

Electrical appliances in home control through IR Remote

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Abstract- In this project, we have designed, built a circuit which mainly meet the requirement of control the house appliances via any remote control device that is portable in the periphery of the room. The tool is able to control a load of excessive energy score from remote area. Any system may be made password included through this tool. The device works satisfactorily and it's also taken into consideration to be a cost effective device.

Index Terms- Microcontroller, password protected, home appliances, automatic control.

I. INTRODUCTION

Today, electronics is used in home appliances for wide purposes including the motor regulation of a washing machine, the control of a vacuum cleaner, the light dimming of a lamp or the heating in a coffee machine etc. This pervasion increases rapidly because appliances require enhanced features, easy to built and modify as electronics based solutions become cheaper and more sophisticated. Within this evolution, the microcontrollers (MCU) progressively replace analog controllers and discrete solutions even in low cost applications. They are more flexible, often need less components and provide faster time to market. With an analog IC, the designer is limited to a fixed function frozen inside the device. Remote control facilitates variety of operation around the home or office from a distance such as fan regulators and mains power supply. It provides a system that is easy to understand and also to operate, a system that would be cheap and affordable, reliable and easy to maintain the system of remote control and offers long durability. It adds more comfort to everyday living by removing the inconvenience of having to move around to operate a fan regulator. The first remote control, called “lazy bones” was developed in 1950 by Zenith Electronics Corporation (then known as Zenith Radio Corporation). The device was developed quickly, and it was called “Zenith

Space Command”, the remote went into production in the fall of 1956, becoming the first practical wireless remote control device [1]. Mahmud Shehu AHMED and team introduced remote controlled mains power supply in 2007 and fan regulator in 2006 [2, 3]. Their design was based on some analog and digital components which were less compact and required to design dedicated infrared remote transmitter, besides the system was less flexible to modify for other control applications.

By means of a result much important has been given to this aspect and a range of remote control are prevalent today one of the most common is that which make use of IR radiations at particular frequencies .The circuit is connected to any of the home appliance (lamp, fan, radio, etc) to make the appliance turn on/off from a TV, VCD, VCR, Air conditioner or DVD remote control. The circuit can be activated from up to 10 meter. It is very easy to build and can be assembled on a general purpose PCB.

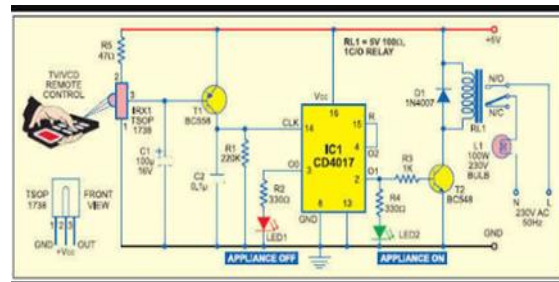


Fig.1 Circuit diagram remote control based on home appliance

II. RELATED WORKS

Authors in [1] proposed an internet based wireless home automation system for multifunctional devices. This paper proposed a low cost and flexible web-based solution. Authors in [2] developed microcontroller based IR remote control signal decoder for home application. The authors only used Sony IR remote as IR remote transmitter. They used ATMEL microcontroller for their

application. Authors in [3] developed a microcontroller based home security system. They designed an IR transmitter section for their work and in the receiver section, they used AT89C51 microcontroller for the work of protection. Compared to this work, we could make every equipment password protected to provide the security facility. Authors in [4] designed remote controlling of home appliances using mobile telephony. They have used X10 technology to carry out the control of home appliances. Authors in [5] developed a cell phone based remote control system to control home appliances and systems. They have used the GSM technology to control home appliances. Authors in [6] presented a design and implementation of SMS based control for monitoring systems. The paper had three modules involving sensing unit for monitoring the complex applications. A processing unit, that is microcontroller and a communication module that uses GPRS modem or cell phone via serial port RS-232. The SMS is used for status reporting such as power failure. Authors in [7] developed a microcontroller based home automation system with security. They have also used ATMEL's AT89S52 microcontroller to control and security purpose. But, their overall system was not cost effective

