



# **Home Automation System (HAS) using Internet of Things (IOT) for Power Management**

Renuka P. Dhage<sup>1</sup>, Shaila P. Kharde<sup>2</sup>

PG Student, Department of E&TC, Shreeyash College of Engg. & Tech., Dr.BAMU University, Aurangabad (MS),  
India<sup>1</sup>

Assistance Professor., Department of E&TC, Shreeyash College of Engg. & Tech, Dr. BAMU University, Aurangabad  
(MS), India<sup>2</sup>

**ABSTRACT:** This paper provides the design and development of a system for home automation using global system for mobile communication (GSM) technology. In this system user uses computers or mobile devices to controlling of electrical devices in home from anywhere in the world. In this project the controller automatically finds the temperature and LDR sensor values and when the temperature value is exceeds the threshold value the fan will automatically on and depends on the LDR values the light illumination (brightness) will be increased or decreases.

**KEYWORDS:** GPRS, IOT, LDR Sensor, Light Illumination, Threshold Value.

## **I.INTRODUCTION**

The demand of wireless system in home is increasing day by day due to its cost and easy placement and also it is easy to connect with our computer or phone [1]. In the 21st century need of controlling electrical appliance and instrument remotely from anywhere such as an air conditioner, refrigerators, computer system, Television, security system, set top box, light or fan and so on. Different systems or technologies are used to control electrical appliance like SMS (short message service), FPGA CONTROLLER, ARM, AVR, GSM module, ZIGBEE etc. Hence Home Automation System (HAS) is the researchers and companies interest area and tries to implement a system and make some gradates that keep your home safe from intruders

Home automation system i.e. HAS is the latest trend that provides user to use and control of home appliances remotely or automatically and internet of things (IoT) plays very important role for remote control and data transfer. The objective of this project is to develop a system that allows for a user to remotely control and monitor home appliances such as fan and light using a cellular phone or Personal Computer (PC) or Laptop. Remote monitoring of processes, machines, etc is becoming very popular due to advances in technology and also useful in hardware cost reduction.

## **II. EXISTING WORK**

Manish Kumar and Ramandeep Singh [1], developed home appliance controlling using Zigbee wireless communication protocol and ATMEGA128 microcontroller. This system ware control the home appliance like refrigerator, fan, and air conditioner etc. by sending command through the computer or laptop. Microcontroller ATMEGA128 plays mediator role between the ZIGBEE and all appliance are connected with microcontroller or through relay. There are three types of Zigbee devices, one is transmitter and one is receiver. The transmitter contains Zigbee transmitter and RS232 circuit and receiver contains Zigbee receiver. Zigbee receiver receives the command given by the Zigbee transmitter and after decoding it will send to ATMEGA128, which is connected with relay and appliance i.e. fan, bulb, motor etc., it will respond according to the command e.g. If we send command 1 to microcontroller the fan will on and when command 2 to the microcontroller the motor will on and if the microcontroller will receive the wrong command it will glow a red LED on the board. Mahesh N. Jivani [2] developed GSM Based Home Automation System. This proposed system contains GSM i.e. Global System Messaging and App-Inventor for Android Mobile Phone. App Inventor programming

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platform provides development different application for Android-based smart phones. This system contains the android mobile, GSM, ATMEGA 328 (8 bit microcontroller) and relay which are connected to the different peripheral home devices. Here App Inventor allows Android Apps to be built and programmed highlighted colorful building blocks, which provides easy user interface. This proposed system contains Arduino board with microcontroller ATMEGA328, GSM Modem, octal peripheral driver array ULN2803, Relay and a few discrete components. In the system command is send through the Android mobile through SMS and which is received by GSM modem. Microcontroller ATMEGA328 is works as main program switching unit which receives data from GSM Modem and transferred appropriate program data to ULN2803 for operating relay ON and OFF.

