



Home Automation using SiriProxy RaspberryPi

Ayesha Siddiqha, Divya L
School of Computer Science
Reva University, Bengaluru

ABSTRACT

In present generation where human needs are expanding, brilliant brains are coming up with innovative ideas to fulfil the individual demands. In this swamped world, where humankind is occupied with their own tasks and work commitments, it's becoming next to impossible to completely dedicate one-self to home chores. In this scenario it would be a piece of cake to even imagine a powerful control on house fundamentals. Thanks to the genius minds, this released RaspberryPi to ease the work. All the fundamental devices are controlled automatically by Home Automation application which is accompanied by a voice based digital assistant that is Apple's Siri which provides location self-reliant access to the internet and local network. Siri's potential is magnified by RaspberryPi to implement the Home Automation system which controls air cooler, Television, lights, door and window blinds. RaspberryPi is equipped as SiriProxy as a proxy server for Siri. The user can precedent his own commands for Home Automation by plugging-in SiriProxy.

Index terms: Home Automation, RaspberryPi, Siri, SiriProxy, Speech Recognition.

I. INTRODUCTION

Evolving technological enhancements has satisfied the raising need for burdensome lifestyle by introducing Home Automation System which provides contributively, energy efficient, secure and gratified environment to the user. In this timeline where human is easily interacting with smartphone for example Apple's Siri which uses speech Recognition technique to follow and respond to spoken commands is a proof to how a smartphone has turned purely into all-purpose portable device that fulfils all the service cravings of human being.



Fig 1 Home Automation System

More adequate capabilities like mobile communications and Home Automation technologies have existing standards that are entryway to RF and IP networks. Home automation system can use other smartphone applications through several system supports, but the disadvantage is that these applications sometimes don't get



adopted well by high standard smartphones. The integration and configuration purpose of SiriProxy isn't as easy as it demands well-skilled technicians.

II. LITERATURE SURVEY

The Home Automation mainly focuses on wireless Home Automation which specifically targets on addressing the pointed issue or power exhaustion, range of operation, seasonable lifestyle. Zhu et al (2010) proposed to automate ZigBee based networks through a voice control system. Voice commands are translated by automatic speech recognition module that is a speaker independent element and destines it to the actuator of the system through ZigBee network. Lights, power outlets, IR operated devices and temperature sensors are ascended by ZigBee network. However, ZigBee based network is mandatory for the system work, as it demands a module for each gadget to be controlled by the system thus, making it uneconomical and limited. The speech recognition technique intimated by the system uses a specific module to identify the spoken words in any environment that sometimes brings down the quality of the speech giving errors due to noise.

To suppress this issue, Apple's Siri here comes to rescue the brilliant. Siri is already installed in apple devices to interact with the user using more convenient natural language. The researchers prescribe multipurpose RaspberryPi to control Home Automation. All the gadgets are directly connected to General Purpose Input Output (GPIO) ports through Relays and motor drivers making Home Automation worthwhile.



Fig 2 SiriProxy RaspberryPi

Piyare and Tazil (2011) introduced Bluetooth technique for Home automation using an Adriuno control sensor shield as a remote control system. The custom made commands are sent to Bluetooth antenna of Adriuno IO port scripted in Python through Bluetooth communication.

A new program has to be plotted to the Adriuno Board whenever a user changes system configuration which is annoying. Thus, the Bluetooth is replaced by the Wi-Fi technology for outspreaded range of connection and RaspberryPi is directly programmed whenever system changes are made. [4] proposed a system about Efficient Sensor Network for Vehicle Security. Today vehicle theft rate is very high, greater challenges are coming from thieves thus tracking/ alarming systems are being deployed with an increasingly popularity. As per as security is concerned today most of the vehicles are running on the LPG so it is necessary to monitor any leakage or level of LPG in order to provide safety to passenger. Also in this fast running world everybody is in hurry so it is required to provide fully automated maintenance system to make the journey of the passenger safe, comfortable and economical. To make the system more intelligent and advanced it is required to introduce some important developments that can help to promote not only the luxurious but also safety drive to the owner. The system "Efficient Sensor Network for Vehicle Security", introduces a new trend in automobile industry.

III. SYSTEM OVERVIEW

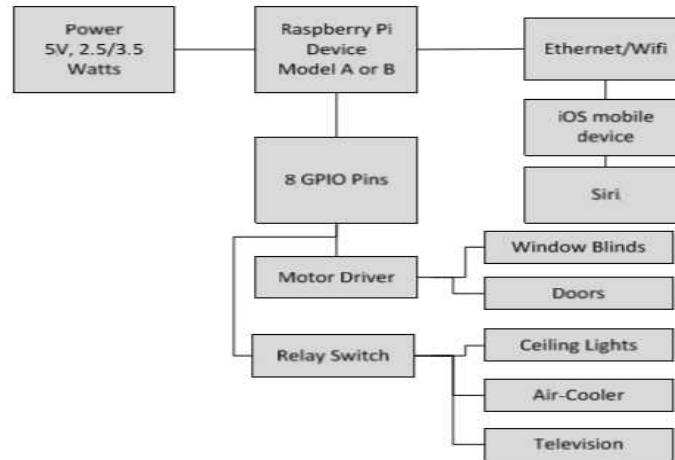


Fig 3 Overall System Diagram.

