3 Vcc), then the interval time ends.
7	DIS	Output	Discharge: this is the output of an open collector (OC), used to discharge capacitors between intervals, in phase with the output.
8	Vcc	Source	The guaranteed voltage range of bipolar timers is usually 4.5-1.5V (some timers are specified for up to 16V or 18V), although most will work as low as 3V.

Table 2.4: Describe the function of each IC NE555 pin

Properties	Value
Mounting type	Surface mount
Timer type	Standard
Package type	SOIC (Small Outline Intergrated Circuit)
Number of timer	1
Number of PIN	8
Minimum supply voltage	4.5V
Maximum operating voltage	16V
Minimum operating temperature	0°C
Maximum operating temperature	70°C
Maximum ouput current	200mA
Excited	4.9 x 3.91 x 1.58mm
Length	4.9mm
Height	1.58mm
Width	3.91mm

Table 2.5: Specification of NE555

The operating mode of IC:

- Astable mode: In this mode, 555 timer can work as an oscillator. Uses contain LED and lamp frashers, logic clocks, pulse generation, security alarms, tone generation and PPM and so on. The 555 timer IC can be used as a simple analog to digital converter.
- Monostable mode: In this mode, 555 timer IC works as a one shot pulse generator. Application mainly include bounce free switches, timers, touch switches, missing pulse detection, frequency divider, pulse-width modulation (PWM), capacitance measurement, and so on.
- Bistable mode: In this mode, 555 timer IC can work as a flip-flop, if the DIS pins is not connected no capacitor is used. It is used in bounce-free latched switches.

In this circuit that we use, NE555 is operated in Astable mode.

2.7 Principles of infrared transceiver

The IR transmitter consists of the LED that emits the IR (Infra Red) radiation. This is received by the photo diode, which acts as IR receiver at the receiving end. Since the IR radiation is invisible to human eye it is perfect for using in wireless coummunication.

A electronic remote device mainly consists of this IR transmitter and receiver. A remote control patterns a flash of invisible light which is turned into an instruction and is received by the receiver module.

So, how it works?

The IR signal is modulated during transmission. Modulation means assigning pattern to the data to be sent to the receiver. The most commonly used IR modulation is about 38KHz.

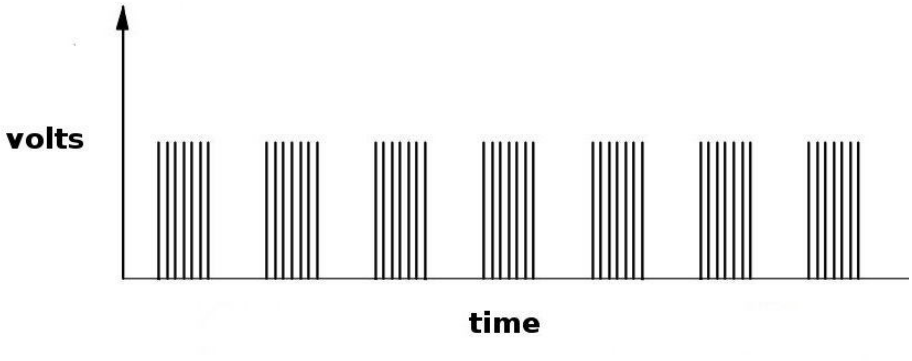

Figure 2.5: The IR signal

2.7.1 Principles of signal transmission

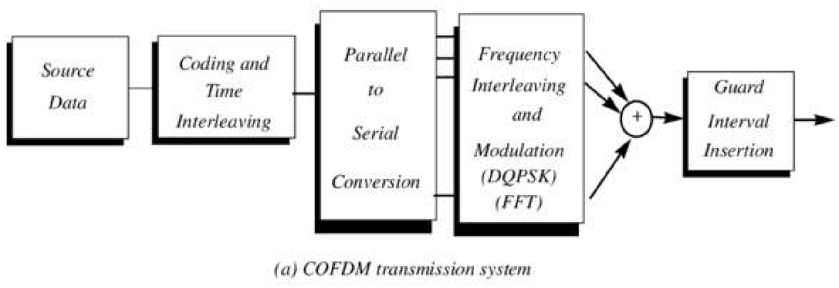

Figure 2.6: Principle of transmission

Explain the diagram:

At the transmitter, the message is encoded bit by bit. After the last bit of the message passes, two flushing bits 0 are interested to make sure the last transittion state is 00. Its aim is to facilitate the decoding process of receiver.

