



Enhanced Security and Automation System Based on IoT

Ann Maria John¹, Maria Jose², Rahul George³, Rohith .C⁴, Amal .M.R⁵

^{1,2,3,4,5}Department of Computer Science, St.Alberts's College (Autonomous),
Cochin, Ernakulum, Kerala, INDIA.

ABSTRACT: Today is the world where smart phone technology is used throughout for decreasing human hard work and time. This application may focus on 'SMART HOME SECURITY' and 'HOME AUTOMATION SYSTEM' using android application. This application can control home appliances like LPG leakage, fire hazards, from home or outside. A notification will be send to the owner's phones and he can take various safety measures using this application. And also using Home Automation System the fans and light will be turned on according to the number of persons entering and when the number becomes zero i.e., if everyone leaves the room light and fan will be turned off automatically or according to the command we give using Arduino. According to the number of persons entering and leaving the room a notification will be send to the owner's phone. And when a special security alarm is turned on, when someone broke into the house a buzzing sound will be heard and only the owner can turn it off using his smart phone. This helps us to control every happening at home or offices on our fingers.

KEYWORDS: IOT, Android, home automation, Global system for mobile communication (GSM), PIR sensor, Arduino, SMS

I. INTRODUCTION

It is not workable for busy families and individuals to operate various kinds of applications manually so at this century automation plays an important role using Smart Home Automation. We can know number of persons entering into the room and if someone tries to broke into the house. A notification is send to the owner's phone and he can take various measures accordingly. . This also helps old people to control the appliances with the help of mobile phones. We will get a notification on the phone when there is LPG leakage or fire. The sensor we use here is PIR sensor it senses and send acknowledge to the phone using Arduinoplatform and there will be applications to absorb the LPG gas.

The main purpose of home security and home automation is to make sure that 'our home is safe even though we are away' and to 'save electricity'.

II. CONTENT

GSM module is used in many communication devices which are based on GSM (Global System for Mobile Communications) technology. It is used to interact with GSM network using a computer. GSM module only understands **AT commands**, and can respond accordingly. The most basic command is "AT", if GSM respond OK then it is working good otherwise it respond with "ERROR". There are various AT commands like ATA for answer a call, ATD to dial a call, AT+CMGR to read the message, AT+CMGS to send the SMS etc.

Arduino is used for controlling whole the process. Here we have used GSM wireless communication for controlling home appliances. After receiving given commands by Arduino through GSM, Arduino send signal to relays, to switch ON or OFF the home appliances using a relay driver.

Circuit Components:

- Arduino UNO
- GSM Module
- ULN2003
- Relay 5 volt
- Bulb with holder
- Connecting wires
- Bread board
- 16x2 LCD
- Power supply
- Cell phone

III. PROPOSED SYSTEM

Now a day's Smart phone technologies is widely used for decreasing human hard work and also for saving time and for remotely control your alarm, lights, locks, thermostats, garage doors and cameras. In this project, we will see the Automatic Room Lights using Arduino and PIR Sensor, where the lights in the room will automatically turn ON and OFF by detecting the presence of a human.

HOME SECURITY AND AUTOMATION USING PIR SENSOR:

Passive infrared motion detectors also known as PIR sensors, these are the most common type of sensors homeowners use because they are practical and affordable. The term passive means that these detectors operate without any need to radiate and generate their own energy. PIR sensors can efficiently detect changes in the ambient temperature as well as body heat. If these sensors detect a temperature spike due to the presence of an intruder or foreign object, the alarm is set off. A thing to note is that infrared energy cannot pass through glass, so the alarm won't trigger due to the presence of people or animals outside.

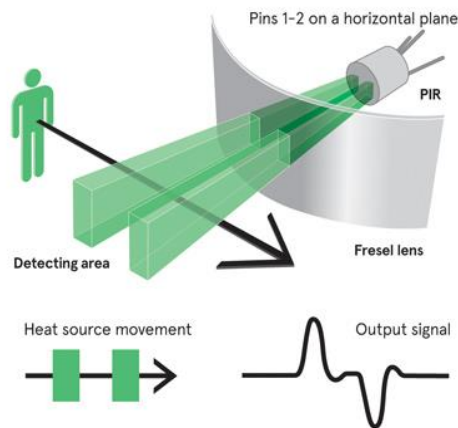


Figure 1: PIR Sensor Operation

Gas leakage is sensed using PIR sensor and it take safety measures using ARDUINO. In the event a fire occurs, the fire department will be notified even if you are not home or if the alarm system is not armed.

