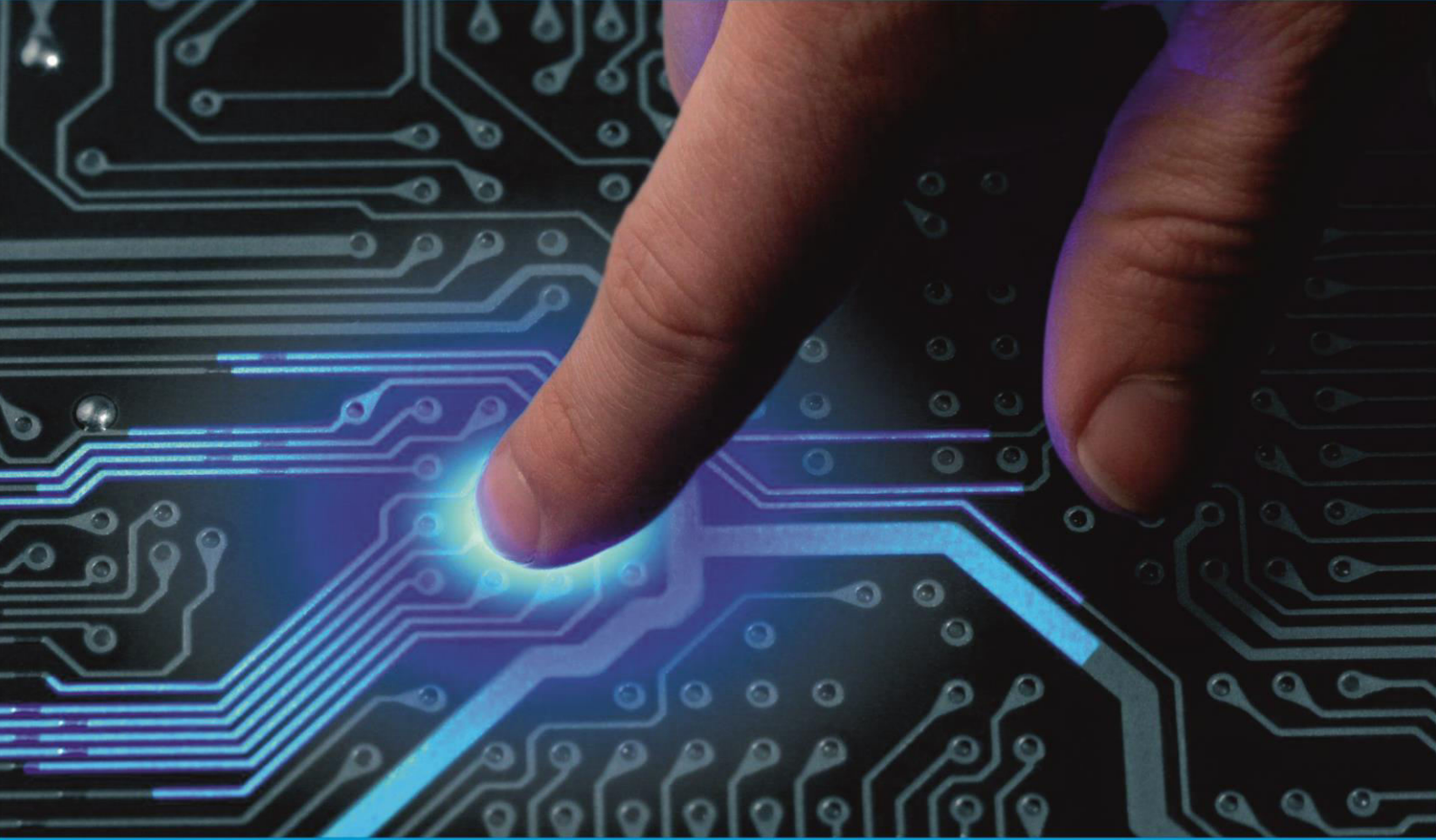




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# Voice Recognized Home Appliance Control with Energy Efficiency Using Python

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**ABSTRACT :**The aim of this project is to build a system that controls the appliances through voice and that also ensures safety with the Raspberry Pi in the absence of the user. The key goal of the project is to save time and power for people. By design, Python is used by Raspberry Pi as the primary programming language. Voice recognition using the Google API is developed. When an individual enters a room, our device detects the human presence by means of a moving sensor and Buzzer is automatically activated. The room temp and humidity are reflected on the LCD monitor by means of the temperature sensor. Energy consumption is the major part of the proposed work which is the power consumed by home appliances.

