International Journal of Computer Sciences and Engineering Open Access
Research Paper Volume-4, Special Issue-6, Aug 2016 E-ISSN: 2347-2693

Advance Remote Control Home Appliance Switching System Using Radio Frequency and Bluetooth

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Available online at: www.ijcseonline.org

Received: Jun/26/2016 Revised: July/08/2016 Accepted: July/26/2016 Published: Aug/12/2016

***Abstract*—** As the world gets more and more technologically advanced, we find new technology coming in deeper and deeper into our personal lives even at home. Modern houses are gradually shifting from conventional switches to wireless controlled switches. This is the advance switching system in today's technology. In this paper, we present the design and implementation of a low cost but flexible home automation system using Radio Frequency and Bluetooth. We are controlling our home appliance using a simple circuit, which consists of RF transmitter (TX02) and RF receiver (ROHS) and also with Bluetooth which can transmit and receive. It is Atmega 8 Microcontroller based circuit. This system is designed to be scalable allowing variety of devices to be controlled with minimum change to its core.

***Keywords*—** *Wireless monitor, RF Trans Receiver mode, Bluetooth mode, AVG Microcontroller.*

I. INTRODUCTION

We have been working on developing a prototype with hardware and software segments for supporting the idea of a wireless radio frequency controlled home appliance switching system and also with a Bluetooth device. For this project we use a Bluetooth module and a radio frequency module with transmitter and receiver section and we use two microcontrollers, one is for transmitter and another for receiver and control system, as it is wireless system so we can control our home appliance away from switch board. So it is very easy to control in modern technology. Remote control for home appliances is an absolute necessity in our fastpaced life. As a result, much important has been given to this aspect and a range of remote controls are preva lent today. One of the most common is that which makes us e of RF radiations at particular frequencies. Our product is a Remote Operated Home Appliance or Remote controlled H ome appliance. The circuit is connected to any of the home appliances to make the appliance turn on/fan, bulb, tube lightetc.The circuit can be activated from up to 10 meters. It is very easy to build and can be assembled on a general-pur pose PCB.

II. DESIGN ISSUES AND CONSTRAINTS

A. Arduino

Arduino is a software company, project, and user community that designs and manufactures computer open-source hardware, open-source software, and microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices.

B. ATMEGA 8 Microcontroller

The ATmega8 is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8 achieves throughputs approaching 1 MIPS per MHz, allowing the system designed to optimize power consumption.

C. RF Module

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK).

D. Bluetooth module

Bluetooth is a wireless technology standard for exchanging data over short distances from fixed and mobile devices, and construction personal area networks (PANs). Bluetooth is a worldwide standard for wireless connectivity. Bluetooth technology facilitates the replacement of the cables used to connect one device to another, with one universal short range radio link operating in the unlicensed 2.45 GHz ISM band [5].

III. WORKING MODULE

In Remote Controlled Switching System is the basic concept of Home Automation System where dissimilar home appliances are operated remotely with the use of various wireless technologies like RF, IR, Bluetooth, DTMF, and so on. This concept of remote operation is exceptionally helpful for physically disabled persons, elders and other patients when frequent switching is required. This Remote Controlled Switching System in home reduces human efforts to turn the switches on and also conserves electrical energy.

Here we can use the unconventional remote control technology for controlling the home appliances easily without using the fixed wall switch boards. RF remote control technology consists of RF transmitter circuit and RF receiver circuit. The RF transmitter circuit consists of a 9V battery that provides power supply to the RF remote. The load switches or switches of home appliances are interfaced to the microcontroller used here. Based on the switch or push button pressed, the microcontroller sends command signals to the encoder block. This data is encoded and transmitted through the antenna of the RF transmitter. The data receiver from the transmitter is received by the RF receiver, decoded by the decoder and then fed to the microcontroller used in the receiver section. Based on the data received, the microcontroller sends command signals to turn on or turn off the home appliances.