III. DESIGN APPROACH

The system circuit diagram shown in Fig.2 has been designed around the ATMEL 89C52 microcontroller [8]. It consists of the arithmetic and the logic unit, I/O Unit, control unit and other various components. Microcontrollers are designed in a single chip, which typically includes a microprocessor, certain byte of R/W memory, from 1K to 2K bytes of ROM, and several signal lines to connect I/O lines. We have used ATMEL 89C52 microcontroller in our project.

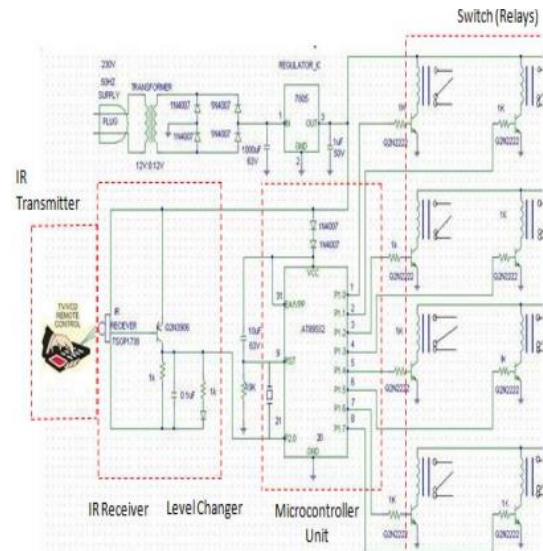


Fig.2 Experimental setup of the system

One of the 8051 based microcontrollers is the most popular and widely used chip named as AT89C51. But because of the higher size of ROM as well as RAM needed in our project, we have used AT89C52, which consists of 8KB of ROM and 256 bytes of RAM. The AT89C52 provides the following standard features timer/counter, five vector interrupt architecture with two levels, full duplex serial port, on-chip oscillator and clock circuitry, In addition, the AT89C52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes [8]. These features of ATMEL 89C52 make the project a low cost, efficient and reliable. In our project, we have used crystal oscillator of 12MHz for the proper operation of the device. TSOP-1738 receiver module is used to receive the IR signal from transmitter. When any IR signal is transmitted, microcontroller matches the transmitted bit pattern with the pre-defined bit pattern. In our present system, 12v:0v:12v transformer & IC-7805 are used to bias the microcontroller. Thus, it remains connected with the AC mains.

A. IR remote transmitter

In present system we have used Sony IR remote which use 12-bit SIRC protocol as shown in fig.2a [4]. The code starts with a header of 2.4ms followed by 7-bit command and 5-bit device address in which least significant bits (LSB) are transmitted first. Then the Commands are repeated every 45ms for as long as the key on the remote control is held down. The address and commands exist of logical ones and zeros. A space of 600µS or 1T and a pulse of 1200 µS or 2T form logical

one. A logical zero is formed by a space of 600 μ S and pulse of 600 μ S as shown in fig.3b.

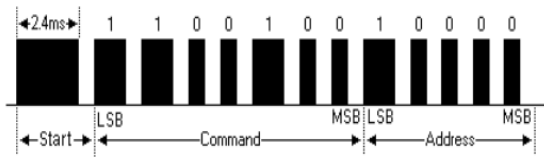


Fig.3a

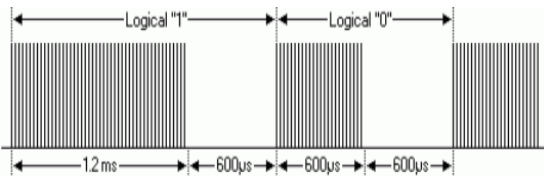


Fig.3b

Fig. 3 IR transmitter protocol

B. Switch

Microcontroller will give the decision about which load has to be driven depending on the pressed button from remote. Any load of any power rating can be driven using this project. In case of load of high power rating, the relay switch has to be changed.

