INFRARED REMOTE CONTROL SWITCH

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ABSTRACT

Imagine the convenience, if we could control different devices at home/industry by using a single PC. Our project aims at the same and could be used to control the printer power, loads & other household electrical appliances. The circuit comprises decoder, inverter, latch & relay driver sections. To control these equipments we are using PC's Parallel port. The program of controlling is written in C language. It is compiled using Turbo C compiler. The project is very efficient in control of real world peripherals.

Keywords: Remote , Controller, Relay, TSOP

I.INTRODUCTION

This Paper REMOTE CONTROLLED SWITCH BOARD is used to switch on/off the Home Appliances by using a standard Remote control. The system is used to switch on/off up to six electrical devices. All the above processes are controlled by the 8 bit Microcontroller AT89S52. The Microcontroller receives the Infrared Signal from the receiver and it decodes and switch on/off the appropriate Device. The Range of the system is unto 10meters. The project can switch on/off electrical devices of maximum load current of 5Amperes. High power loads can also be connected by changing the Relay and the devices will come to the original state after the power failure. The Microcontroller is used receive the Infrared signal from the Transmitter, the received signal is processed by the Microcontroller and according to the signal the corresponding device is switched On/off. Any RC5 remote control can be used to control this circuit.

The remote we use sends a train of bits (0's and 1's) of some fixed length modulated with a 38 KHz infrared signal. The sequence of bits which the remote sends is decided by a particular protocol known as RC-5 protocol. Power Saving Using Time Operated Electrical Appliance Controlling System is a reliable circuit that takes over the task of switch on/off the electrical devices with respect to time. This project replaces the Manual Switching. It has an Inbuilt Real Time Clock which tracks over the Real Time. When this time equals to the programmed time, then the corresponding Relay for the device is switched ON. The switching time can be edit any Time using the keypad.

In other words you can say The PC parallel port is an expensive yet a powerful platform forimplementing projects dealing with the control of real-world peripherals. This port can be used to control the printer as also house hold and other electrical appliances. The computer program through the interface circuit controls the relays, which, in turn, switch the appliances on or off.

II. BLOCK DIAGRAM OF INFRARED REMOTE CONTROL SWITCH

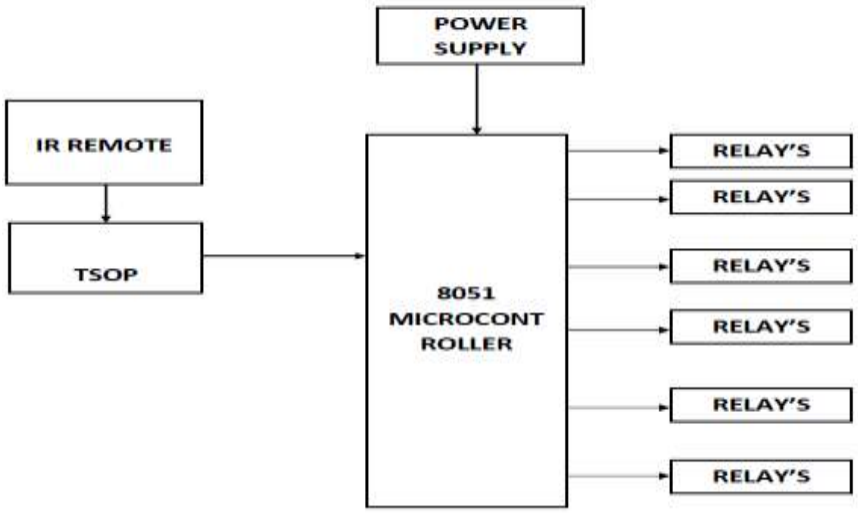

Figure:1.Block Diagram

As seen in the block diagram, our circuit consists of an IR transmitter, an IR receiver, decoder, relay driver IC and relays.

