

Smart Home - An Advance Home Automation System

Prakruthi P Rao

Student, M. Tech

Dept.of Electrical & Electronics Engineering

Dr. Ambedkar Institute of Technology

Bengaluru, India

Arpitha Raju

Assistant Professor, EEE

Dept.of Electrical & Electronics Engineering

Dr. Ambedkar Institute of Technology

Bengaluru, India

Abstract— The unusual wastage of power and lack of security is the biggest challenge the world is facing today. Smart wireless home automation and security technique is one of the emerging technologies for intelligent building surveillance which uses control systems and information technology.

In this paper, 'SMART HOME – An Advance Home Automation Project' appliances of entire home is automatically controlled based on the output of various sensors and commands from the users from anywhere around the world. This is useful in getting timely information about the power consumption and of theft.

I. INTRODUCTION

Home Automation allows smart and intelligent control of home appliances using computer and information technology.

The era of automation began with the sensors and it's respective outputs such as automatic opening and closing of the door or turning on and off of the street lights based on the intensity of the light. This idea was further modified to control home lighting system and fan based on intensity of the light and temperature respectively.

With an advancement in telecommunication technology, a wireless automation system was developed. These wireless technologies used remote controller using infrared signal to communicate with the devices. There was also an idea to use voice command to control the appliances[2]. With mobile phones becoming more and more popular, a home automation using bluetooth was built which could control the appliances by sending the data in bluetooth frequencies[3]. This was very popular but had limitation in the range of operation and signal interference with multiple devices. Hence it was only useful for indoor controlling of the house. Next step in this technology was an automation system using GSM technology, where the commands were sent in an SMS to control the devices[2]. Although this technology was efficient, it was not very cost effective.

Then with a view to control and monitor the home from a far-away place, An automation system using WiFi was chosen[4]. This is efficient, low cost and highly reliable.

This project involves building an automation controller which can turn on/off home appliances through a Smartphone and control appliances automatically based on sensor values as desired by the user. Home automation is better than conventional manually switching in terms of ease of use, security and energy efficiency.

II. OBJECTIVES

- A. *A. To make use of modern technology to ensure safety.*
- B. *B. To reduce the wastage of power and supervise the power consumption level.*
- C. *C. Build an automation system that is simple and convenient to use.*
- D. *D. To control and monitor home from anywhere around the world.*
 - *A. To make use of modern technology to ensure safety*

The advancement in information technology and computers have paved way for a more secured surveillance of our home. By making use of this technology, we are able to build a smart home, in which the owner gets timely information about theft and hazardous situations like gas leakage and fire.

- *B. To reduce the wastage of power and supervise the power consumption level.*

The primary priority of this project is to reduce the wastage of power. It is programmed such as to automatically turn off the appliances when it is not necessary. It can also notify the power consumption level on a smartphone.

- *C. Build an automation system that is simple and convenient to use.*

Since the appliances are used by common people it is important to keep it simple and convenient for use. This project is helpful for physically challenged and aged people, hence complex designs are undesirable.

- *D. To control and monitor home from anywhere around the world.*

This project finds an application for people who stay away from their house. This automation system using Wifi helps them in controlling and monitoring their house from anywhere around the world.

III. HOME AUTOMATION USING WiFi

A home controlling and monitoring system can be built using various technologies like bluetooth, android app, RF module based remote controller and speech recognition controller. One such technology is an automation using WiFi.

This module is simple and cost effective. This technology involves a WiFi module interfaced to the central microcontroller and is used to send the appliances data to the owner and receive the commands from the user to control the appliances.

IV. COMPONENTS USED

A. Hardware

- Microcontroller
- WiFi module
- Smartphone

B. Software

- Embedded C

V. WORKING

The project will include a central microcontroller (Atmel Atmega328) which will run the home automation code written in embedded C using Arduino. The microcontroller will connect to a Wi-Fi network and will allow appliance control through this wifi network. Smartphone's can control appliances through the appliance control dashboard by connecting to this network. The project will use a wide range of sensors like – light sensors, temperature, motion detectors, smoke sensors, LPG Gas sensor. The output from these sensors can be viewed on the Smartphone. The microcontroller will also be able to automatically control appliances based on the sensor data (ex. automatically control fan speed based on room temperature). Relays will be used to control individual appliances from a microcontroller.

VI. MODULE LEVEL DESCRIPTION

A. Microcontroller

The high-performance Microchip 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts.

By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

B. WiFi module and Smartphone

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices.

VII. ADVANTAGES

- Home automation allows easy use and convenience to users
- Wireless and automatic control of appliances greatly improves energy efficiency and current consumption
- Allows centralized control of all home appliances through a Smartphone
- Home automation helps disabled and aged users control home appliances

VIII. APPLICATIONS

- It can be used in apartments where power consumption is more.
- It can be used in a house where the owner is away from home.
- It can be used by the aged people.

IX. CONCLUSION

It is simple yet highly efficient system and can be used in the applications mentioned.

It can also be further developed to facilitate more features.

X. REFERENCES

- [1] Speech Recognition Based Wireless Automation Of Home Loads (E-HOME) published in International Journal of Engineering Science and Innovative Technology (IJESIT), Volume 4, Issue 1, January 2015
- [2] Smart Home Automation Control Using Bluetooth and GSM published in International Journal of Informative and Futuristic Research(IJIFR) Vol. 2, Issue 8, April 2015
- [3] Bluetooth Based Wireless Home Automation System Using FPGA published in Journal of Theoretical and Applied Information Technology. Vol. 77, No. 3, July 2015
- [4] Web Based Real-Time Home Automation and Security System published in International Journal of Electrical and Electronics Engineering and Telecommunications. Vol. 4, No. 3, July 2015.
- [5] https://en.wikipedia.org/wiki/Home_automation
- [6] <http://www.safewise.com/home-security-faq/how-does-home-automation-work>
- [7] <http://www.atmel.com/devices/atmega328.aspx>
- [8] <https://en.wikipedia.org/wiki/Sensor>
- [9] <https://en.wikipedia.org/wiki/Relay>
- [10] www.electronics-tutorials.ws > Input/Output Devices
- [11] <https://www.quora.com/How-do-I-interface-a-Wi-Fi-module-with-a-microcontroller>