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Smart home automation system using IR, Bluetooth, GSM and Android

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ABSTRACT

The misuse of AC appliances is very common in this busy life as people tend to forget to switch off the appliances while staying away from the house. In home automation, the controlling of household appliances and residential house features like curtains and gates etc. is done automatically or semi-automatically. The web application also provides a view of the house but the user can face some troubles regarding it as the user needs to use the web every time he/she wishes to view the home appliances' status. An easy method to control the home appliances using the android app is introduced that uses IR remote, Bluetooth and GSM rather than the traditional method of switches has been portrayed in this paper. Thus, to make an ordinary person understand the new technologies and to make the system as simple as it can is the sole motivation behind this system's development. The control and automation of home appliances through mobile applications in remote areas and its implementation is the result of this research.

Keywords: GSM (Global System for Mobile Communication), SMS (Short Message Service), HAS (Home Automation Service), IR (Infrared Radiation), Bluetooth, Android, App Inventor.

1. INTRODUCTION

Smart and secure ways of living are being adopted by us which is being provided by automation and android phones. Light, appliances, heating and cooling systems and electrical outlets are connected to a remotely controllable network called home automation. In the present scenario, automation system provides control over electrical appliances and the status back to the android.

Domotics is another name of home automation. The controlling and automation of lighting, heating, ventilation, and security is involved in it. Control and automation of home appliances like washers, refrigerators, and ovens are also done through it. Performing different sets of tasks automatically is a transformation of home through a modern technology called home automation. Saving electricity is the main purpose of the home automation system. The facility of user comfortable living and energy management, as well as benefits for disabled, are features of smart home automation.

The usage of home automation system causes the communication of home appliances in an integrated manner. Remote monitoring and access to home appliances are the key characteristics of home automation. Factors such as energy efficiency, convenience, and safety benefits are obtained through it. High cost and exhausting maintenance do not make it reasonable to many people. In this project, the methods used for home automation are Bluetooth, IR remote and GSM.

2. RELATED WORK

Controlling of home appliances such as dryers, ovens etc. using three methods that are IR remote, Bluetooth and GSM are demonstrated in this paper. An app for the android phone is developed by MIT app inventor and a sketch for Arduino is developed by Arduino IDE. The home automation system proposed is affordable, comfortable and easy to use. Energy saving feature is enhanced in this.

For the development of home automation system, various methods have been proposed. The IoT approach to control various home appliances has been described by some home automation systems. For the interaction between Android mobile application and appliances under the control of the system, Bluetooth and GSM are used [1]. [2] Describes the commanding and controlling of home gadgets using mobile phones. This system can be used by people to control home devices from a far distance before reaching home. An instruction in the form of SMS is sent by the user to control a device from his/her mobile to a connector. The connector is

connected to the appliance. The computer will send the command to the microcontroller once the message is received for proper controlling of the appliance.

3. PROPOSED SYSTEM OF HOME AUTOMATION USING IR, BLUETOOTH, AND GSM

A. BLOCK DIAGRAM

Fig 1. Shows block diagram of home automation system using IR remote, Bluetooth and GSM. Relay module has an interfacing with 8 digital input-output pins of Arduino. NO/NC pins of Relay module has an interfacing with home appliances. Arduino is provided with external 5 volts power supply and relay module and 12 volts power supply for GSM MODULE.

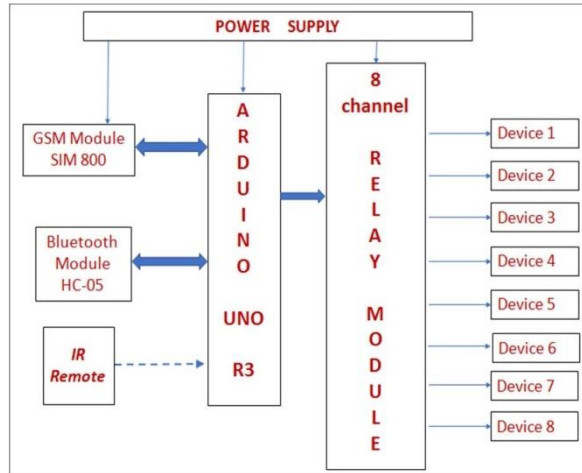


Fig.1. Block Diagram of Home Automation System

B. CIRCUIT DIAGRAM

The operation of circuit diagram has been done in two ways: (a) Automated and (b) Conventional

(a) AUTOMATED

IR remote, Bluetooth, GSM and Android app are used in this automation system to control appliances. Clicks on the Android application are used to control electrical appliances. GSM module, Bluetooth module and TSOP 1738 is used as a medium to send a message to the Arduino.