A. IR TRANSMITTER

The IR transmitter used in the circuit is a **TV remote**. As mentioned earlier a remote that follows RC5 Protocol is being used in this circuit. A Phillip's TV remote is a best example for such remotes. As per this, IR signals from the remote are modulated by a carrier frequency of 36 kHz. This is because there are many other IR sources like sun, light bulbs, fire etc. In order to exclude other sources, IR signal is modulated.

B. IR RECEIVER

The IR receiver in the circuit is **TSOP 1736.** These are capable of receiving pulsed IR rays of 36 kHz only and can receive no other frequencies. It receives the signals from the transmitter and retrieves the original modulating signal from the 36 kHz carrier. The front end of this module has a PIN photodiode and the input signal from the remote is passed into an Automatic Gain Control (AGC) stage from which the signal passes into a Band pass filter and finally into a demodulator. The demodulated output drives an NPN transistor. The collector of this transistor forms the output of the module.

C. IR DECODER

The microcontroller **AT89C2051** is used as the IR decoder in the circuit. It is flashed with a program that decodes the RC5 Protocol. It is designed to control the inputs and outputs. The demodulated output from the receiver will be sensed and decoded using this microcontroller. Thus it helps to determine which device is being operated by the user.

D. RELAY DRIVER IC

As we all know **ULN2803** is used as the relay driver IC. It consists of octal high voltage, high current Darlington transistor arrays. The eight NPN Darlington connected transistors in this family of arrays are ideally suited for interfacing between low logic level digital circuitry (such as TTL, CMOS or PMOS/NMOS) and the higher current/voltage requirements of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications**.**

E. RELAYS

A relay is an electrically operated switch. It allows one circuit to switch a second circuit which is completely separated from the first. The output from the driver IC is send to the corresponding relays which thus results in its excitation and gets activated. As a result it controls the corresponding home appliance.

III. CIRCUIT DIAGRAM AND OPERATION

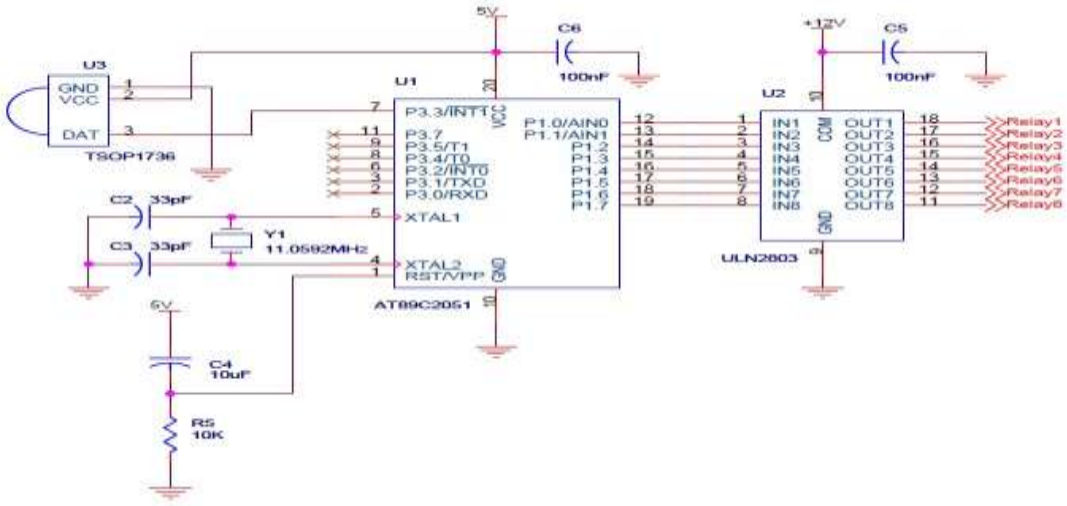

Figure: 2.Circuit Diagram

As this paper as mentioned earlier is aimed at controlling 6 home appliances using a TV remote or any remote supporting RC5 Protocol. It controls the on/off process of the appliances interfaced to this circuit. The devices are operated using the keypads 1-8. It performs the function of an IR transmitter which sends pulsed IR rays after modulating the original signal with a carrier of 36 kHz frequency. These signals are received by TSOP 1736 which is our IR receiver. These are designed to receive signals of only 36 kHz. It senses the received output and demodulates them. Therefore original signals are retrieved after demodulation. The output from the receiver is then sent to the microcontroller AT89C2051. It is programmed so as to decode the RC5 Protocol. It decodes the signals from TSOP1736 and thereby it recognizes the device to be functioned. The inputs and outputs are thus controlled.