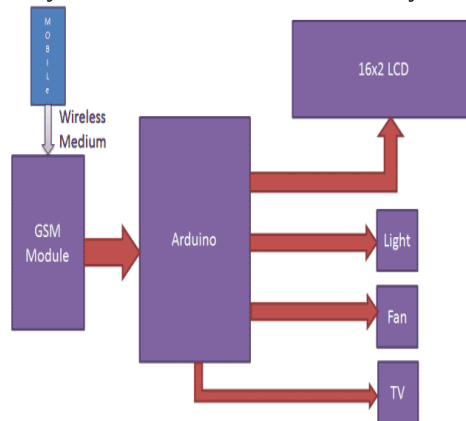


Figure 2: Block diagram

Receive text and email alerts when lights are turned on or off, or settings are changed. Live more efficiently with lights that respond automatically to triggers like opening a door or disarming the security system. We send some commands like “#A.light on*”, “#A.light off*” and so on for controlling AC home appliances.

S.no.	Message	Operation
1	#A.fan on	Fan ON
2	#A.fan off	Fan OFF
3	#A.light on	Light ON
4	#A.light off	Light OFF
5	#A.tv on	TV ON
6	#A.tv off	TV Off
7	#A.all on	All ON
8	#A.all off	All OFF

Table 1: Commands used to operate the Appliances

Advantage of using PIR sensor:

- **Thickness range** – From as thin as 12mm right through to 200mm.
- **Environmental impact** – PIR insulation to achieve an A+ rating when compared to the BRE Green Guide.
- **Fire performance** – PIR insulation is made through an irreversible chemical reaction which means it cannot melt
- **Structural strength** – Celotex is the preferred choice of PIR insulation because it has an intrinsic structural strength..
- **Moisture resistance** – Due to having a closed cell structure, is a hydrophobic product meaning it doesn't absorb water. This allows the thermal performance and reliability of the product to be retained over time.
- **Fire performance** – PIR insulation is made through an irreversible chemical reaction which means it cannot melt
- **Life expectancy** – Absorb moisture or get permeated by air, you can be confident of consistent performance which will typically last the full lifetime of the building.

AUTOMATIC FUNCTIONS IN HOME USING ARDUINO:

- Automatic Room Lights System using Arduino is a very useful project as you need not worry about turning on and off the switches every time you want to turn on the lights. The main components of the Automatic Room Lights project are Arduino, PIR Sensor and the Relay Module.
- Out of the three components, the PIR Sensor is the one in focus as it is the main device that helps in detecting humans and human motion.
- In fact, the Automatic Room Lights project can be considered as one major application of the PIR Sensor. A similar concept is being already implemented in automatic toilet flush valves, hand dryers, etc.
- If you do not have a relay module, you can make one yourself using very simple hardware.

RELAY MODULE

A Relay Module is a very useful component as it allows Arduino, Raspberry Pi or other Microcontrollers to control big electrical loads. We have used a 2-channel Relay Module in this project but used only one relay in it. In order to control a single relay on the board, we need to use three pins of the relay module: VCC, GND and IN1.



Figure 3: Relay Module

WORKING:

The Automatic Room Lights using Arduino and PIR Sensor is a simple project, where the lights in the room will automatically turn on upon detecting a human motion and stay turned on until the person has left or there is no motion.

Working of this project is very simple and is explained here:

Initially, when there is no human movement, the PIR Sensor doesn't detect any person and its OUT pin stays LOW. As the person enters the room, the change in infrared radiation in the room is detected by the PIR Sensor. As a result, the output of the PIR Sensor becomes HIGH. Since the Data OUT of the PIR Sensor is connected to Digital Pin 8 of Arduino, whenever it becomes HIGH, Arduino will activate the relay by making the relay pin LOW (as the relay module is an active LOW module).