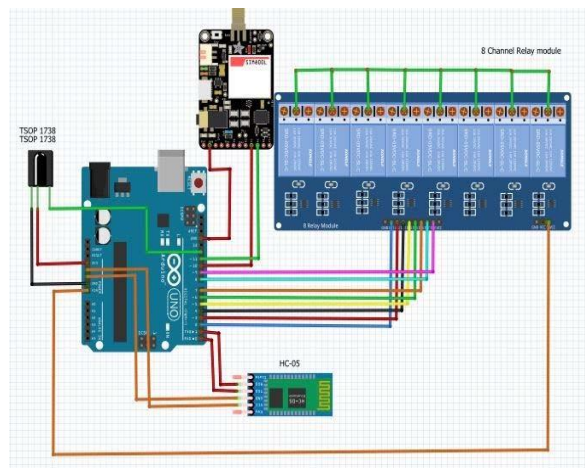


Fig.2. Circuit Diagram of Home Automation System

(b) CONVENTIONAL

Controlling all the electrical appliances normally using switches through a switch board is the conventional method. Any human can turn the device ON/OFF without using HAS can use a specific switch on the switch board which is attached to the device. The integration of this is done by connecting relays through a "two-way switch" as shown in fig.3.[3]

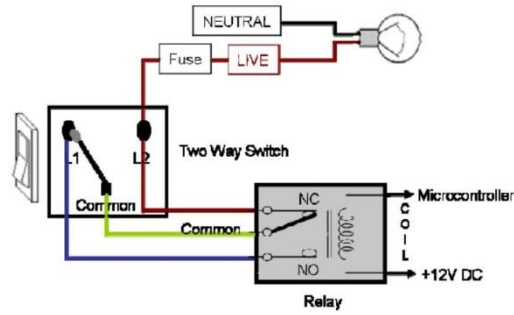


Fig.3. Two Ways Switch Connection with Relay

3. MATERIALS AND METHODOLOGY

A. Arduino UNO:

Arduino UNO is an Atmega328 based microcontroller board having 14 digital I/O pins. Among those 14 pins, 8 pins have been used for interfacing home appliances. USB connection, reset button and a power jacket is also provided. The signals sent by IR remote, Bluetooth and GSM are decoded here and it sends the control signal accordingly to the relay module. Arduino is serially interfaced with Bluetooth module HC-05 and GSM module SIM 800. Digital input pin of Arduino UNO is interfaced with IR receiver TSOP 1738.



Fig.4. Arduino UNO

B. Android

Initially developed by Android INC, it is an operating system for mobiles, which is based on Linux kernel. It was bought by Google in 2005. This operating system has gone through multiple major releases. Its current version is 7.0 “Nougat” which released in August 2016.

C. GSM module:

SIM 800, which is a GSM/GPRS module, is designed for the global market. SMS from a smartphone is sent to the GSM module interfaced with Arduino when a specific button is pressed on GSM home automation screen of the application. Appliances are switched ON/OFF on the basis of SMS sent. At the same instance, the current status of devices is sent through the Arduino by SMS via GSM module.



Fig 5. GSM module

D. Bluetooth module:

HC-05 is the Bluetooth module used in this project. The serial port module is easy to use. This module is designed for transparent wireless serial connection setup. 3.3V to the 5V power supply is required by this module. Data is serially sent using Bluetooth of a smartphone to that interfaced with Arduino when a specific button is pressed on Bluetooth screen of android application. In the basis of data sent, Arduino decodes the data and takes the action. At the same time, Arduino reverses the data of current status of devices into smartphone Bluetooth.