- Function selection and coding block: when the user presses the function keys to issue the request according to his request, each function key corresponds to the decimal number. The coding circuit will convert into corresponding binary code in the form of a digital signal code consisting of 0 and 1. The number of bits in a binary instruction code maybe 4 or 8 bits depending on the number of function keys more or less.
- Conditional oscillator block: when we press a function key, we simultaneously start the oscillator circuit to generate clock pulse, the clock frequency determines the standard time of each bit.
- Data latch block and parallel conversion unit to serial: the binary code at the coding circuit will be latched into the parallel data conversion circuit to serial. Serial to parallel data conversion circuits are controlled by clock pulses and timing circuits to ensure a timely completion of the conversion of a sufficient number of bits of code.
- Modulation and FM transmitter block: The code in the form of serial will be sent through the modulation circuit and FM transmitter to pair the code into the carrier with the frequency of about 38kHz to 100kHz, thanks to the higher frequency signal carrier, the longer the signal is transmitted, which means increasing its transmitting distance.
- Transmitter device block: it is simply an infarred LED. When the instruction code has a bit value of 1, LED imits infarred in the T interval of that bit. When the instruction code has a bit value of 0, LED will not light. Therefore, if the receiver does not receive the signal, it will be considered as having a bit value of 0.

2.7.2 Principles of signal reception

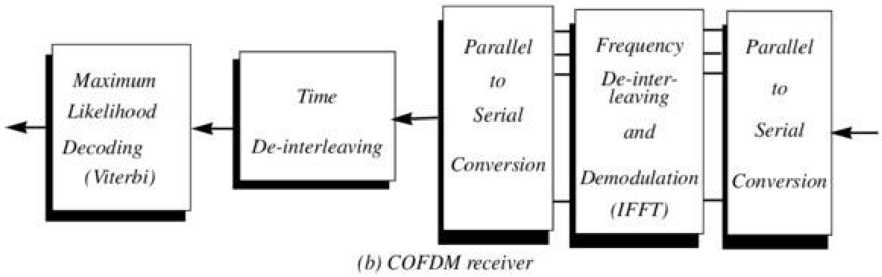

Figure 2.7: Principle of reception

Explain the diagram:

- Receive unit: infarred from the transmitter is directly received by the infarred receiver or other optical components.
- Application and decoupling unit: the signal amplification component will receive first and then pass through the detector circuit to eliminate the carrier and decouple the necessary data, which is the code.
- The carrier frequency is also used to compare the phase with the oscillation frequency on the receiver side to help the transceiver circuit be synchronized, ensuring the detector and serial to parallel circuits work correctly.

