



MICROCONTROLLER BASED HOME APPLIANCES CONTROLLING SYSTEM USING GSM MODULE

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Abstract: Compared to other home automation systems our system is capable to switch on or switch off light, fan, AC or other appliances via text message using global system for mobile communication and PIR motion sensor, which will benefit us to save electricity if we forgot to switch off the appliances while leaving our home by identifying motion. The concept of serial communication and AT commands has been applied towards development of the smart GSM based Home Automation system. Microcontroller ESP8266 and PIR Motion Sensor will be used to control the whole system. Our system will benefit to handicapped persons and elderly persons.

Index Terms - Microcontroller ESP8266, GSM Module, PIR Motion Sensor, Relay Module

I. INTRODUCTION

Home automation is becoming more popular around the world and is becoming a common practice. Smart home automation becomes important, because it provides the user the comfort and easy access to the home appliances. So, here we have implemented a system named Microcontroller based Home Appliances Controlling System using GSM module in order to control home appliances automatically. The aim of this project is to develop a home automation system that can be controlled remotely using mobile phone. The process of home automation works by making everything in the house automatically controlled, using technology to control and do the jobs that we would normally do manually. In this project, we propose a unique System for Home automation utilizing PIR Motion Sensor, Microcontroller and GSM module that is paired with a wireless module to provide seamless wireless control over many devices in a house. We can operate our system from any distant or remote area. It is a wireless system but instead of using a separate wireless module (transmitter and receiver) we are using the cell phone for this purpose.

II. LITERATURE REVIEW

1) M. Chetty, J.-Y. Sung, R. E. Grinter, "How Smart Homes Learn: The Evolution of the Networked Home and Household," Lecture Notes in Computer Science, vol. 4717, pp. 127-144, 2007.

This paper deals with the idea of implementing microcontroller based home automation and the controlling this system using global system for mobile communication to efficiently control the home appliances loads like light, fan. The proposed research work is focused on functionality of the GSM protocol, which allows the user to control the target system away from residence using the frequency bandwidths.

2) Parameswaran G, Kamatchi S, Keerthana S, Kiruthika S, Lavanya MS. Smart Home Energy Management System Using GSM. IOSR Journal of Electronics and Communication Engineering 2016.

A smart home energy management system using GSM was proposed. This model primarily employed a power module, GSM modem, liquid crystal display (LCD), temperature, and passive infrared sensor connected to a microcontroller unit. The power module has relays that switch the system's main power supply to an auxiliary (solar) power unit and vice versa based on signals received from the microcontroller. The temperature sensor detects and isolates electrical equipment from short circuits, and the PIR sensor likewise detects the user's presence to ensure the operation of light loads. The GSM modem enables communication of the system's information to the user via short message service (SMS). Even though this system has a low implementation cost and is cost and energy-saving, routine maintenance of the auxiliary (solar) power unit is required for effective operation.

III. PROPOSED METHODOLOGY

Existing System:

The current system is capable to switch on or off the home appliances like light, fan or other appliances via text message. However it is beneficial for homeowners but this system is not helping to reduce the electricity wastage which is happening very much.

Proposed Solution:

Our system is capable to switch on or off the home appliances via text message using GSM module and with the help of PIR motion sensor it reduces electricity wastage. Our system switch on light or fan when needed and switch off when not needed. By detecting motion. (in room if there is any human being present then only light or fan will be turned on otherwise it will be turned off).

IV. BLOCK DIAGRAM

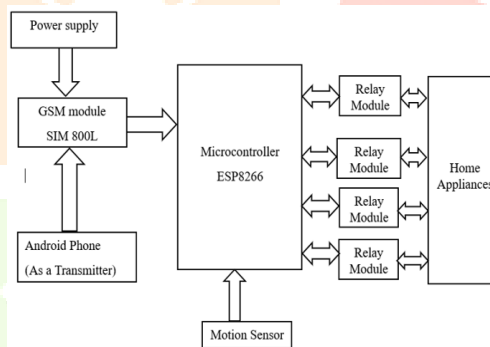


Figure 1: Block diagram

The block diagram of our system includes microcontroller ESP8266, GSM module SIM 800L, Buck Converter LM2596, PIR Motion sensor, Relay module and Android phone. Microcontroller and communication unit serves as smart unit of the system. GSM module and microcontroller is powered via buck converter. User from android phone sends SMS to GSM module, gsm module forwards it to microcontroller reads the message, decodes it and takes action accordingly. The PIR motion sensor continuously monitors presence of human being. If any presence it detects light or fan will be turned on according to the SMS sent by user and if it doesn't detects a y presence then the lights will be turned off automatically.