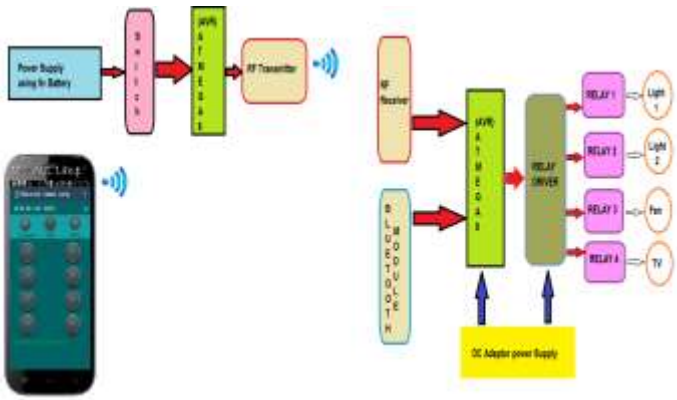


Fig 1: Block Diagram of overall module

a) Circuit Description

The circuit of this project utilizes the RF module (Tx/Rx) for making a wireless remote, which could be used to drive an output from a distant place. RF module, as the name suggests, uses radio frequency to send signals. These signals are transmitted at a particular frequency and a baud rate. A receiver can receive these signals only if it is configured for that frequency.

A four channel encoder/decoder pair has also been used in this system. The input signals, at the transmitter side, are taken through four switches. The circuit can be used for designing Remote Appliance Control System. The outputs from the receiver can drive corresponding relays connected to any household appliance. This radio frequency (RF) transmission project employs Amplitude Shift Keying (ASK) with transmitter/receiver (Tx/Rx) pair operating at 434MHz. The transmitter module takes serial input and transmits these signals through RF. The transmitted signals are received by the receiver module placed away from the source of transmission.

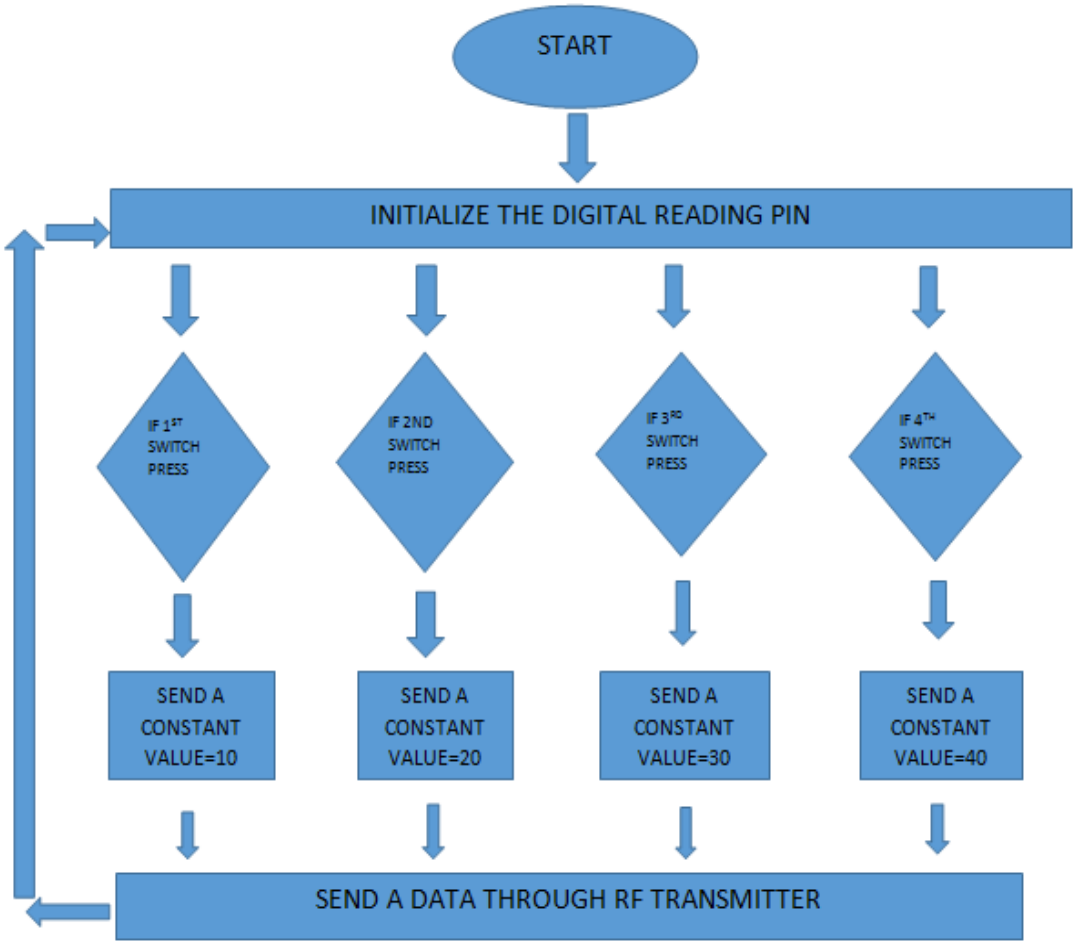
The system allows one way communication between two nodes, namely, transmission and reception. The RF module has been used in conjunction with a set of four channel encoder/decoder ICs. The encoder coverts the parallel inputs (from the remote switches) into serial set of signals. These signals are serially transferred through RF to the reception point. The decoder is used after the RF receiver to decode the serial format and retrieve the original signals as output.