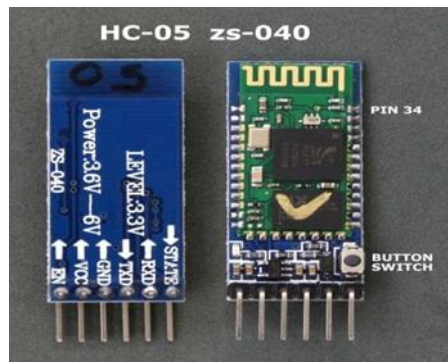


Fig.6. Bluetooth module HC-05

F. TSOP 1738:

It is an IR receiver having an active low output. It is represented as 17xx. A microcontroller can directly decode the output signal which is demodulated by TSOP. Low power is consumed and high immunity is built by it against ambient light. IR remote transmits infrared signals when a button is pressed on it and the signals are demodulated by TSOP which is then decoded by Arduino, which later sends control signals to the relay module according to that device which switches ON/OFF according to the buttons pressed.

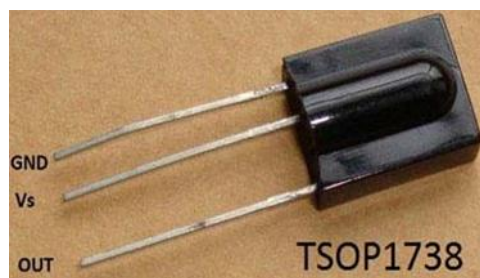


Fig.7. IR Receiver TSOP 1738

G. Relay module:

Turning ON/OFF of home appliances using voltages or current more than Arduino could handle is referred as a relay module which also provides an isolation between the Arduino side's low voltage circuit and high voltage circuit side which controls home appliances. The external 5V power supply is used to activate relay module through which electrical appliances like fans, lights, and ovens etc. are controlled. 8 channel DC 5V relay module is used in this project. 15-20mA driver current is needed for this relay.



Fig.8. 8-channel Relay Module

H. Power Supply Circuit

The power supply is the elementary unit of any electronic system which provides the required power for the operation of the system. In this project, Arduino and relay module uses the +5V power supply and GSM module SIM 800 uses +12V power supply.

I. MIT app inventor and android app

A) MIT APP INVENTOR: To develop android application for GSM and Bluetooth, we use MIT app inventor which is initially provided by Google. Nowadays, Massachusetts Institute of Technology (MIT) maintains it.

B) ANDROID APP: Data and messages are sent to the app on the smartphone when the buttons are clicked through GSM and Bluetooth from the mobile to Bluetooth module which is connected to the Arduino board. The received data is processed and the relay module is operated according to the microcontroller.



Fig.9. Screenshots of Android Application

4. RESULTS



Fig.11. Hardware Setup



Fig.12. Result

5. CONCLUSIONS

An auspicious sector called home automation is being developed rapidly. An extensive range of developments is required which can be made by the idea of a smartphone. In this paper, with the use of Bluetooth, GSM and IR remote, home automation can be modeled and executed. Simplicity and practicality are proposed through this system. TSOP decodes the transmitted commands by

the use of IR remote. The usage of Bluetooth makes the integral feature of mobile phones to work for home automation. Since the range of GSM is worldwide, it can be used from any part of the world and home can be automated. If the control circuit fails then the option of manual switching is available.

6. FUTURE WORKS

Making homes more intelligent through home automation is the sole requirement of future. Sensors like temperature sensor, flame sensor etc. can be integrated into this system which will provide safety and control benefits. Development of Wi-Fi and Ethernet-based home automation can be done.

7. REFERENCES

- [1] Anandhavalli D, Noorul S. Mubina, Bharathi P, “Smart Home Automation Using GSM and Bluetooth”
- [2] www.sparkfun.com
- [3] www.android.com
- [4] www.engineersgarage.com
- [5] www.sainsmart.com
- [6] Poonam V. Gaikwad, Yoginath R. Kalshetty, “Bluetooth based Smart Automation System using Android”, International Journal of Science and Research, Volume 6, IssueNo.5, May 2017.