V. WORKING

The GSM module and microcontroller is powered via buck converter; as we can not provide direct power supply to GSM module. We need to convert it to 3.8V or 4V power supply for better working and to microcontroller we are providing upto 6V. The GSM module SIM 800L is serially interfaced with ESP8266 microcontroller. At power-on, the system runs and checks GSM module by activating and deactivating the GSM module itself and after that displays the system's status. When power supply is turned on we first send AT command to initialize GSM module and wait for the reply, when we get the ok (0) reply our GSM module is initialized then we send command to configure it. After configuring we will send another command that is for deleting the previous message if any present to avoid errors and system's failure. Now we are sending new command to read next message which we are sending from android phone that is our base station or transmitting station. GSM module will receive SMS from base station. when GSM module receives SMS from android mobile phone it triggers microcontroller ESP 8266. Then microcontroller ESP 8266 decodes it, identifies the message number, and switches on the particular relays attached to its port to control the electrical appliances. Also, we have used motion sensor to reduce electricity wastage. When user

sends SMS to gsm module as switch on light; microcontroller will decode it but light will be turned on after detecting any motion by sensor. And if light is turned on mistakenly it will switch off automatically after not detecting any motion more than 2 min. To control the speed of fan and to turn on/off the fan we have used TRAIAC circuit, with the help of TRAIAC circuit we are able to prevent our system from damage.

VI. FLOWCHART

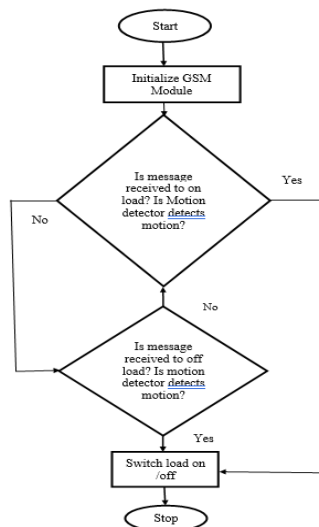


Figure 2 Flowchart

VII. RESULT

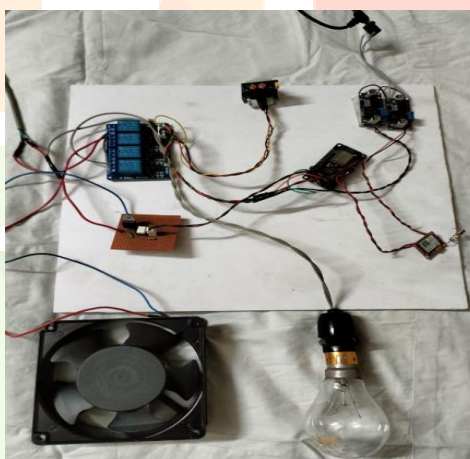
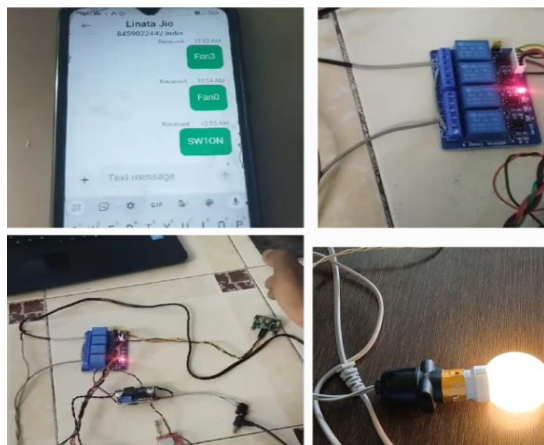


Fig 3. Setup pf GSM based home appliances controlling system with motion sensor



When SW1ON message sent from users android phone, relay 1 is turned on but bulb remained off; after detecting motion by motion detector bulb turned on immediately.

Similarly for fan, after sensing message as Fan1 particular relay is turned on and after detecting any motion by motion detector the fan is turned on immediately.

VIII. SIGNIFICANCE & SCOPE

Remote Control: One of the most significant benefits is the ability to control home appliances remotely. With a GSM module, you can send commands via SMS or call, allowing you to turn devices on or off from anywhere with network coverage. **Convenience:** Remote control adds convenience to daily life. You can operate appliances such as air conditioners, heaters, lights, or even security systems without being physically present at home. **Automation:** Microcontrollers can be programmed to automate tasks based on predefined conditions. For example, you can set timers or create scenarios where certain appliances turn on or off automatically, enhancing energy efficiency and comfort.

The scope includes **Remote Appliance Control:** Users can remotely control various appliances such as lights, fans, air conditioners, heaters, and kitchen appliances using their mobile phones. This allows for convenient operation, especially when away from home or in different rooms. **Security Systems Integration:** The system can be integrated with security devices such as door locks, surveillance cameras, motion sensors, and alarms. Users can receive alerts and remotely monitor and control security aspects of their homes. **Energy Management:** By using scheduling & automat-on features, users can optimize energy consumption. For example, they can set timers for turning off lights or adjusting thermostat settings based on occupancy patterns or time of day, leading to energy savings.

IX. CONCLUSION

In this project design and implementation of smart GSM house was considered. ESP8266 microcontroller with the cooperation of GSM provides the smart automated house system with the desired baud rate of 9600 bps. The proposed system was implemented and tested with maximum of four loads. Aim of the project is to design low cost an intelligent home system using the concept of mobile to machine & machine to mobile communication is designed. We developed a general purpose electronic circuit design that can control and monitor a variety of home appliances with interface that can be plugged into GSM modem. It reduces the wastage of valuable time, electricity and our daily life becomes easier and more flexible, saves money on electricity bill. The project is successfully developed and met the stated objectives.

REFERENCES

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5. <https://techatronic.com/gsm-based-home-automation-using-arduino-sim800>