Siri uses voice recognition technique to understand the user's command which is pre-written in RaspberryPi GPIO (SiriProxy). Now, Siri communicates with Adriuno Board over Wi-Fi to transfer the commands where Adriuno Boards turns this commands into action and the task is well performed.

IV. HARDWARE DESIGN

The hardware operation of Home Automation system is discussed in this session. The entire process is divided into two elements that are 8 channel Relay module and L298N motor driver.

- **8 CHANNEL RELAY MODULE**

RaspberryPi is connected to three gadgets that is ceiling lights, air conditioner and Television through 8 channel relay module. This figure describes how exactly these gadgets are connected to the system and how well RaspberryPi is carrying out its functionality.

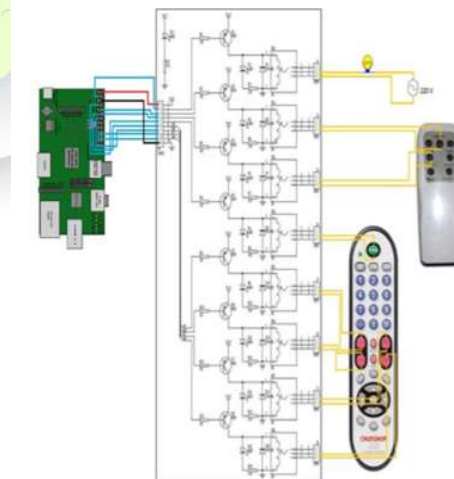


Fig. 4 Diagram of 8-Channel Relay connected to the RaspberryPi.

- **L298N MOTOR DRIVER**

The exertion of window blinds and doors is carried out by L298N motor driver which has two 24-volts DC motor embedded in it to demonstrate its complete control over the mechanism. GPIO pins of RaspberryPi are accompanied by four input pins of motor driver to control the commands. A specific binary sequence is allotted to a specific operation that is 10 to make the motor turn clockwise while 01 turns the motor anti-clockwise. The kinetics of motor rotation defines the actual movement of the gadget that is winding and unwinding of window blinds and door.

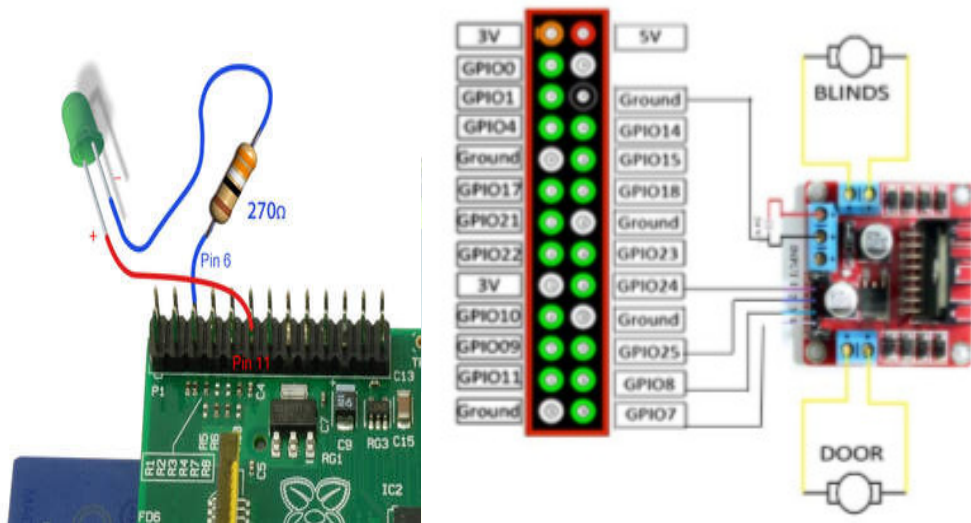


Fig. 5 Diagram of L298N Motor Driver to the GPIO ports of the Raspberry Pi.

V. SOFTWARE DESIGN

The home device set up is built on the translation of voice commands to the text to run the commands on the system.