b) *Transmitter Circuit*

In the transmitter circuit, we are using

- A bread board.
- A microcontroller (AT mega 8).
- A 9v battery used as power supply.
- 7805 IC voltage regulator, which converts 9v to 5v, which gives constant 5v output.
- This 5v output is connected to the RF transmitter.
- Push button switch for power supply.
- 4 switches for giving four different task commands.
- Crystal oscillator and Ceramic capacitor for giving 16MHz frequency externally to the microcontroller.
- LEDs, to describe the state, after the switch is pressed.
- RF transmitter module, which works on 433MHz frequency, it is connected to the microcontroller with the help of dateline. When the microcontroller sends command signals to the encoder block, this data is encoded and transmitted through the antenna of the RF transmitter.

c) Transmiiter flow diagram



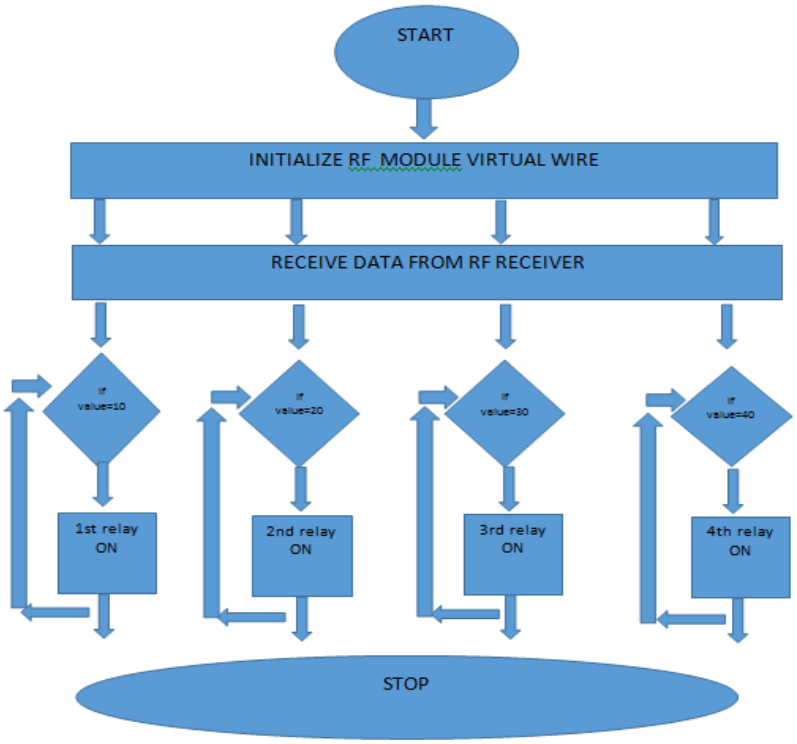
d) Receiver Circuit

In the receiver circuit, we are using

- A bread board.
- A microcontroller (AT mega 8).
- 4 relays of 5v, operates any load of 220v- 5A.
- An adapter as power supply of 5v, in place of battery. Adapter is used because, this receiver circuit will be fixed within the switch board and hence battery has no significance here. This adapter gives power supply to microcontroller, relay, and the RF receiver module.
- Electrolytic capacitor, which acts as voltage filter.
- 4 transistors, which act as current buffer. Here it is used to supply extra current to drive the relays. This is because microcontroller gives maximum 10 mA current which is not sufficient to drive a relay. To drive a relay 100 mA current is required. Hence here we use n-p-n transistors which control the relays. Here input is forward biased and output is reversed biased. Hence this transistor operates in active region.
- RF receiver module operates as 5v, connected to the microcontroller through a dateline. The data receiver from the transmitter is received by the RF receiver, decoded by the decoder and then fed to the microcontroller used in the receiver section. Based on the data received, the microcontroller sends command signals to turn on or turn off the home appliances.

