

# CONTROLLING ELECTRONIC DEVICES AND APPLIANCES USING A REMOTE CONTROL

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## ABSTRACT

Having the ability to control various electronic items and appliances inside or outside of the house wirelessly is a huge convenience and can make life much easier and safer. In this study, a circuit is proposed for controlling electronic items and appliances by using a remote control. For the wireless communication, a 433 MHz radio frequency (RF) module has been used. A four channel encoder/decoder pair (HT12E/HT12D) and PIC microcontrollers have also been used for the implementation. A RF remote control is used to turn ON / OFF different devices independently and the outputs from the receiver can drive relays connected to any 230 V household appliances such as hot plates, heaters, irons, fans and switches. The remote control utilizes a LCD display to show the status of each switch and it provides long range operating facility and works even through the walls. Therefore, by using this remote control, it is easy to turn ON a particular device when needed and turn OFF it on time without reaching it. Hence, electricity consumption can be saved and any risk from some electrical equipment can be overcome.

**Keywords:** *Electronic appliances, Remote Control, RF module, Encoder, Decoder*

## 1.0 INTRODUCTION

There are several instances where wireless communication is of utmost importance for remote controlling purposes. When consider about Infrared (IR), it can be used for operating a device wirelessly only from a short line-of-sight distance. Also for controlling switches via Bluetooth, data is transferred between two Bluetooth enabled devices and a Bluetooth module is very expensive<sup>1</sup>. Therefore, use of radio frequency is a very ideal and a cost effective solution for wireless communication. For the design implemented in this study, a RF module was used and controlling of appliances is done from a central point.

The device is user friendly since LCD displays the status. Due to possibility of using RF frequency over a wide range, the device can operate any appliance at a certain distance.

## 2.0 EXPERIMENTAL

The block diagram of the proposed remote controller and receiver is as shown in Figure 1.

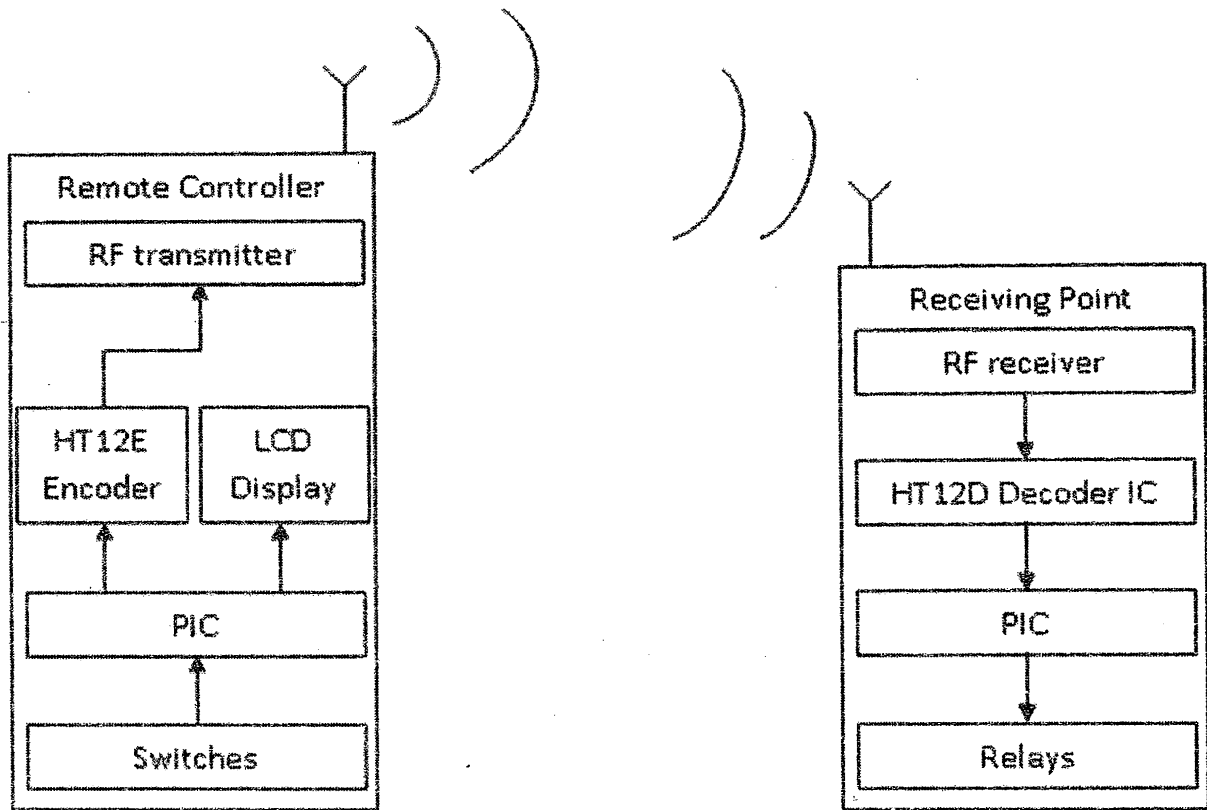


Figure 1: Block diagram of the remote control and receiving point

At the remote control, the input switches are connected to the microcontroller and PIC gives a four bit output to the encoder IC while displaying the status of the switches on LCD display. Then, RF transmitter module transmits the signal through 433 MHz frequency. At the receiving point, the RF receiver receives a signal and decodes it from decoder IC and gives four bit input to the PIC. Relays are connected to the electronic items and appliances and are operated according to the input signal of the transmitter<sup>2,3,4</sup>.

## 3.0 RESULTS AND DISCUSSION

With the use of the 433 MHz, RF module the wireless communication is possible for long range of up to 50 m. This can be improved to control any number of devices from a

distance place. The receiving point acts like a hub and it receives signal and directs to the corresponding output device through the relay. These kinds of items are useful to keep home safe and to support the elderly and the disabled people to use and control electronic items and appliances. The LCD which is used at the transmitter displays the status of each and every switch and by using it, electronic items can be turned ON/OFF without reaching it. By using this type of equipment, electricity consumption can be saved and the risk from some of electrical equipments can be minimized.

Currently there are already available similar units for this and most have used IR (Infrared) and Bluetooth. Both technologies are useful only for communication between devices in relatively close proximity to one another<sup>5</sup>.

IR uses light for data transmission and it requires a direct line of sight between communicating devices. Due to that, IR is most effectively used by devices that remain close to one another. The effective range for IR wireless is very short, generally no more than five meters. An IR system can work well as long as there are no obstructions between remote and the equipment<sup>5</sup>.

Bluetooth wireless uses the particular frequency (2.4 GHz) for data transmission from device to device. Bluetooth has a maximum range of 10 m. This kind of application requires Bluetooth modules for the transmitter and receiver but they are very expensive and the connections between modules are little bit complicated<sup>6</sup>.

Therefore radio frequency is the most suitable technique for this kind of application because RF provides long range operating facility and it works even through the walls. And also, cost of using RF is cheaper.

#### **4.0 CONCLUSION**

The specific identification code for each and every switch is defined by the PIC microcontroller and also it is used for increasing the number of inputs and outputs to the encoder /decoder ICs<sup>7, 8</sup>. The specialty of this remote control system from other systems is the wide range of coverage as well as the low cost.

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