- **SPEECH RECOGNITION**

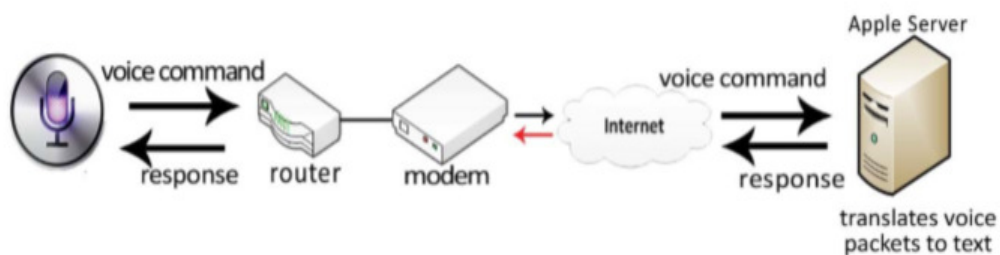


Fig. 6 Standard Siri Operation.

This figure demonstrates how Siri application of an Apple device generates voice packets delivered from the user that is directed to the Apple server for text translation and responses to the request. A proxy server directs voice commands that are traversed via speech recognition done by Siri server to the control system to complete the home automation process. SiriProxy hijacks the meta-phrased text and reverberate from the apple server and channel it through the SiriProxy plug-in that is developed to spawn command libraries to enable GPIO port of RaspberryPi retort the Apple device.

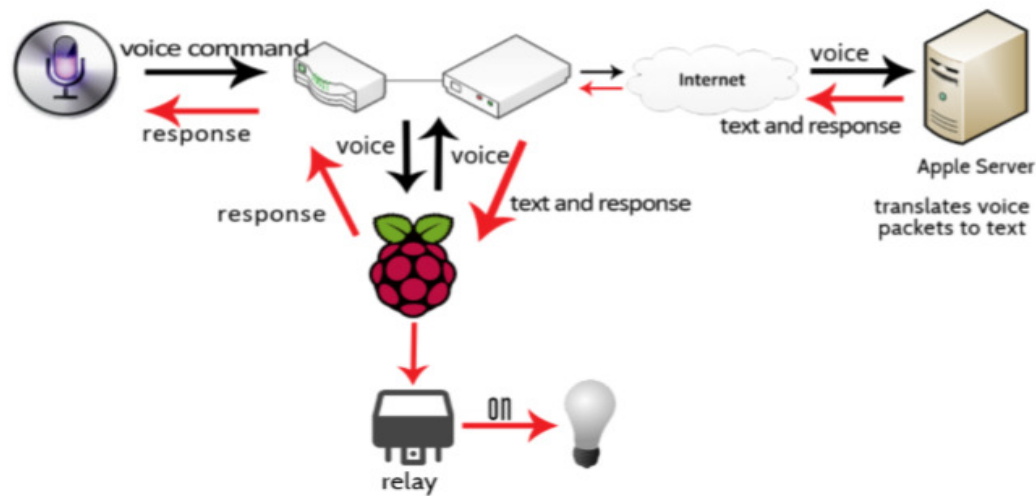


Fig. 7 SiriProxy Operation.

- **DOMAIN NAME SERVICE (DNS) CONFIGURATION**

The voice packets are directed to a RaspberryPi IP address of an Apple server by Apple device to translate the text and then process the command to satisfy the user's demand dnsmasq.com is installed and configured in harmony with RaspberryPi to redirect the DNS.

This entire theme of communication is a false show of disguise where Apple device is made to believe that it is interacting with Apple server and on other end apple server is so confident of its communication with authenticated Apple device, to initiate the confidential task, unaware of the pathway of their convers is masqueraded by the SiriProxy.

A fakeApple SSL must be first generated and installed in Apple device to ensure that data passed over the internet is secure. This enhances the dissimulation of SiriProxy to hijack the request from Siri enabled device and response from Apple server. The configuration of RaspberryPi and apple device should be correlated.

- **SYSTEM CONTROL THROUGH RASPBERRYPI**

The system is programmed in Ruby and WiringPi to operate the gadgets hitched on RaspberryPi. This script embodies special library of instruction set to run the commands in LX terminal. The program first recons the hijacked information from the Siri server is compared with the command programmed within the code, if match is found it executes appropriate set of instruction otherwise control is handled to the apple device.