IV. SYSTEM ANALYSIS

This simulation architecture is used for driving several loads using remote control. In our work, as a part of trial, we implemented our project to drive a tube light, fan and multiplug. Using multi-plug, we were able to drive various loads (rated: 230v (50 Hz), 5A). Meanwhile, we have increased load driving capability from 3 to 8 by changing the program in microcontroller. To drive loads of 1 MW, we just changed the relay configurations. So, to drive loads of several MW, the project does not depend on the rating of power. Rather, changes in relay configurations make the project possible to drive loads of any power ratings. A part from these, we have also fixed a display board on the project to provide timer facility for driving different loads. Using this timer facility, we can fix a specific time (say 15 min, 30 min etc.) for which the load will remain on/off. If anyone wants to drive a load at a particular time, then the person can do it using the timer facility through the remote control. In short, load on/off can be made fully time dependent through this project using the remote control.

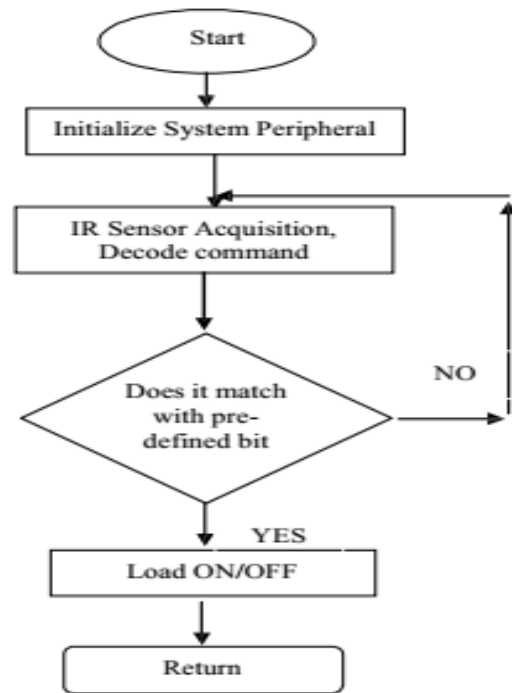


Fig. 4 Flow chart of proposed system

When the device is powered –up, the initialization part of the device software biases various on-chip peripherals such as interrupts, port, timer etc.

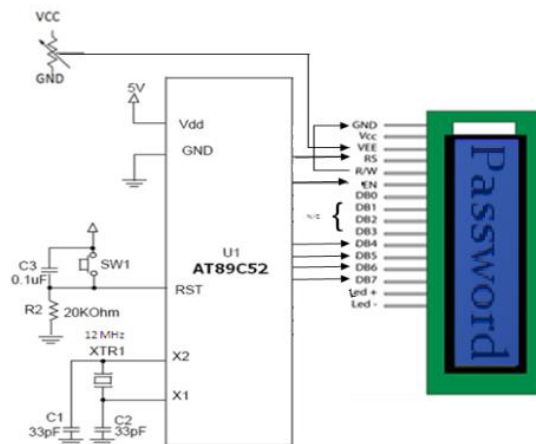


Fig.5 Microcontroller interfaced with 16x2 LCD.

Our project can also protect any equipment to turn on/off instantaneously. If any user wants to make his equipment password protected, then he just needs to ON the password protection option through the display board (LCD). The user can specify any password for his equipment. In this case, other user will not be able to turn ON the equipment without knowing the password. Now, if the user wants to withdraw the password protection option, then he can also do the same.

V. CONCLUSION

In our work, we annoyed to develop an automatic control system which is not reliant on on the power rating if the load. Timer facility of the project provides an extra advantage to the user. Timer facility allows the user to on/off the load for any specific time. Our target is to develop an automatic control system for home appliances where the project will be able to decide to turn off all the loads after leaving the room. In this project, the user can be able to get the security facility. For instance, in case of fire in house, the security system will provide an alarm.

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