LED, explains the receiving state.

e) Receiver flow diagram



f) Circuit Diagram

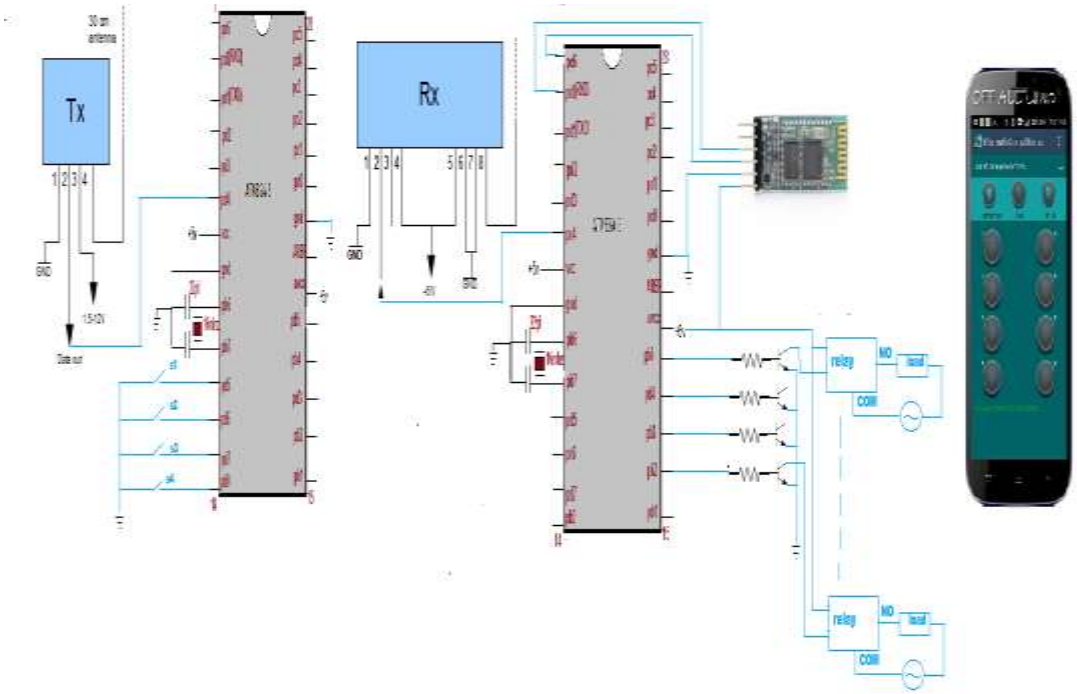
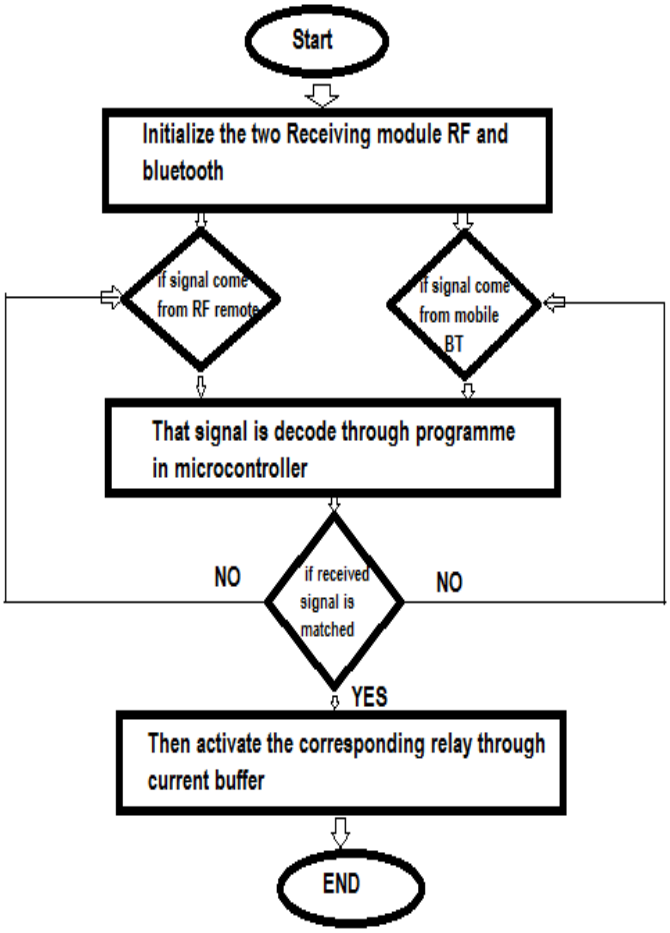