2.8 Learn about infrared transmitter circuit

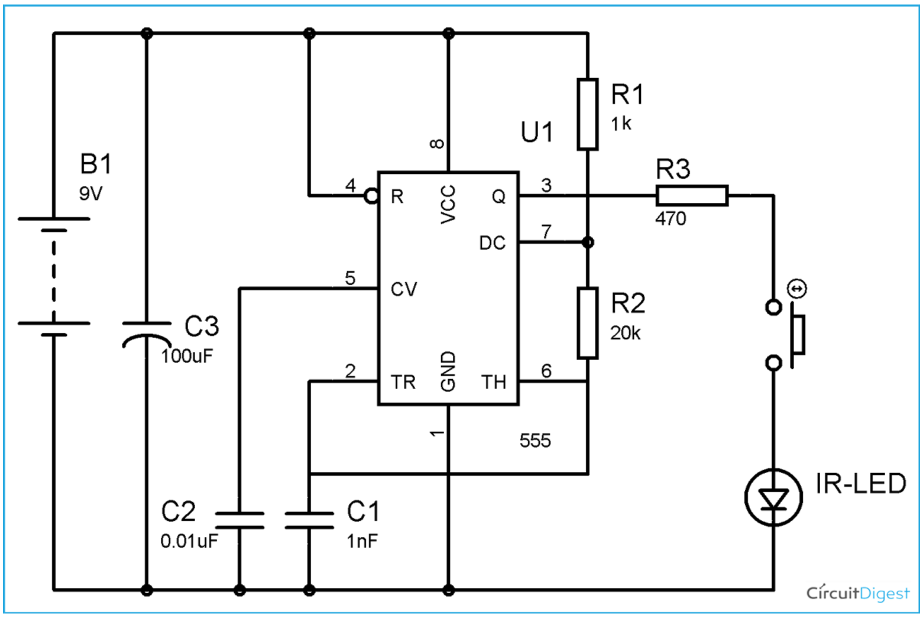

Figure 2.8: Transmitter Circuit Diagram

Here we use the infrared receiver (TSOP) for the receiver, so we need to create an IR (Infrared Ray) modulated at 38kHz. We can use any receiver, but we need to create IR with the frequency corresponding to the infrared receiver. Therefore, we should use the 555 timer in Astable mode (as above on the section on IC 555 mentioned) to oscillate at 38kHz frequency.

In this circuit, the oscillator frequency of 555 timer is decided by resistor R1,R2 and capacitor C1. We use 2 resistor R1,R2 and capacitor C1 to create frequency of approximately 38kHz. It is calculated by the following formula:

$$F = \frac{1.44}{((R1 + 2 * R2) * C1)}$$

PIN 3 of IC 555 (timer) is connedted to IR LED by R3 resistor and push button switch. Whenever we press the button, the circuit will emit an infrared signal modulated at 38kHz. Capacitor C1 is responsible for filtering noise for the circuit.

