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Home Appliance Controller Based on GSM & IR Technology

Raj kumar Mistri[1], Mrs. Nikhat Anjum[2], Shiulee Hembrom[3], Shemer Surin[4], Sanjiv Kr. Choudhry[5]
[1,2]*Assistant Professor*, [3,4,5]*B. Tech Scholar*,
[1,2,3,4,5] *Dept. of ECE, RTC Institute of Technology, Ranchi*

Abstract: ***In today's era, the ease of life and simultaneous conversion of energy is most demanding thing. This should be the required contribution for every person for making a better world. In our proposed module we have designed a module which can control maximum four home appliances such as Bulb, TV, AC, Cooler, fan etc. via SIM900A module through SMS and Remote through infrared technology. This project is targeted for applications in conventional homes for people with disabilities or for elderly. Our proposed module consist mainly two sections TX and RX. Our RX section of proposed module is very efficient and at the same time power consumption is very less. This module can be used efficiently at home, offices, college, school and industries. Our main objective of this project is to design a circuit that can control home appliances using SMS and infrared technology.***

Index Terms: Arduino, SIM900A GSM, IR detector and Relay

I. INTRODUCTION

The information is transferred in both short and long distance. The project entitled "HOME APPLIANCE CONTROLLER BASED ON IR & GSM" is a wireless device use to long-range communications, that are impossible or impractical with the use of wires. This is commonly used in the telecommunication industry to refer the telecommunication systems (e.g. radio transmitter and receiver, remote control etc.) which use some form of energy (e.g. radio wave, acoustic energy etc.) to transfer information without the use of wires.

II. OBJECTIVE

The main objective of this project is to design a circuit that can control home appliances using Bluetooth, infrared technology and GSM technology. The project is targeted for applications in conventional homes for people with disabilities or for elderly. The nature of this project will provide these people desired comfort in their own home and further increase their productivity in their everyday lives. By using this circuit, we can reduce human efforts and save time. The circuit can be operated from almost anywhere.

III. EXISTING SYSTEM

There are two ways of connecting GSM module to arduino. In any case, the communication between Arduino and GSM module is serial. so, we are supposed to use serial pins of arduino (Rx and Tx). So we connect the Tx pin of GSM module to Rx pin of Arduino and Rx pin of GSM module to Tx pin of Arduino. Now connect the ground pin of arduino pin of GSM module. Now we load different programs to communicate with GSM module and make it work.

A. Booting the Gsm Module

1) Insert the SIM card to GSM module and lock it.
2) Connect the adapter to GSM module and turn it ON.
3) Now wait for some time and see the blinking rate of 'status LED' or 'Network LED'.
4) Once the connection is established successfully, the status/network LED will blink continuously every 3 second. We may try making a call to the mobile number of the sim card inside GSM module. If we hear a ring back , the GSM module has successfully established network connection.

IV. PROPOSED SYSTEM

Our proposed system consists of Arduino Uno, IR detector, SIM900A GSM, relay and bulb. Our proposed system block diagram is in fig.1.
Our proposed system consist transmitter part is also. We are having two transmitter (1) TV remote & (2) Mobile for SMS.

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Here we have designed the proposed system to control two number of home appliances. Both can be controlled by any of transmitter. TV remote key '1' is used to control first home appliance & TV remote key '2' is used to control second home appliance. Similarly we have used '*ON1#' & '*OFF1#' [for SMS] to control first home appliance & '*ON2#' & '*OFF2#' [for SMS] to control second home appliance.