Fig 2. Circuit diagram of the overall module

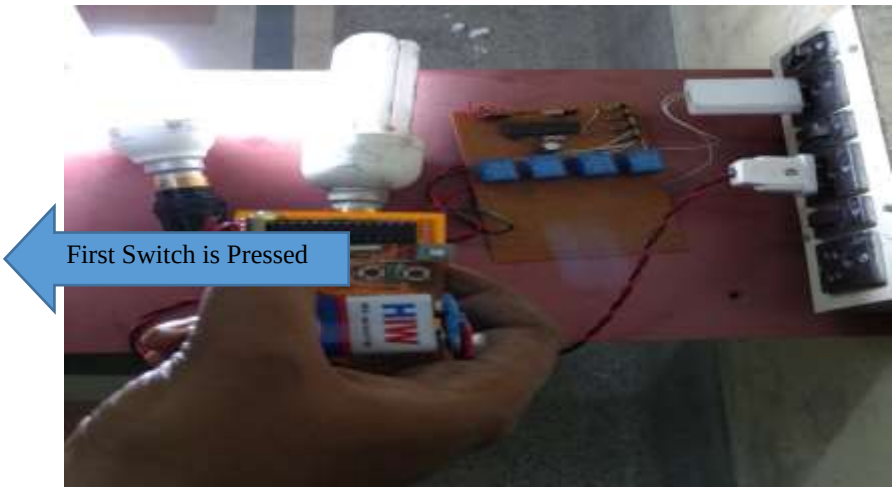
IV. FLOW DIAGRAM AND HARDWARE IMPLEMENTATION

a) Flow Chart

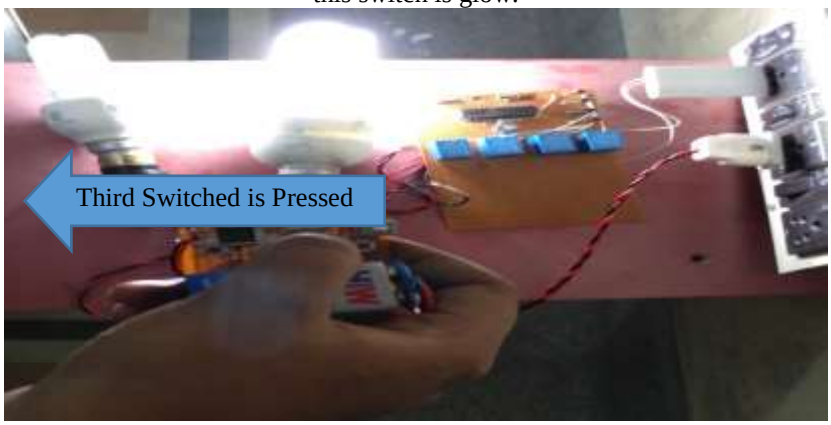


b) Hardware Implementation and Output

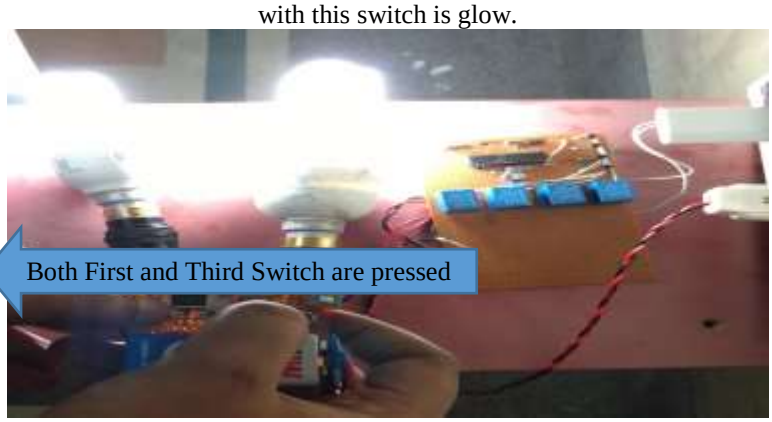
c) Output



After giving the power supply to both transmitter and receiver when the first switch is pressed, the bulb which is connect with this switch is glow.



After giving the power supply to both transmitter and receiver when the third switch is pressed, the bulb which is connecting with this switch is glow.



IV. CONCLUSION

In this paper we have introduced design and implementation of a low cost, flexible and wireless solution to the home automation. The power line devices to control from the radio and Bluetooth communication was a unique study, which concentrated on finding out how a smart home we have considered would function in everyday life and what kinds of functionality it should provide to its user, this instrument can control appliances from anywhere around the 10 meter periphery and very much compatible & easy to handle by any age persons. In future it can be modified

through speech recognize by android phone and it sends through Bluetooth to our receiving target device.

VI. REFERENCES

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