2.9 Learn about infrared receiver circuit

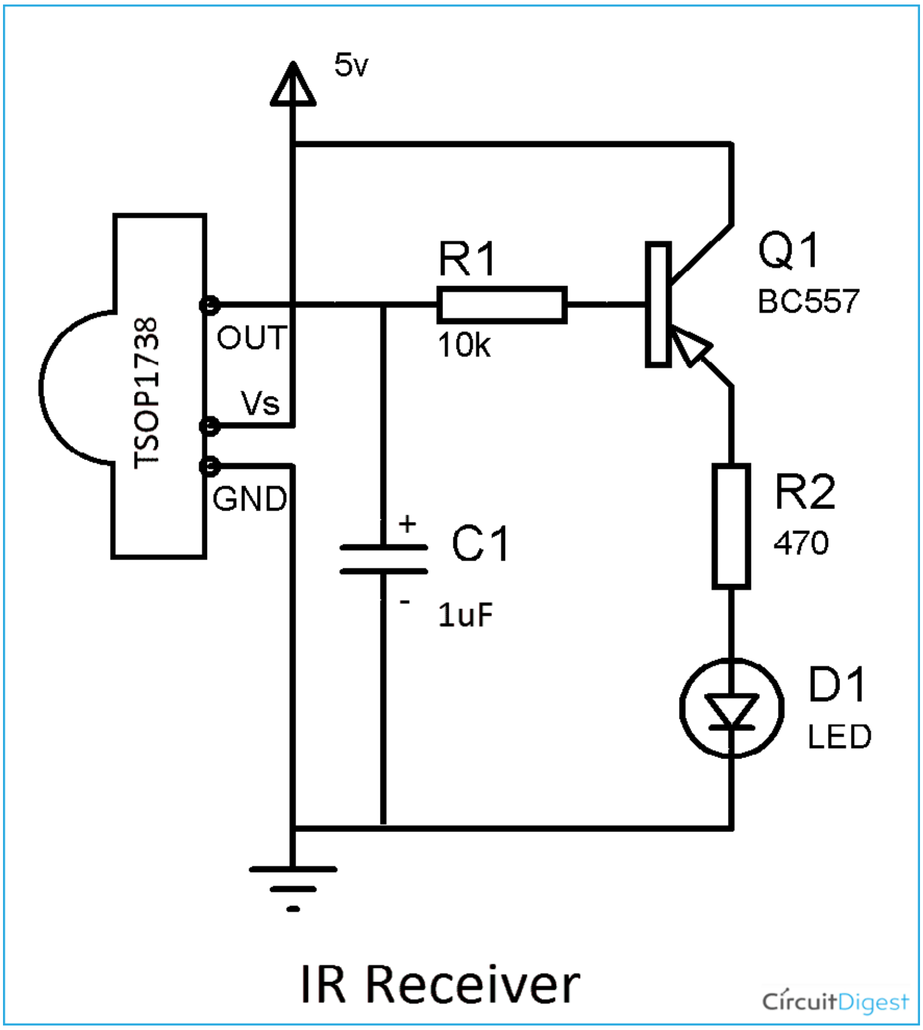

Figure 2.9: Receiver Circuit Diagram

About the receiver circuit is very simple, what all we do is connect a LED to the output of infrared receiver eye 1738 with purpose to check the receiver. Here we use semiconductor light bulb BC557 PNP, the purpose is to reverse the effect of the infrared receiver eye, that mean whenever the output is high, the LED will turn off and vice versa if whenever low, the LED will turn off. PNP transistor work in stark contrast to NPN semiconductor light bulb, it works like a open switch when a voltage is applied to its base and works as a closed switch when there is no voltage as it base. So, usually the output of TSOP still high and transistor works like an open switch and LED will turn off. When the TSOP discovered the infrared, the output will get low and semiconductor light bulb will work like a close switch and LED will turn on. A resistor 10kΩ usually use to provide appropriate deviation for semiconductor light bulb and resistor 470Ω use at LED to limit the current.

2.10 Quickview about relay

2.10.1 Introduction

Relay is a passive electronic components usually use in practical application. When we have problem about wattage and we need high stability, besides can be easily to maintenance.

Relay actually is a switch (also known as K key). But relay different from conventional electrical switch is relay is activate by electric instead of we use the manually is flipped the switch. So, relays are often used as electronic switches. Relay is a switch, so it has 2 status: open and close.

2.10.2 Structure of relay

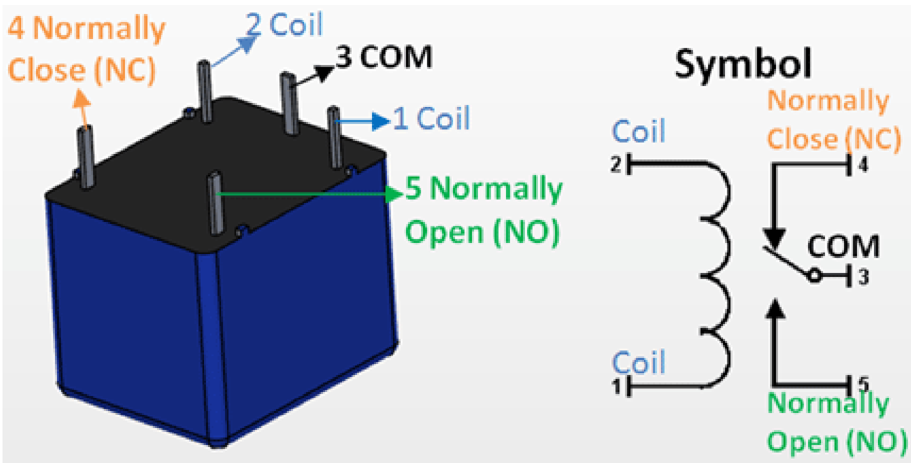

Figure 2.10: Relay's structure

Pin number	Pin name	Description
1	Coli end 1	Used to trigger (on/off) the relay, normally one end is connected to 5V and the other end to ground
2	Coli end 2	Used to trigger (on/off) the relay, normally one end is connected to 5V and the other end to ground
3	Common (COM)	Common is connected to one End of the load that is to be controlled
4	Normaly Close (NC)	The other end of load is connected to NO or NC. If connected to NC, load still connect before activate
5	Normaly Open (NO)	The other end of load is connected to NO or NC. If connected to NC, load still disconnect before activate

Table 2.6: Describe the function of each relay PIN

2.10.3 Schematic diagram of relay and how it works

Relays are most commonly used switching device in electronics.

