

# Voice Controlled Home Automation and Vehicle Motion

Chetan More<sup>1</sup> Akash Rohila<sup>2</sup> Akshay Saxena<sup>3</sup> Amitesh Singh<sup>4</sup>

<sup>1</sup>Assistant Professor

<sup>1,2,3,4,5</sup>Department of Electronics and Telecommunication Engineering

<sup>1,2,3,4,5</sup>Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune, India

**Abstract**— In the past few years, technology has grown at a high speed. Human lives have also become much more dependent on electronic devices and appliances. It has thus led to the idea of developing a home automation system. This paper is about home automation system which would use a smartphone with voice command recognition to enable any naïve user to operate all the appliances. The system has three major components: an Atmega 328 microcontroller for connecting the appliances, an ESP8266 wifi module, and a smartphone running the Android application designed for this home automation. The system also supports voice command for naïve users with command sensing by google apk development. It decodes the user's voice command and extracts the exact meaning of his command. The paper focuses on the features and design of the wifi connected HAS. The whole design comprises of a wifi module (Atmega-328) embedded on the board to which all electrical appliances (Lights, fans) and vehicle are connected to this board using relays. The smartphone interacts with the Atmega 328 via the ESP8266 WIFI Module. The chief goal of the HAS development is to be economical and scalable according to the requirements. Password protection is being used for authentication via the wifi encryption.

**Key words:** HAS, VRS, Android, Smart Speech Sense, WiFi

## I. INTRODUCTION

In this present era of development and technology, automation of everything is the need of the hour. The chief goal of any technology is to ease the human life. Home automation aims at automating the human lives. Controlling the home appliances like lights, Fans and even vehicle motion without any switch but with the help of a smart phone and internet is known as home automation system. In home automation, with the help of one or more computerized remotes one can easily control home tasks like switching ON or OFF electrical appliances. Home equipped with Home automation system is called as Smart Home. Due to complications and disordered nature, now days more emphasis is laid upon Wireless technology. These wireless technologies have impacted human life in a positive manner and human development speed has increased fore fold. The main components which are used in home automation systems are Android application, Internet, Cloud and WiFi. Every development in technology has its own pros and cons. But WiFi based home automation systems have way more advantages. Devices can be connected from anywhere using the SSID connection around the range of the wireless router and this range can be increased by using more powerful routers.

### A. ATMEGA-328



Fig. 1: ATMEGA-328

Atmega 328 (28 pins/8 Bit) which is very popular microcontroller among Arduino Duemilanove boards is mass manufactured by ATMEL Company. Main specifications of the microcontroller are

- 14 digital I/O pins (6 for PWM outputs,6 for analog input pins)
- 32K of flash memory.
- 1K of EEPROM
- 2K of internal SRAM.

### B. ESP 8266 Wifi Module

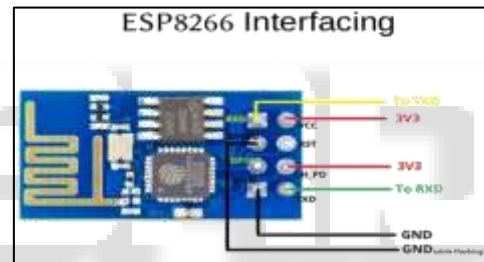


Fig. 2: ESP 8266 Wifi Module

This WiFi Module has In Built SOC (start of comment) with interspersed TCP/IP protocol which enables any microcontroller to access to any WiFi network. Each module has default AT command set firmware programming which in technical term means you can simply connect this device with your Arduino device. Main feature of this Wifi module is it is extremely cost effective.

### C. Gas Sensor MQ-5



Fig. 3: Gas Sensor MQ-5

The Grove (MQ5) Gas sensor is used widely for leakage detection. It is used both in home and industrial purposes for the detection of H<sub>2</sub>, CH<sub>4</sub>, Alcohol but majorly used for detecting LPG. The Main reason for which this Gas Module is used widely for its High sensitivity, fast response time and

its long stable life which helps to take measurements quickly. With the help of adjusting the potentiometer, sensitivity can be decreased or increased.

## II. PROPOSED SYSTEM

The primary concern of this home automation system is that it uses WiFi Module for interacting between the mobile application and appliances (lights, fans and vehicle motion). This paper will shed light on the features & design of the system.