### III. WORKING PRINCIPLE

In this project the controller automatically finds the temperature and LDR sensor values. When the temperature value is exceeds the threshold value the fan will automatically on and depends on the LDR the light illumination (brightness) will be increased or decreases like the LDR value is low the illumination of the light is 100%, if it is mid the illumination of the light is 50%, if it is high the illumination of the light is in OFF condition these operations will perform automatically performed and the values of the sensors will be posted through GPRS module to web page (server). Thus the project is design for energy saving by designing lamp illumination according to needy. Through GPRS server we can ON or OFF the loads at any time. And how much of electricity is consumed by the loads that information also posts in to server by using of GPRS module. Remotely, the system allows the home owner to monitor and control the home appliances via mobile phone set by sending commands in the form of SMS messages and receiving the appliances status as well. It can also control through internet from anywhere around the world, therefore an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. Automation System can be accessed from the web browser of any local PC in the same LAN using server IP, or remotely from any PC or mobile handheld device connected to the internet with appropriate web browser through server real IP (internet IP).

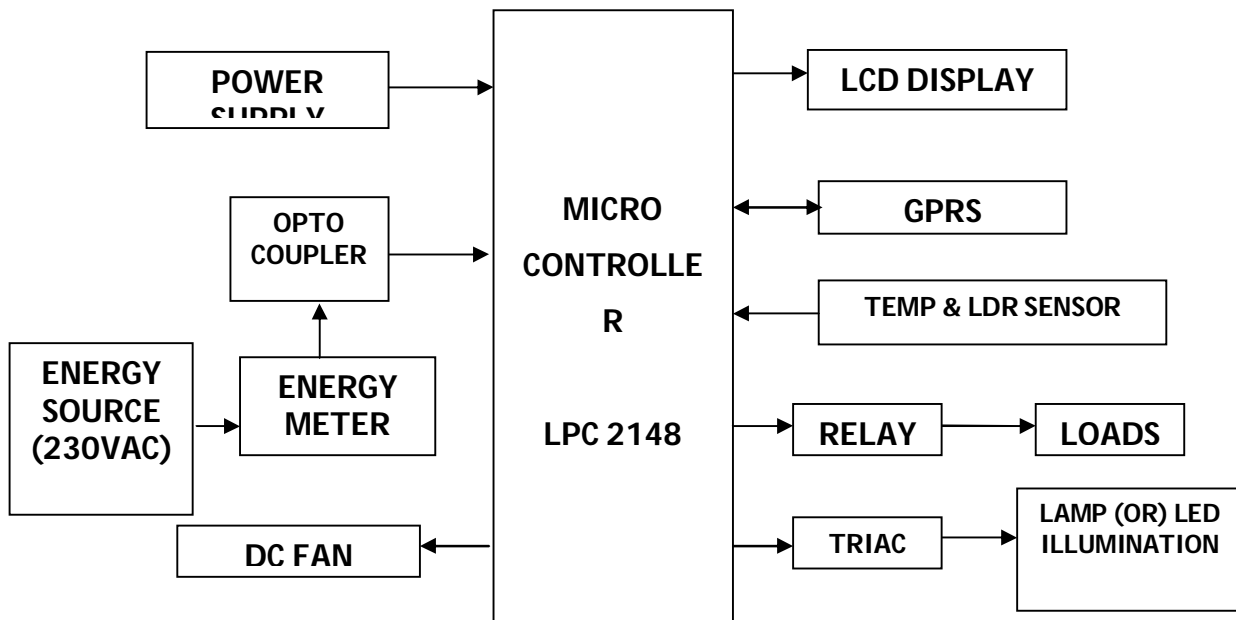


Fig. 1 Block Diagram of the system

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## IV. SYSTEM DESCRIPTION

Fig. 2 shows the experimental setup of the proposed system. This home automation system contains hardware part as well as software part. Hardware like LPC2148 microcontroller, Thermistor NTC and LDR, GPRS Sim 900 Module etc. and software part like Keil  $\mu$ Vision and flash magic.



Fig. 2 Experimental Setup

### 4.1 ARM7 LPC2148

LPC2148 microcontroller is the brain of system. The LPC2148 microcontrollers [3] are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support. This microcontroller contains embedded high-speed flash memory ranging from 32 kB to 512 kB. The LPC2148 microcontroller provides 128-bit wide memory interface and unique 32-bit code accelerator architecture, which execute at the maximum clock rate. LPC2148 microcontroller is ideal to access control and point-of-sale because of their tiny size and low power consumption. Embedded ICE RT and Embedded Trace interfaces offer real-time debugging.