Before we processed with the circuit to drive the relay we have to consider two important parameter of relay. Once is **Trigger Voltage**, this is the voltage required to turn on the relay that is to change the contact from Common -> NC to Common -> NO. Our relay here have 5V trigger voltage, but you can also find relays of value 3V, 6V even 12V. So select one based on the available voltage in your project. The other parameter is your **Load Voltage and Current**, this is the amount of voltage or current that the NC,NO or Common terminal of the relay could withstand, in your case for DC it is maximum of 30V and 10A. Make sure the load you are using falls into this range.

The above circuit shows a bare-minimum concept for a relay to operate. Since the relay has 5V trigger voltage we have used a 5V DC supply to the end of coli and other end to ground through a switch. This **switch** can be anything from a small transistor to a microcontroller or a microprocessor which can perform switching operating. You can also notice a diode connected across the coli of the relay, this diode is called the **Fly back Diode**. The purpose of

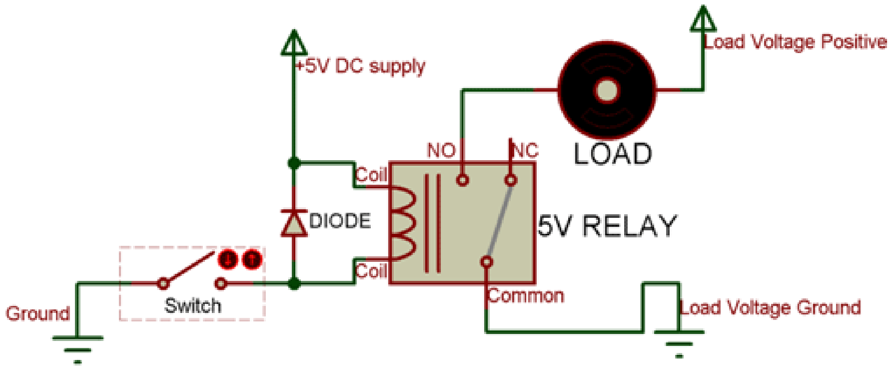

Figure 2.11: Schematic diagram of relay

the diode is to protect the switch from high voltage spike that can produced by the relay coli. As shown one end of the load can be connected to the Common PIN and the other end is either connected to NO or NC. If connected to NO the load remains disconnected before trigger and if connected to NC the load remains connected before trigger.

2.10.4 Featured of 5-PIN 5V Relay

- Trigger Voltage (Voltage across coli): 5V DC
- Trigger Current (Nominal Current): 70mA
- Maximum AC load current: 10A @ 250/125V AC
- Maximum DC load current: 10A @ 30/28V DC
- Compact 5-PIN configuration with plastic moduling
- Operating time: 10msec release time: 5msec
- Maximum switching: 300 operating/minute (mechanically)

2.10.5 Types of relays and how to determine their status

Currently on the market we have 2 main models: the relay closes at a low level (connect negative pole -> relay close), the relay closes at a high level (connect positive pole -> relay close). If the comparision between 2 modules has the same specifications, almost all of its components are the same, except that the transistor of each module. Becasue of this transistor, there are 2 types of relay modules.