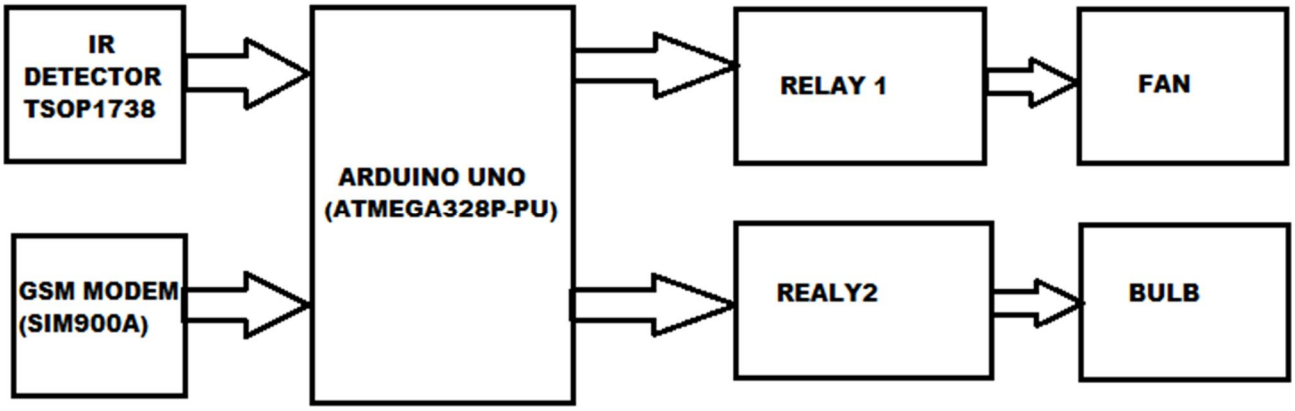


Fig.1 Proposed system block diagram

V. MODULE / COMPONENT DESCRIPTION

A. SIM900A MODULE

This is an ultra compact and reliable wireless module. The SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mmx24mmx3mm, SIM900A can fit in almost all the space requirements in user applications, especially for slim and compact demand of design[4].

B. Infrared Technology

Infrared (IR) is invisible radiant energy, a type of electromagnetic radiation with longer wavelengths than those of visible light, extending from the nominal red edge of the visible spectrum at 70nm(frequency, 430THz) to 1mm(300GHz), although people can see infrared upto atleast 1050nm in experimentally. Infrared technology was developed by an astronomer, Sir William Herschel. The primary source of infrared radiation is heat or thermal radiation, any object such as an ice cube, emit most of its energy in the infrared form. Infrared technology is used in various places like industries, scientific purpose and medical applications[1].

C. Arduino Uno

Arduino is an open-source platform used for building electronics project. Arduino consists of both a physical programmable circuit board and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins(of which 6 can be used as PWM outputs), 6analog inputs,a 16MHz quartz crystal, a USB connection, a power jack, an ICSP(ICSP) header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started[3]. The ATmega328 on the Arduino Uno comes preprogrammed with a boot loader that allows you to upload new code to it without the use of an external hardware programmer.

D. Relay

Relay is an electronics device which is used to isolate two circuits electrically and connect them magnetically. Relay can be used to interface between an electronic circuit to a high voltage electric circuit based on the principle of electromagnetic induction for example a 230V AC main can be switched be a relay operated 5V battery. In this way we can use relay circuit to drive our above said appliances efficiency according to our requirements. Input section of a relay has a coil which generates magnetic field with

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implementation of a very small voltage from an electronic circuit, called the operating voltage. Commonly used relay with operating voltage are-6V, 9V, 12V and 24V. There are mainly three connectors in a basic relay – Normally Open (OC), Normally Closed (NC) and Common (COM). At NO input state COM is connected to NC. At applied operating voltage coil gets energized and the COM make contact to NO. Depending on different change over contact different relay configuration are available in the market such as- SPST, SPDT, DPDT, etc. Here in our proposed Rx part we have used SPDT Relay.

Program to test IR detector & GSM modem are as follows

```
#include <IRremote.h>
int RECV_PIN = 11;
IRrecv irrecv(RECV_PIN);
decode_results results;
void setup()
{
  Serial.begin(9600);
  irrecv.enableIRIn();
}
void loop()
{
  if (irrecv.decode(&results))
  {
    Serial.println(results.value, HEX);
    irrecv.resume();
  }
}
```

```
#include <SoftwareSerial.h>
int incoming_char=0;
SoftwareSerial cell(2,3);
void setup()
{
Serial.begin(9600);
cell.begin(9600);
pinMode(13, OUTPUT);
delay(1000;
}
void loop()
{
  if(cell.available()>0)
  {
     incoming_char=cell.read();
     Serial.write(incoming_char);
  }
  if(Serial.available()>0)
  {
    incoming_char=Serial.read();
    cell.write(incoming_char);
  }
}
```

VI. CONCLUSION /FUTURE SCOPE

This project is user friend and easily implemented because of its wireless communication standards. Nowadays, almost have mobile phone in their pocket and TV remote at their home so anyone easily used our proposed module at their home after installing it. It is also easy to install this module through the switch board. This is very useful in everywhere like school, college, companies, industries and many other places to control any kind of electrical equipment. This system has very low power consumption and also has very low cost.