### 4.2 Thermistor NTC and LDR

Thermistors are thermally sensitive resistors used in a variety of applications, including temperature measurement. Thermistors are widely used as inrush current limiters, temperature sensors, self-resetting over-current protectors, and self-regulating-heating elements. A thermistor is a piece of semiconductor made from metal oxides which exhibits an electrical resistance that varies with temperature. The NTC thermistor has the highest sensitivity, small heat capacity, rapid response, small size, low cost and moderately high-resistance at room temperature. The room temperature resistance of NTC thermistor was customized to get the moderate high value for power optimization and thus to avoid the self heating [4].

### 4.3 GPRS Sim 900 Module

Fig.3 shows the SIM900 Quad-band GSM/GPRS module. This module will controlled by AT commands for example GSM 07.07, 07.05 and SIMCOM enhanced AT Commands, and fully compatible with Arduino / Iteduino and Mega. This module is Quad-Band 850/900/1800/1900MHz and also provides Short message service, Free serial port selection. It supports Class 4 (2W@850/900MHz) and Class 1 (1W@1800/1900MHz) [5].

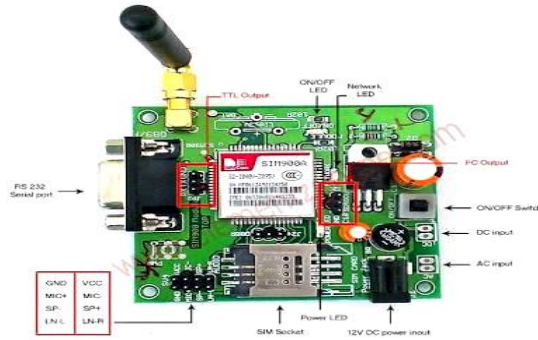


Fig.3 SIM900 Quad-band GSM/GPRS module [5].

#### 4.4 Keil $\mu$ Vision

It is possible to create the source files in a text editor such as Notepad, run the Compiler on each C source file, specifying a list of controls, run the Assembler on each Assembler source file, specifying another list of controls, run either the Library Manager or Linker (again specifying a list of controls) and finally running the Object-HEX Converter to convert the Linker output file to an Intel Hex File. Once that has been completed the Hex File can be downloaded to the target hardware and debugged.

#### 4.5 Flashmagic

Microcontrollers contain on-chip Flash memory and the ability to be reprogrammed using In-System Programming technology. Flash Magic is Windows software from the Embedded Systems Academy. Flash Magic allows easy access to all the ISP features provided by the devices. Flash Magic provides different features like erasing the flash memory, Programming / reprogramming the Flash memory, Reading Flash memory, Direct load of a new baud rate, Sending commands to place device in Boot loader mode etc. [6].

### V. COMMANDS FROM USER

Table 1 shows the different user command to control the various home appliances.

Table 1 User Command Table

Sr. No.	User's Command
1	*BULB1 ON
2	*BULB 2 ON
3	*FAN ON
4	*BULB 1 OFF
5	*BULB 2 OFF
6	*FAN OFF

### VI. RESULT

This proposed system is made for transmit the command wireless through GPRS. The GPRS received the user command and transmit these commands to the microcontroller LPC 2148. Microcontroller take action as per the command that is light illumination (brightness) will be increased or decreases, ON or OFF the loads, and also how much of electricity is consumed by the loads that information also post in to server by using of GPRS module. It can also control through internet from anywhere around the world.



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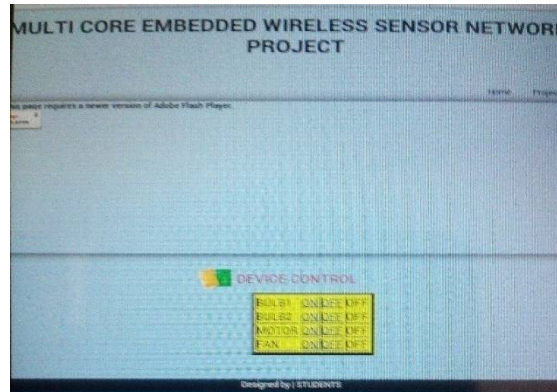


Fig.4 Web server page

## VII. CONCLUSION AND FUTURE SCOPE

Now a day's mobile is mostly used for communication purposes and this technology is used in this developed system. Using SMS user can having remote control for home appliances and easily user can handle the electrical devices. In future we are going to develop the audio or voice based remote home and office control system which is beneficial for physically handicapped persons or blind persons.

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