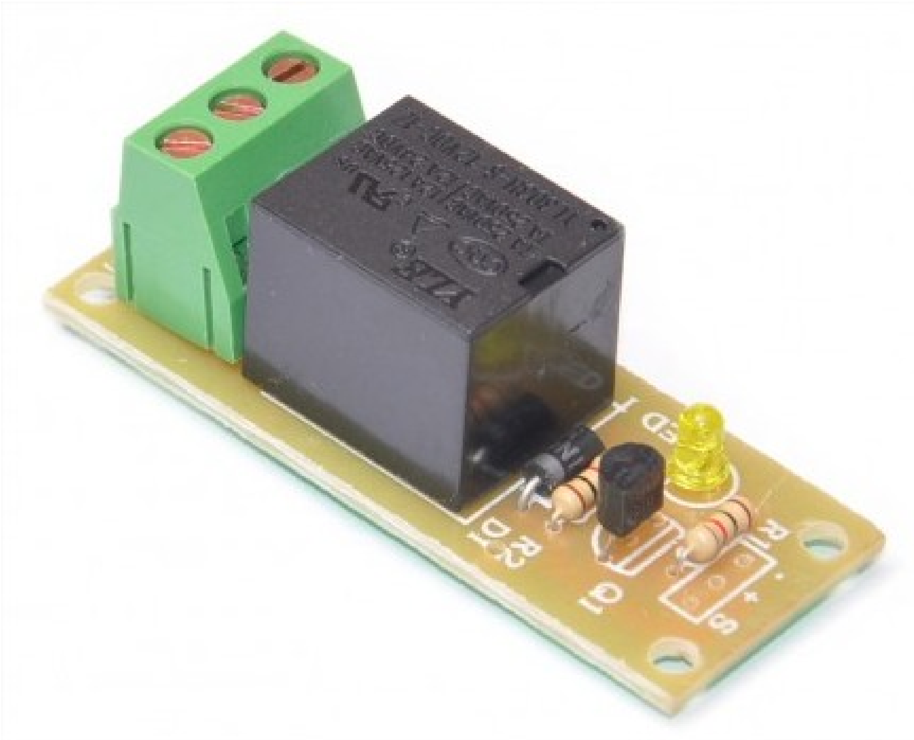

Figure 2.12: High Quality Relay Model

Figure 2.13: Low Quality Relay Model

2.10.6 Application of relay

Relays are widely used and used for a variety of purpose. In which, relays are often used with some basic functions as follow:

- Switching multiple currents or voltage to different loads using a control signal.
- Monitor industrial safety systems and disconnect machinery if safety is ensured.
- And the more practical application, when running on the road you need to turn left, now you will need the flashing signal from the turn signal light, even the click-click. What make that sound is relay.

2.11 Quickview about mini pulse source module

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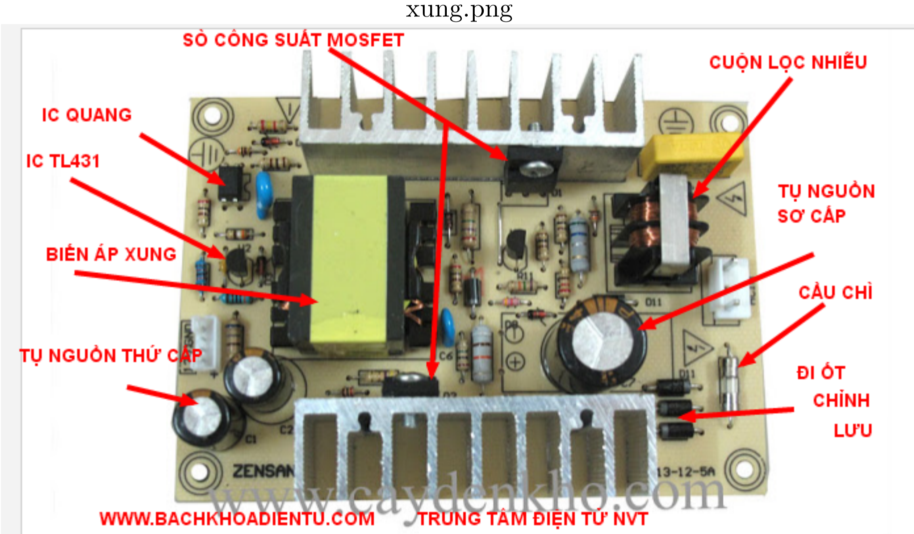

Figure 2.14: The actual pulse source circuit is often used

We have often heard the term "pulse source" a lot, but most of us don't know what it is. It includes any component and its superiority in electronic design. The application of pulse sources is usually very wide, it will appear in devices such as: induction hob, microwave oven, electric cooker, amplifier, hood, electric fan... So what is the source of the pulse? This will be basic information about pulse source.