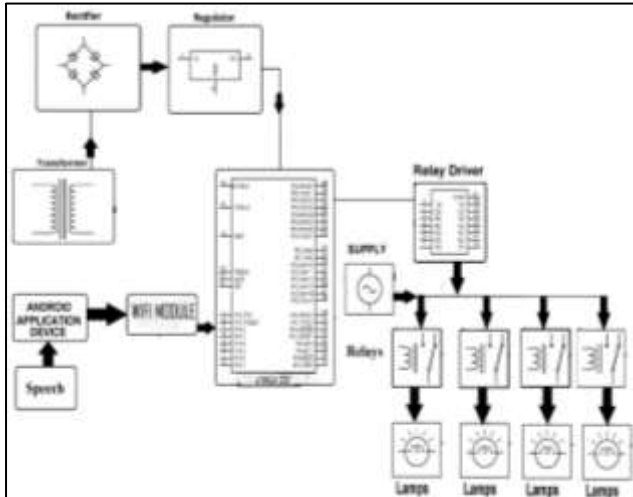


Fig. 4: Circuit diagram of Wifi Based Home Automation and Vehicle motion using Atmega-328

### A. Working

- 1) Assemble each and every component as shown above on the PCB.
- 2) Power on PCB using a DC source to control electrical home appliances through speech as input to the HAS.
- 3) Install mobile application (apk) on your mobile phone.
- 4) After installation you need to Pair your mobile phone to wifi module. It will ask you to enter a password. The Default password is "XXX".
- 5) Open the mobile app and connect to Wifi module again. Your voice controlled home automation system is ready to control appliances.
- 6) Touch 'Speak' icon on the app, say 'Turn On' in front of your smartphone to turn the appliance on and 'Turn Off' to turn it off.

### B. Features

#### 1) Voice Command as an Input

This HAS will have an android application in the user's Mobile device. This application is so designed that it receives the user's voice as input to system. The Mobile application will automatically convert the voice signals into digital data and send these signals to the main system.

#### 2) Smart Speech Sense

The mobile application is coded so as to decode any statement from the user. The user is not restricted to use any fix type of command for the input. User just have to state out his problem & the mobile application will itself sense the meaning of the user's speech & convert it into respective meaningful command for feeding as input to the HAS.

### 3) LPG Leakage Detection

The system will also have sensors of LPG leak in its control. If there is a leak, the application will notify the user about the leak. The sensors, as soon as, detect the leakage will generate signals. These analogue signals will be converted to data signals and sent to the application by the microcontroller via the Bluetooth module.

### 4) Regular Appliance Support

The system won't require any specialized appliances with support for WiFi module or technology. The existing conventional appliance will work in total efficiency with the system.

### 5) Scalability

This feature can be achieved in two ways:

#### (1) WiFi Range

The range of Wifi Module is 300m line-of-sight outdoors. External antennas will give more range if they're oriented in the 'best' direction (usually parallel to each other). Indoors, range depends on the number of walls / windows etc and the construction of those. Some older building materials (e.g. granite) are very difficult to get radio signals through. Many windows in modern buildings have an (almost invisible) reflective film built in to conserve heat - this film reflects radio signals rather than allowing them to pass through.

So, Practically Wifi Module has less than 10 metres or less indoors if the signal needs to pass through 2 or 3 walls.

#### (2) Appliances

The system can also be made scalable based upon the appliances used. The variety of appliances and the number and location of these appliances will determine the relay network of the microcontroller. It will also decide the business logic for the application.

### 6) Authentication

The android application will be password protected. The user of the application will be provided with a password. The user of the application will have to enter the password each time he wishes to operate the appliances from the application. This will ensure that the application won't be used by any unintended user.

### C. Design

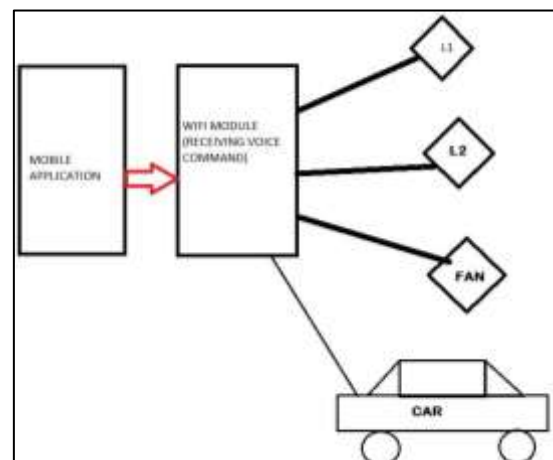


Fig. 5: Block Diagram of Voice Controlled Home Automation and Vehicle Motion

The block diagram shown above demonstrate the work-flow of the system. The user would be initially logging into the system with his/her login credentials. On authentication, the user will be presented with number of options for controlling the different appliances. Also, an option for voice command is available. The user will just have to record his voice. On receiving the input, the application will convert this input into byte format and transmit this signal to the Arduino microcontroller via WIFI module. The microcontroller is connected with the appliances through relays. The microcontroller converts the byte signal it has received to string format and passes it to the respective relay. The application is coded using the concept of Smart Speech Sense, which would help in enabling the system to convert the user's sentences into appropriate commands.