This will turn the Light ON. The light stays turned ON as long as there is movement in front of the sensor.

If the person takes a nap or leaves the room, the IR Radiation will become stable (there will be no change) and hence, the Data OUT of the PIR Sensor will become LOW. This in turn will make the Arduino to turn OFF the relay (make the relay pin HIGH) and the room light will be turned OFF Applications

We have already mentioned a few applications of the Automatic Room Lights concept. Some of them are:

- Garage Lights
 - Bathroom Lights
 - Hand Dryers
 - Toilet Flushers
 - Security Lights
- GSM BASED AUTOMATION**

Our system allows user to operate these devices through sms, also the status weather the device is switched on or not is sent to user via a return sms. This can be used by domestic users and company users to operate as well as check status of home and company appliances from anywhere in the world.

It is a very convenient system for users since it allows them to easily control and monitor these appliances from anywhere. An example is that a person may switch on his House or office AC 15 minutes before he arrives so that he gets a cool environment as soon as he reaches there.

The system works in the following manner; the sms sent by user is received by the GSM receiver and then sent to an 8051 microcontroller in order to process it. The microcontroller then activates the appropriate relay for that appliance and controls it.

IV. CONCLUSION:

From the above research paper, we can conclude that of all the automation system it is most affordable and also user friendly. Here we use PIR sensor because it is of low cost and have many advantage as compared to other sensors and Arduino is the platform we are using here. Main purpose of home automation system is to provide ease to people to control different home appliances with the help of their mobile phones and to save electricity, time and money. This system also helps the user to protect our homes from burglars when we are away from our home by using alarm as the alarm will start ringing whenever a burglar tries to enter the house and the person will receive a message on his mobile phone whenever some other person will try to enter the owner's house. And if there is any fire hazards it is sensed through the PIR sensor and take various measurements according to it.

ACKNOWLEDGEMENTS:

We would like to offer a sincere gratitude to our Project Guide Prof. Amal M.R, who helped us in creating this project and also a special thanks to our H.O.D Prof. Sangeetha J, and also thanks for their valuable guidance during this period

REFERENCES:

- [1]. "Home Automation And Security System" Surinder Kaur¹, Rashmi Singh¹, Neha Khairwal¹ and Pratyk Jain Department of Information, Bharat Vidyapeeth's College Of Engineering, A-4 Paschim Vihar, New Delhi-110063, India.
- [2]. "Smart GSM Based Home Automation System" Rozita Teymourzadeh, CEng, Member IEEE/IET, Salah Addin Ahmed, Kok Wai Chan, and Mok Vee Hoong Faculty of Engineering, Technology & Built Environment UCSI University Kuala Lumpur, Malaysia.
- [3]. "Automatic Smart Home Security System" ty Kumari¹, Kalyani Pawar², Priyanka Dhonde³, Rupali Deshmukh⁴,^{1,2,3}UGraduate, Dept. of E&TC Engg., D.Y.P.I.E.T, Maharastra, India ⁴Assistant Professor, Dept. of E&TC Engg., D.Y.P.I.E.T, Maharastra, India.
- [4]. Wikipedia Home automation, http://en.wikipedia.org/wiki/Home_automation.
- [5]. "Home Automation System (HAS) using Android for Mobile Phone" Sharon Panth¹, Mahesh Jivani², Shri M & N Virani Science College, ot-360005 (Gujarat) India ²Department of Electronics, Saurashtra University, Rajkot-360005 (Gujarat)
- [6]. Malik Sikandar Hayat Khiyal, Aihab Khan, and Erum Shehzadi, "SMS Based Wirelless Home Appliance Control System (HACS) for Automating Appliances and Security", Issues in Informing Science and Information Technology Volume 6, 2009
- [7]. Deepali Javale Assistant sProfessor Dept. of Computer Engg. MAEER's MITCOE Pune, India Mohd. Mohsin Student Dept. of Computer Engg MAEER's MITCOE Pune, India "Home Automation and Security System Using Android ADK" Volume 3 (March 2013)