2.11.1 What is pulse source?

Impulse source is a power supply unit that converts from an alternating current source to a direct current by means of an oscillating mode created by electronic circuits combined with a pulse transformer, and other basic components.

2.11.2 Structure of the pulse source circuit?

Common pulse sources are made up of basic components as follows:

- Pulse transformer: Made from coil wound on a magnetic core similar to the conventional transformer we often use. Pulse transformer usually use ferritic cores and have quite a large capacity, it can work well even in the high frequency range, things that conventional transformer can hardly meet.
- Fuse: the effect of a common fuse to protect the power circuit from short circuit.
- Anti-jamming coil, primary filter capacitor, rectifier diode: these things are responsible for converting the 220V AC voltage into the DC voltage stored on the primary filter capacitor to power the primary winding of the pulse transformer machine.
- Power shell: this is a semiconductor component used as a switch, which can be a transistor, mosfet, integrated IC, IGBT (Transistor with isolation control pole) is responsible for cutting power from positive pins of the primary filter capacitor on the primary winding of the pulse transformer and then dropped to mass.
- Secondary power filter capacitor: it is used to store electrical energy from the secondary winding of the pulse transformer to supply comsumption. We know that when the primary winding of the transformer is continuously switched on by the power cockle, the reciprocal magnetic field appears, which leads to the secondary winding of the transformer. This voltage is rectified through several diodes and then out put secondary filter capacitor to flatten the voltage.
- Optical IC and TL431 ICs: these 2 ICs are responsible for creating a fixed voltage to control the voltage on the secondary side stable as we wish. They will control the switching on the primary winding of the transformer so that the secondary output is satisfactory.

2.11.3 Block diagram and principle of operation of the pulse source

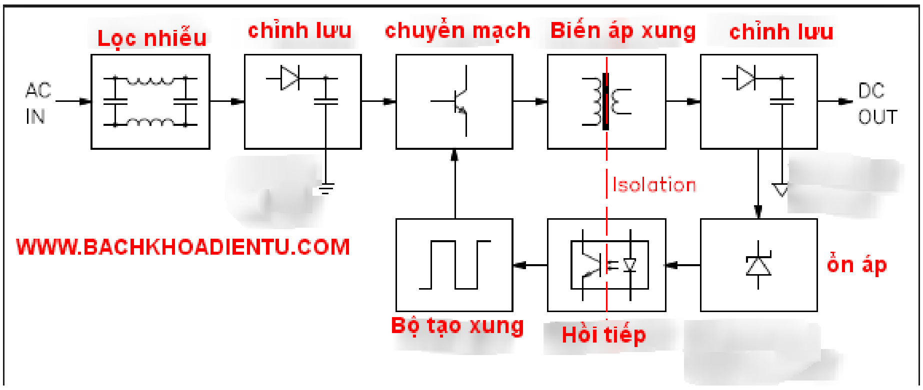

Figure 2.15: Block diagram of pulse source

First the input voltage is from 80V to 220V AC through the noise filter coil and then into the rectifier diode into DC about 130-300V (depending on AV voltage at the input) on the primary filter capacitor. The primary filter capacitor. The primary filter capacitor is responsible for the storage of DC power for the transformer primary pulse operating coil. The common primary filter capacitors will have value such as: 4.7μF-400V, 10μF-400V, 220μF-400V, 10μF-200V.

The primary winding of the pulse transformer is energized according to the high frequency pulse through the semiconductor switching block, which is components such as transistor, mosfet or IGBT (Transistor with isolated control pole). These electrical impulses are generated by a pulse generator or electronic oscillating circuits.