A. It can be used as

1) Controlling any home appliances
2) Controlling room temperature
3) Recording our favorite TV program when we are outside from our home by SMS

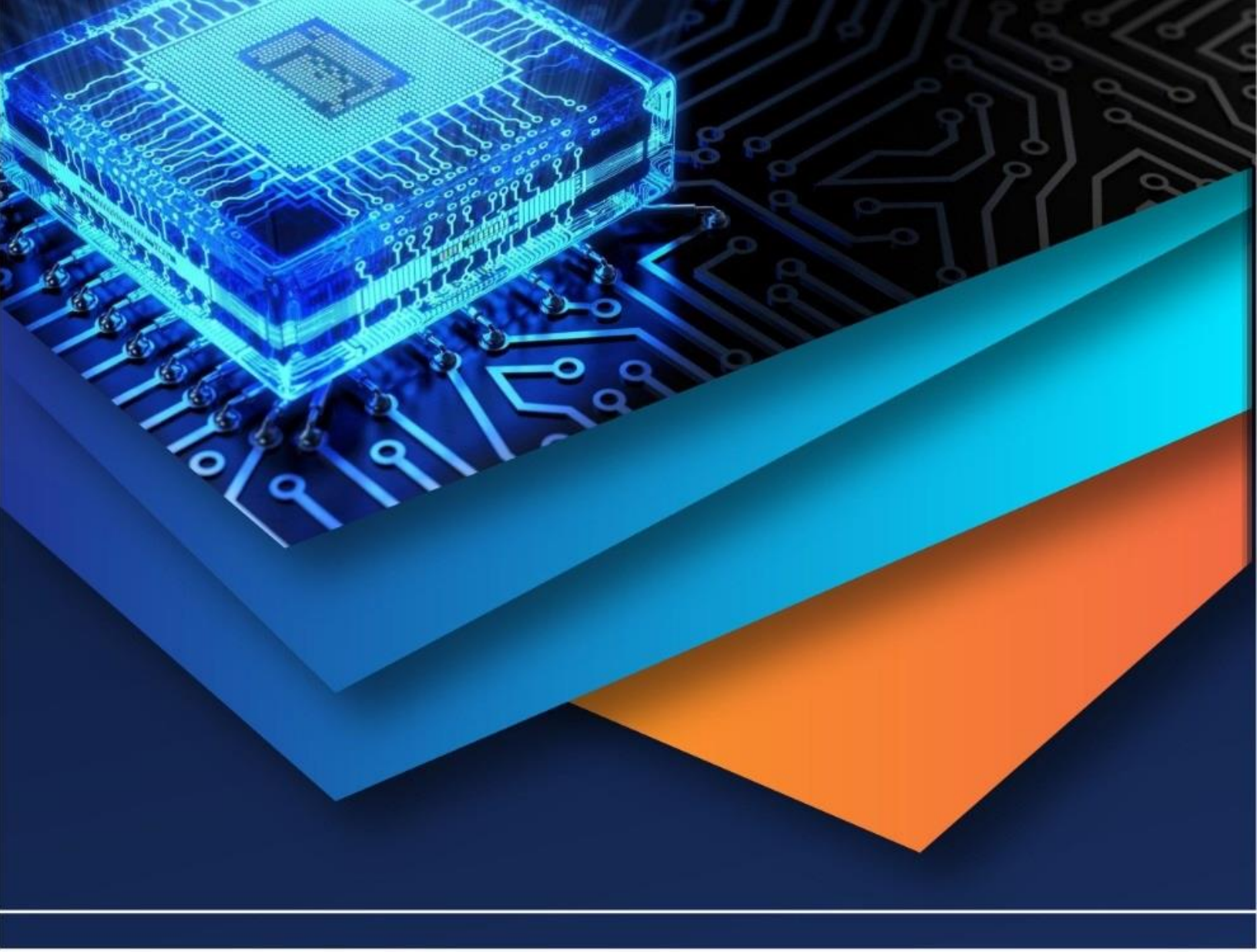
VII. ACKNOWLEDGMENT

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