### III. FLOWCHART

Flowchart is very imperative part of any project. Its main aim is to represent whole Process in a sequence of STEPS. Hence, it can be said as a visual representation of the whole process. Each step is connected to next step with the help of lines and arrows which helps to view the process more logically from beginning to end .Flowchart of HAS project is given below which allows Student to understand the design of project more logically.

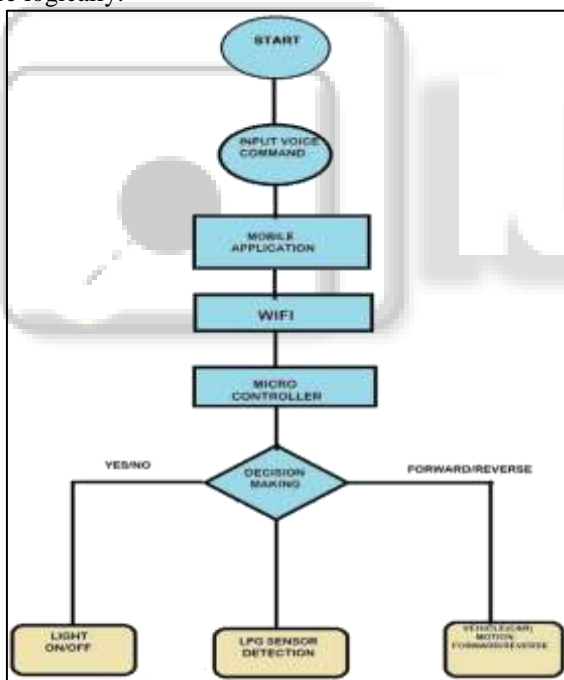


Fig. 6: Flowchart Depicting control stages

### IV. APPLICATION OF IMAGE PROCESSING

The basic aim of project implementation is to show home automation at a very basic level. The need to implement this project topic is to switch each and every electronic appliance manually using voice synthesis with the help of mobile application. The use of wifi module is crucial as it helps to cover a large area which is easily accessible for complete home. The input of this HAS is fed with voice command of the user. We can easily command the appliance to enable it or to turn it off by simply giving voice commands. From the android application we can easily gather what steps to be use

to implement multiple appliances can be controlled using voice command. We can install this HAS for multiple storeys building so that one can easily access fans and lights using less human effort and also time efficient. For old age people and handicapped people HAS has proved to be of great use. They can easily access without making any extra effort to switch on and off electronic appliances. In fast moving life people often forget to switch off lights abd other appliances due to which there is a huge electrical power loss hence government of India can take an initiative to implement this HAS system in every home to reduce power loss.

Electrical appliances (fan, light, vehicle) can be easily controlled with the help of simple voice commands.

- This system is implemented to target people with disabilities.
- Further, the project can be expanded by adding Vehicle Control to move forward and reverse and switching off the main engine of the vehicle.
- The Internet is not required for using this project
- Multiple devices/appliances can be controlled using one Android device

### V. FUTURE SCOPE

The whole design of this project is developed to target Senior citizens and physically challenged people. The chief aim of this system is to control electrical appliances (Lights, Fans) in Home, offices or in industries. The HAS's input is fed with Voice Commands by the user through a mobile application. This system uses wireless network using ESP 8266 Wifi module for its efficiency and low power consumption.

Future work will involve:

- Confirmation commands can be added to the VRS
- Variable control functions can be combined for improving the design's flexibility for providing regulatory instructions rather than giving simple ON/OFF instructions. For example "Increase or decrease Temperature", "Dim Lights" etc.
- Powerful routers can be integrated in the design to increase the range which helps to control HAS from long distance.
- An online home control panel can also be designed.

### VI. CONCLUSION

In this paper, we have shown the design and features of a Smart Home Automation System. It is Wifi module (ESP8266) based, hence wireless and can be flexible in terms of cost. It has a special feature for smart speech sense, which would decode user's sentences into appropriate commands. It requires authentication details as a medium of security, thus preventing the use of application by unauthorized users. The system also connects with sensors, thus helping in detecting LPG leakage, intrusion detection or fire breakout. Voice command also helps in car forward and reverse instructions. In future, the system could use more concepts of Artificial Intelligence so as make it more user friendly and increase the automation. Another function that may be added is developing the system for different languages other than English

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