In the secondary winding: the secondary winding of the pulse transformer will have rectifier circuits that give a direct current to power to load. This secondary voltage will be maintained at a certain voltage such as 3.3V, 5V, 9V, 12V, 15V, 18V or 24V thanks to the voltage stabilizer circuit. At the same time, the feedback circuit will take out the voltage signal to put into the oscillator to control so that the oscillation frequency is stable with the ouput voltage as we want. The voltage regulator IC is often used as: 7805, 7809, 7812, 7818. The PIN IC inserted into the feedback circuit is IC431, while the main feedback IC is the Opto couple PC817.

2.11.4 Some basic types of pulse sources

- Buck type: transform the source for a smaller output voltage than the input voltage is Vinout.
- Boot type: for ouput voltage greater than input voltage Vin < Vout.
- Flyback type: indirect power transmission via transformer. Output voltage is greater or smaller than input voltage. And especially from an input, it can produce a lot of output voltage.
- Push-Pull type: also known as push pull. This type of impulse source is transmitted indirectly through a transformer, giving an output voltage smaller or larger than the input voltage. And just like with Flyback type, from one type of input voltage can produce many output voltages.

In this content, we will use a mini pulse source that converts from AC 220V AC to 5V DC and the maximum power is 3W, the design of this circuit uses AC/DC isolation pulse transformer and Anti-interference and feedback machanisms for maximum safety and stability. The specifications of this module are as follows:

Figure 2.16: 5V-3W pulse power model

- Input voltage: 85-256V AC
- Input current: 0.0273A (110V AC) / 0.014A (220V AC)
- Output voltage: 5V DC (error 1%)
- Average output current: 600mA

- Wattage: 3W
- Size: 20 x 30mm

2.12 Remote Controlled circuit

2.12.1 Circuit principle

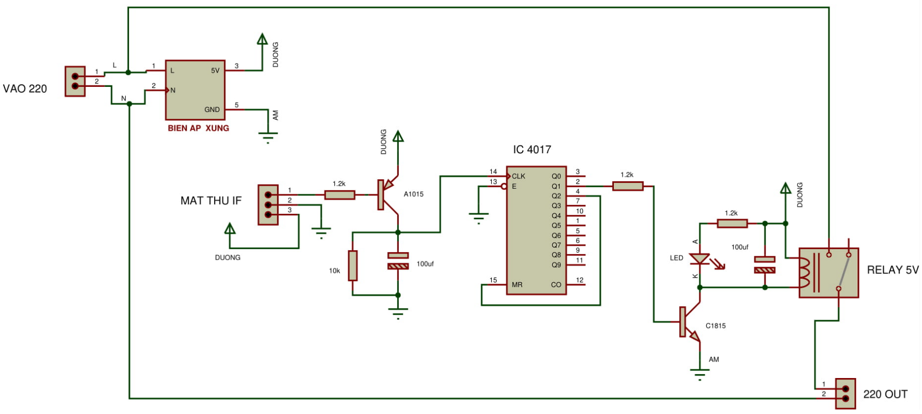

Figure 2.17: Principle remote control circuit

2.12.2 Explain the principle of circuit

The mini pulse transformer converts from 220V AC to 5V DC, the positive and negative positions in the circuit are connected together. When transmitting the signal to the infrared receiver (TSOp) from which TSOP will generate a signal at the signal pin of the infrared receiver, then A1015 transistor leads and fills capacitor C5 according to the principle of the capacitor, the capacitor will discharging through resistor R7 will produce a shock at pin 14 of IC 4017. Therefore, the signal generated from pin number 3 transmits to pin number 2 to a high level. The C1815 resistor is activated to make the relay work in principle. So the load will work with AC voltage of 220V.

Similarly, once we trigger the signal in the infrared receiver again, it is similar to the first time it generates a pulse at pin number 14 of IC 4017, and it will restart the output signal at pin number 2 to low level, C1815 transistor will not lead to a failure of the relay. So the load will not work.

Chapter 3

Construction circuit and results

Chapter 4

Conclude

- The circuit works exactly as the target set.
- Advantages: The circuit is quite simple and easy to do, the principle as well as finding data are quite simple.
- Disadvantages: Using a lot of components, wires (if do it on Vero board), cost is quite a lot, must test on the test board many time to get the desired results.

REFERENCES

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