**KEYWORDS:-** Raspberry pi, Python language; PIR sensor; Temperature Sensor.

## I. INTRODUCTION

Nowadays, people tend to do tasks with the least amount of effort as effectively, reliably and easily. By transforming 'average' homes to 'smart' homes, a home automation device will effectively meet this need. For science culture, smart home is not a recent work, it has been used since decades. The area of home automation is growing exponentially as electronic devices advance. Several intelligent systems where control is via Bluetooth, Internet etc. were suggested. Conceiving and providing protection for the home owners through voice recognition using raspberry pi is an enticing choice. In the industrial and economic landscape as well as in everyday reality, automation plays a constantly growing and very critical role. Costs and ease of implementation and usage also constitute obstacles to widespread use. Our aim is to design a low-cost, open source and scalable framework with a wider range of powered devices. The technology can be easier to use and user-friendly by using speech recognition-based home automation devices for paralyzed and elderly people. The home automation system would provide an enhanced quality of life for elderly or disabled persons. In this method, we use a high-performance, low-cost Raspberry pi. Raspberry Pi has many generations of various computer systems. The new Device 'Raspberry Pi 3' version is available with Bluetooth and Wi-Fi on board. Based on Raspberry Pi, many traditional home security peripherals will be implemented for this project. A thermostat for monitoring temperature is available. To interpret voice commands, Google APIs are used. It receives commands and informs the machine to run the requested unit. The system also monitors the actual status of the equipment and can connect basic codes and devices to the system for other functionality. The dominant language in programming is Python. Protection is also included in this framework in addition to home automation. We use a motion sensor to track human movements and a camera module to take an unwanted individual's picture and send them to the owner's telephone over the web. The exponential evolution of new technology has begun to function as an instrument for contact with machinery and computers with the surveillance, control services, and the Internet. The technology can be found in many areas such as banks, laboratories, hospitals and other advanced electronic systems that mitigate the dangers of unwanted admission. The key reason this device is developed is to save time, energy, safety and comfort. The control of domestic appliances by voice and protection.

## II. LITERATURE SURVEY

In this part, we examine briefly the current work on smart home network systems and attempt to divide them into three categories based on their key contributions: decision-making support, service provision and real implementation driven. For instance, the intelligent home control project [1] is designed to provide smart services to

consumers on the basis of an active sensor network. Second, the raspberry pi home automation project [2] is responsible for the remote control of home appliances by any handheld Wi-Fi. The Arduino-based Smart home framework [3] project proposes a system that regulates domestic appliances and safety. Built on a sensing mechanism Smart Home project [4] offers home automation with more functionality such as an intelligent alarm clock, a clever water tank, mosquito sensing. Finally, more realistic testing has been carried out to highlight a real implementation. H Bharathi[5] recommended the use of Raspberry Pi and mobile Android to power electronic devices anywhere and around the country. Aiding Navigation for Visually Impaired Persons [9] The proposed system finds the obstacles and indicates the visually impaired persons to avoid the accident. The camera is attached with raspberry pi in order to sense the properties of the obstacles. Contourlet transform based adaptive nonlinear diffusion filtering for speckle noise removal in ultrasound images [10] This scheme improves the speckle noise removal using contour let transform based multiresolution analysis combined with anisotropic diffusion filtering. These papers focus on home automation, raspberry pi identification, and security compared to current work. It keeps the users relaxed and easy. Our system offers home automation with more features, including gas detection, gas valve locking, etc.

### III. SALIENT FEATURES OF RASPBERRY PI

Raspberry Pi is a scale credit card built on an ARM computer. It's all computer technology "on chip." Here is the model B of the raspberry pi3. 3board of Raspberry pi 802.11 and WIFI in built-in wireless LAN, and Bluetooth 4.1. Raspbian stretching was built onto the board memory card. The LINUX operating system called Raspbian is based on Raspberry Pi 3. The R-pi board features 40 GPIO pins that can be used for digital input for general uses. It features 4 USB ports, 1 HDMI port, 3.5 mm audio jack and a micro-USB power supply. It has a digital output. The board also includes serial connections for the monitor and monitor connection.