The decoded output from the microcontroller is obtained by the relay driver IC ULN2803. It consists of eight NPN Darlington connected transistors (often called a Darlington pair). Here the signals from AT89C2051 are given to the base of the corresponding transistor in the Darlington array. Thus, when a 5V input is applied to any of the input pins (1 to 8), output voltage at corresponding output pin (11 to 18) drops down to zero providing GND for the external circuit. Thus, the external circuit gets grounded at one end while it is provided +Vcc at its other end.

So, the circuit gets completed and starts operating. A total of sixrelays are connected to the output pins of ULN2803. When the relay gets excited from the outputs appearing at the driver IC pins, it gets activated. Thus the coil gets energized and the COM gets connected to the N/O contact and the AC mains circuit gets completed and the appliance starts working.

IV. RC5 PROTOCOL

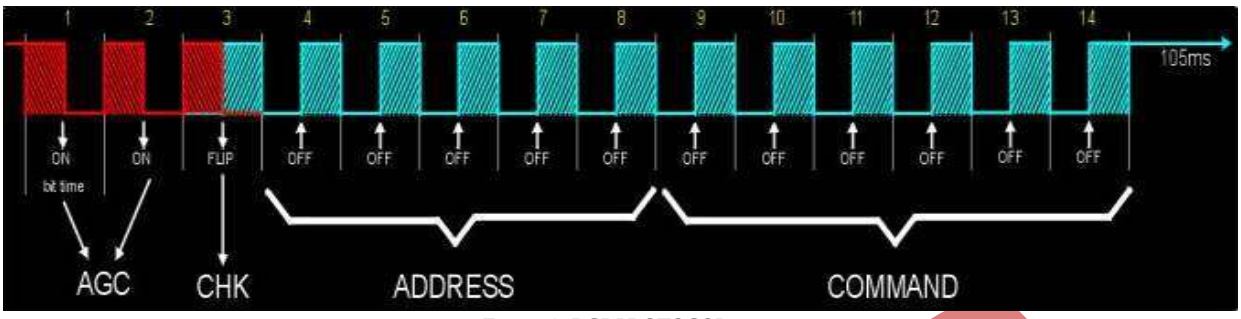

Figure: 2. RC5 PROTOCOL

The basics of the protocol are well known. The handset contains a keypad and a transmitter integrated circuit(IC) driving an IR LED. The command data is a Manchester codedbit stream modulating a 36 kHz carrier. (Often the carrier used is 38 kHz or 40 kHz, apparently due to misinformation about the actual protocol.) The IR signal from the transmitter is detected by a specialized IC with an integral photo-diode, and is amplified, filtered, and demodulated so that the receiving device can act upon the received command. RC-5 only provides a one-way link, with information traveling from the handset to the receiving unit. The 36 kHz carrier frequency was chosen to render the system immune to interference from TV scan lines.

VI.APPLICATIONS & ADVANTAGES

The main application of this circuit is that we can control any appliance by just being in our living room. This is very much helpful for elderly people as well as for those who are unable to walk either due to physical disabilities or due to accidents. This circuit enables us to control appliances in the top floor also. Another major use of our project is that we can turn off the operating devices all together at one shot by just pressing the power button.

Time saving as it is operated by a remote. Controlling all devices from one place. More secure as there is no direct contact with the appliance.

VII.CONCLUSION

Hereby we come to an end of or project "**remote controlling of home appliances".** This project gives us an idea of RC5 Protocol and the microcontroller AT89C2051. This project can be used anywhere either at home or offices. This is also cost efficient. Thus by this attempt of ours the ON/OFF processes of many devices was successfully carried out by just using a TV remote.

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