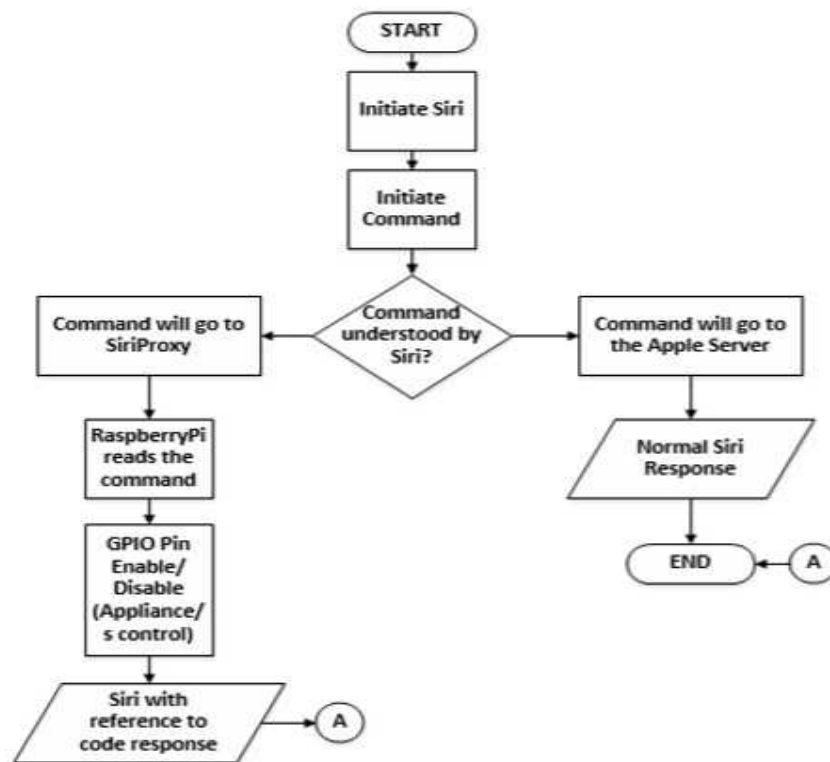


Fig. 8 Code Block Diagram

VI. DATA ANALYSIS

- ACCURACY**

The quality of faultlessness of Home Automation mechanism is recorded by the following test that's where the speech recognition capability of Siri is examined. 30 volunteers pronounced the commands which was taken as input by the Siri for speech recognition and translated by RaspberryPi. The outcome is simulated in figure demonstrates the efficiency of "light off" command has lowest accuracy, as Siri often mistakes "light off" to "night off".

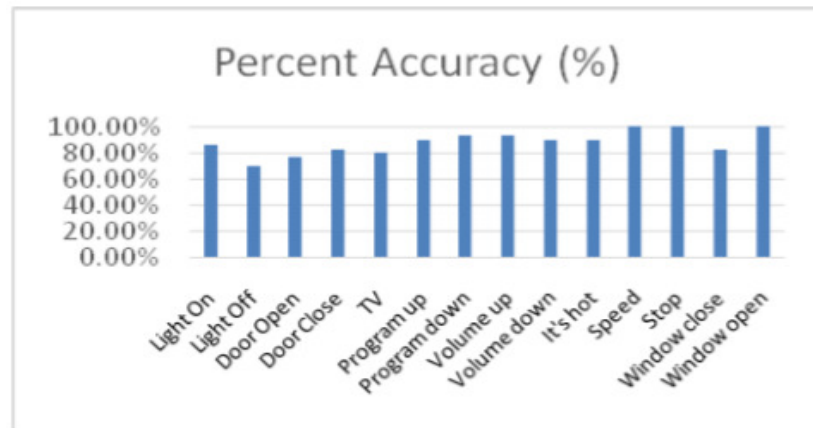


Fig9Percent Accuracy of the System.

- **LATENCY**

To endow the quality of this application, the time taken to run the command is considered as threshold that's less time taken more qualified the application is. The figure simulates how Door and Window blinds have longest response time and deteriorates the work performance of Home Automation System.

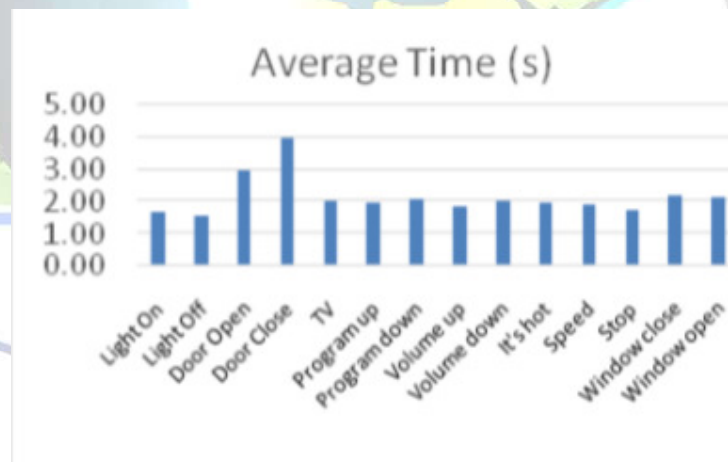


Fig. 10 Average Response Time for each Command

VII. CONCLUSION

Here Siri's speech recognition capability is inch-by-inch put into work. To translate voice command into text command to perform the operation the Raspbian Operating System is configured in RaspberryPi network and DNS settings to contact Siri enabled device. The system was able to robotise the five gadgets in the room that's Air cooler, Television, Window blinds, Door and Lights which provided acceptable success rate.



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