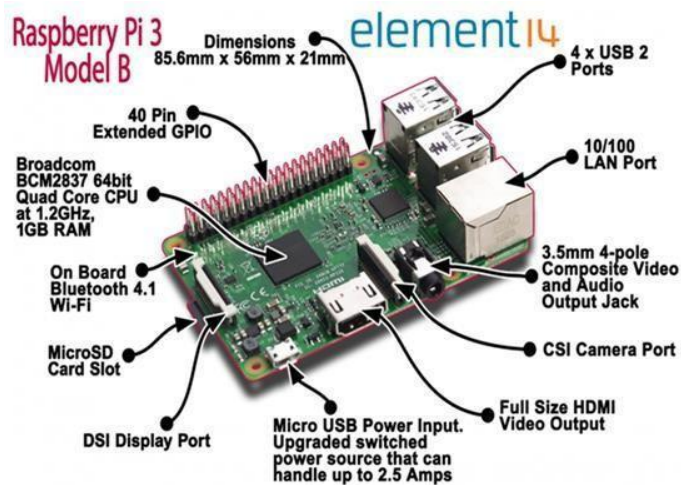


Figure 1:- Diagram of Raspberry Pi 3B

### IV. PROPOSED SYSTEM

Figure (2) displays a block diagram of home automation and safety-based voice recognition by Raspberry Pi. The software and hardware components are dealt with in this project. The component of hardware consists of a voice input command, meaning control home devices by voice.

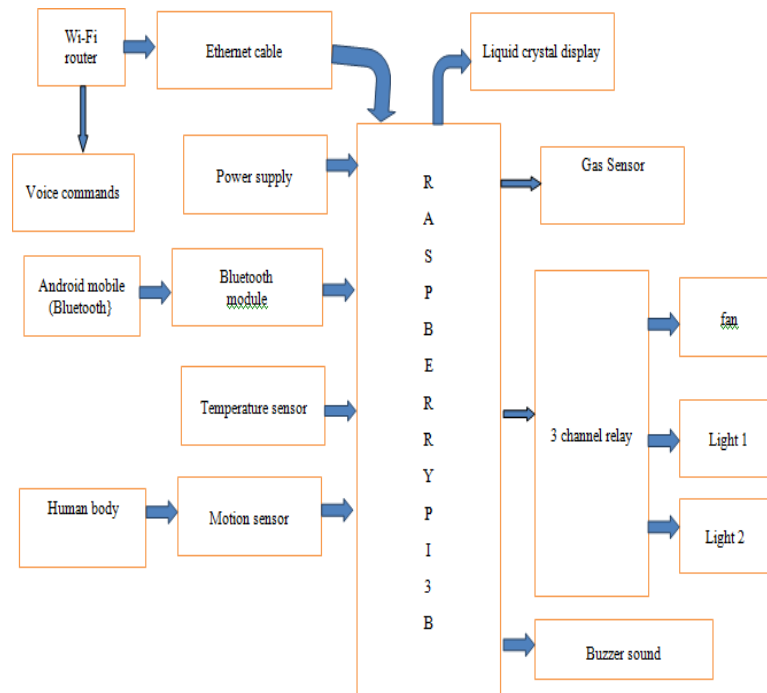


Figure 2:-Block Diagram

### A. Motion Sensor

An electronic sensor that detects infrared (IR) light radiating from objects in its field of vision is the passive infrared sensor (PIR sensor). The PIR sensor is composed of two special IR-sensitive material slots. If the sensor is inactive, the same amount of IR is felt on both slots. Outside, walls, space, etc., it radiates from the ambient. It is being used for protection.

### Figure 3: Motion Sensor

### B. Bluetooth module

It is a wireless exchange of data within the 10 meters range between two Bluetooth modules. HC-05 Bluetooth module is used for this purpose.

### C. Relay Board of Circuit

Relays are simple, electrically and mechanically controlled switches. A relay is an electrically operated switch that is commonly used in industrial controls, cars and machinery. Two independent parts of a circuit may be isolated using two distinct voltage sources. 12V is consumed by the relay circuit board.

### D. Temperature Sensor

DHT11 humidity and temperature sensors are used here. Here we are. The DHT11 is an ultra-low-cost sensor that produces digital, calibrated data, digital temperature & humidity. The data pin has a capacitive moisture sensor and a thermistor to test the surrounding temperature (no analogue input pins needed).

### E. Pressure Sensor

Next to the gas valve is used to avoid gas explosions. The gas sensor is used. It monitors the atmospheric gas regularly and sends the values to the home control system for the prevention of gas explosions.

It monitors the atmospheric gas regularly and sends the values to the home control system for the prevention of gas explosions.

#### **F. Wi-Fi and Ethernet Cable**

By connecting a Wi-Fi router to the R-Pi via Ethernet cable, the network IP application scanner can be downloaded for Raspberry Pi's IP address.

#### **F. Buzzer**

Buzzer is the vibration signal transducer for the respective electric signal. A buzzer is an audio-signaling instrument, which is mechanical, electronic, magnetic, electromagnetic, electro-acoustic or piezoelectric. A piezoelectric buzzer can be driven by an oscillating electronic circuit or other audio signal source.

#### **G. Power consumption**

It is really important to us to understand the functioning of the current sensor ACS712, as it is the main component of the project before we start constructing the project. Measurement of current, especially AC, is often a difficult task because of the noise associated with the improper insulation, etc. But it has become a lot easier with the help of this ACS712 module, designed by Allegro.

This module is based on Dr. Edwin Hall's theory of hall effect. In accordance with its theory, a tension is generated at its edges perpendicular to the directions of both the current and magnetic field when the current carrying leader is put in a magnetic consumption. The new transportation driver across. This calculation takes the millivolt measurement that we called the hall-voltage. This hall tension is commensurate with the current running through the conductor.

The greatest benefit of ACS712 Current Sensor is that AC and DC current can be measured and both the load (AC/DC load) and measurement unit are insulated (Microcontroller part). As shown in the image, the module consists of three pins, each VCC, Vout or Ground

### **V. SOFTWARE DESIGN**

#### **A. Installation**

Download the raspbian zip file. Org [7] and remove it from the zip file. Raspbian zipper. The win disc 32 manager can then be downloaded [8]. Now open the Win32 disc programme, add SD card (Sd card format after connection to pc) After writing good, remove the memory card and load the image file into raspberry pi, enter the image file into the memory card. Now link the raspberry pi to your desktop and connect to the LAN such that the raspberry pi IP address is identified by the IP scanner. Then enter the pi IP address for the download putty. We can install on the laptop by applying the VNC viewer, which we can run through a laptop. Python's the language of programming. In order to improve the Home Automation device voice code, python language is used. It is a high-level language for the programming of raspberry pi.

### **VI. METHODOLOGY**

Voice commands are given through AMR (android meets robot) voice app which connects to the nearby Bluetooth device and sends it to the r-pi and the corresponding action is performed. For Security purpose we are using Motion sensor, and Temperature sensor and Gas Leakage sensor. In order to know the temperature and Humidity value we are using a temperature sensor (dht-11) and its value is displayed on the LCD screen. When PIR sensors detect any motion, it triggers to raspberry Pi and it sends to the buzzers automatically.

When any Gas leakage occurs automatically it will be detected and it will send a signal to Buzzer on. We can do watering of plants in the home garden from time to time by interfacing the water motor to the Raspberry Pi and giving the time delay to the Raspberry Pi automatically it turns ON/OFF the motor which reduces the human effort.

### **VII. RESULTS**

Controlling home appliances through voice and providing security to the home when the owner is absent. The power consumption the electrical appliances can be obtained.

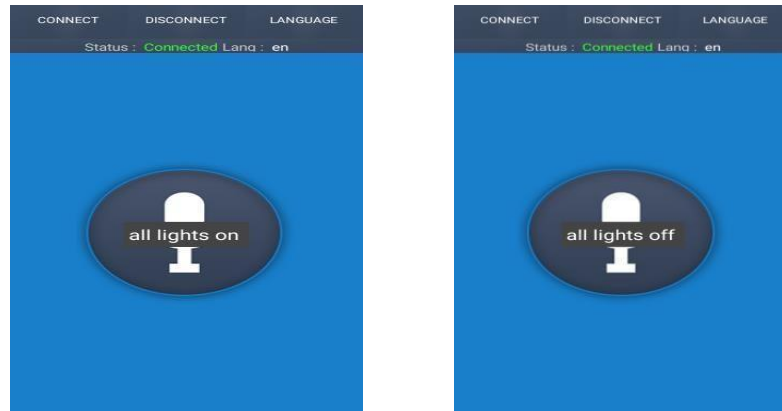


Figure 3: screenshot of android mobile phone when Bluetooth module is connected to Bluetooth of the mobile phone

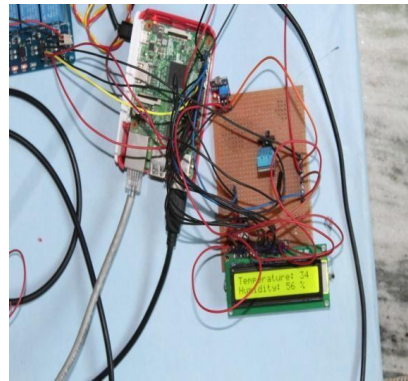


Figure 4:- To display room temperature

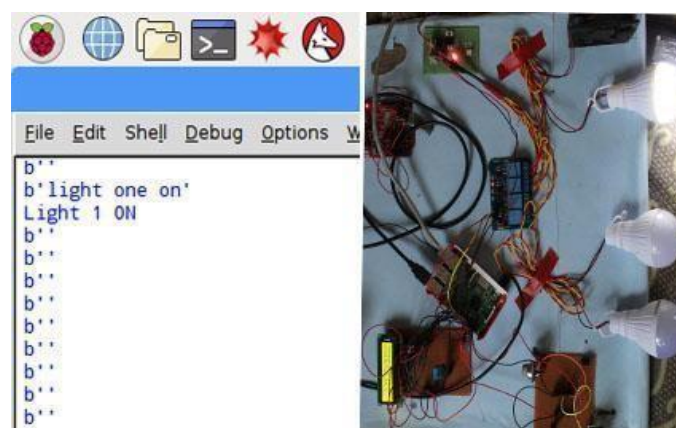


Figure5:- When light 1 ON

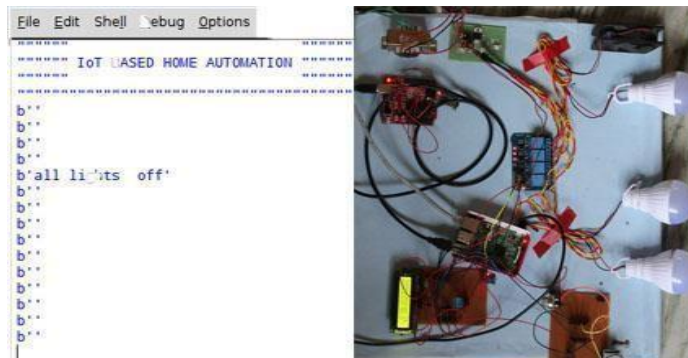


Figure6:- To display “ALL LIGHTS OFF”

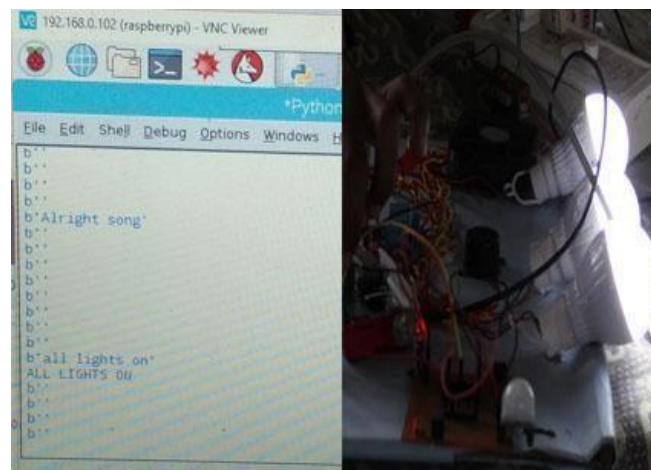


Figure 7:- To display “ALL LIGHTS ON”

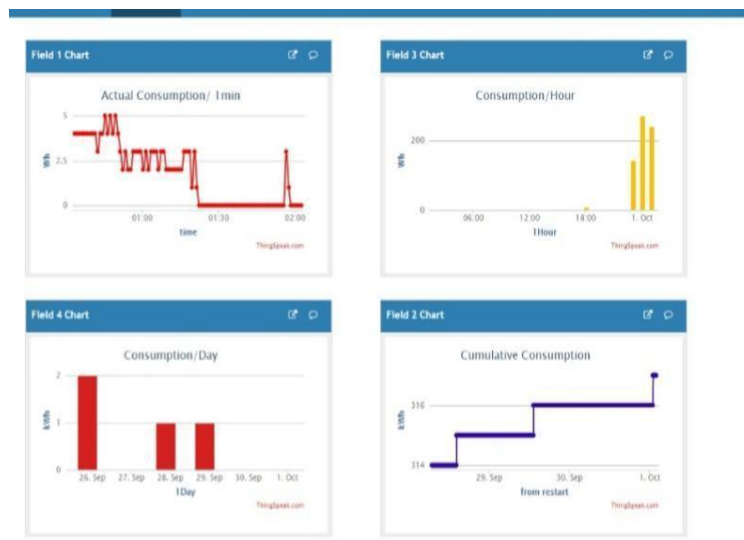


Figure 8: Power Consumption Graph

## VIII. CONCLUSION

The main aim of the project was to design a system in such a way that to produce maximum output with minimum complexity. Voice controlled home appliances are to reduce human efforts. It is mainly helpful for old and paralyzed people. By temperature sensor room temperature and Humidity will be displayed on the LCD display. If any unknown person enters the room or any gas leakages occurs automatically Buzzer will be on. It's security features can be extended for future scope by interfacing the camera to Raspberry Pi. With the proposed work energy consumption is reduced and that can be viewed in the think speak network of math works.

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