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# Chatbot Control Home Automation over Telegram/ WhatsApp

**Prof. Swati Y. Kale[1], Mr. Otari Om[2], Mr. Sanap Omkar[3], Mr. Nakade Om[4], Mr. Naikwadi Aditya[5]**

Prof. Computer Engineering Department, Adsul's Technical Campus, Ahilyanagar, India [1]

Student, AIDS Engineering Department, Adsul's Technical Campus, Ahilyanagar, India [2]

Student, Information & Technology Engineering Department, Adsul's Technical Campus, Ahilyanagar, India [3]

Students, Computer Engineering Department, Adsul's Technical Campus, Ahilyanagar, India [4,5]

**Abstract:** *Smart home system aim to maximize surveillance, monitoring, and security. This system is integrated with telecommunications and control systems from the microcontroller to create the Internet of Things (IoT). Nowadays, home appliances are integrated with the Smart System that connected to the internet. On the other hand, messenger applications now integrated with chat bot with Artificial Intelligence to make user easier to communicate. This trend made a possibility to implement a system where a home appliance can be operated by only using a messenger application. In this research, a Smart home system designed with a client-server system based on Raspberry Pi as microcontroller and Telegram Messenger as interface that perform the control communication. The process separated into three stages: design, implementation, and result. The design consists of designing the server, interface, and Smart Home control system. To test the performance, the Messenger Bot are compared with other direct controller application. The result shows that the Telegram Messenger application is suitable and more convenient for being the IoT controller.*

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**Keywords:** Chatbot, Smart Home System, Appliances, Telegram

## I. INTRODUCTION

Automation in the 21st century is a tipping point making it assume an imperative job in our day to day life. The rule interest of any robotized structure is reducing human work effort time[1] & goofs in light of human recklessness with the improvement of presence day advancement, computerization has turned into a need for everybody in everyday life. Applications are being created on Raspberry Pi's [2] that are valuable in different ways. Another forthcoming innovation is regular language handling which empowers us to direction and control things through talking bot. Joining these, our paper displays a smaller scale controller (Raspberry Pi) based sensors home mechanization framework. Such a framework will be useful for clients to have power over each apparatus. The term Chatbot implies controlling or working electrical Machines by utilizing Chatbot direction. [3]

This project presents the development of home appliances based on Chatbot command using Android. In this venture, the order input has been caught by the Android and will be sent to the Raspberry Pi. Raspberry Pi got the flag and handled the information flag to control the light and fan. We are utilizing a PIR movement sensor to recognizes developments in home and DHT11 moistness sensors to identify temperature.[4]

The android application for example Chatbot controls the Raspberry Pi remote to play out the fundamental capacity. This task can be altered by our necessity and need. This should be possible as it has numerous GPIO ports that can be modified and can give the client authority over different utilities and capacity from his/her shrewd gadgets. It permits a controlling number of home machines at the same time. Here nearby server is made on Raspberry Pi. A client can work

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the home apparatuses utilizing different cell phones, for example, PDAs, workstations or tablets. Chatbots are gradually supplanting applications close by held gadgets as a result of their usability and knowledge. As demonstrated by a continuous report by 'Business Insider', about 83% of associations have effectively utilized or plan to utilize chatbots by 2020. Telebots owe their insight to customary language taking care of methodology. Immaculate chatbots must probably understand the setting of a discourse, gain from the dialogs and improve itself after some instance. It can be cultivated through different AI and significant knowledgeable frameworks. There are three types of home automation:
1. Individual control gadgets: This gadget controls just a single machine, models incorporate; photocell Lighting controls and
2. Distributed-control systems: Framework which takes into consideration single apparatuses to discuss inside with one another with electrical wiring and without a focal controller.
3. Centrally controlled systems: This framework transmit motions between a focal PC and machine controllers or ecological sensors. This paper present controls the home mechanization apparatuses utilizing cell phones or workstation phone custom calculation with the assistance of Raspberry Pi.

## II. LITERATURE SURVEY

Currently there are many systems working on home automation but there are some problems happening so to overcome those problems and make our system easier, secure and effective to use. There are some systems which work on voice recognition. In voice recognition it operates through voice as a input but there is a problem that , if owner gets some problem related voice or oral surgery is done then the system cannot access the functionalities, even though some systems use Arduino but Arduino has also problem that, it has less processor speed than Raspberry PI. We are using raspberry pi because it is nothing but a mini computer where we can use as a server to manage over the web also. So we referred some papers to find out what problems can happen in currently used home automation system and we have tried to overcome those problems. Following are the referred papers that describe the how their system works.

• Paper [1] ATmega328P launched by Arduino-UnoRev3 is used in robotized system. Diverse detectors are used like LPG Sensor (MQ5) which perceives any spillages of LPG gases, Temperature Sensor (LM35) and Moisture Sensor (DHT11) which separates soaked quality in addition air recognizing is conceivable. Bluetooth component is utilized for framework HC05module. The voice based structure gives precision in vocal attestation and better sound examination. Many gadgets can be replicated & the clock can be set for automatic performance.

• Paper [2], House computerization is done by the Raspberry-Pi3 ZigBee Protocol and Mobile Communication (GSM). ZigBee includes very less information exchange limit and Global System for Mobile Communication as generally huge transmission limits. It depends upon Fringe Interface Controller which is 8-bit µcontroller.

• Paper [3], the House robotization framework - managed by Raspberry-PI3, It gives command through chatbot using natural language processing. This system also uses Email-server. It can work through also via a web application. When command entered and system checks with the server it response as switching a light on/off. This framework responds on if interloper coming when entryway is bolted, it sends letters to the owner of the house.

• Paper [4], the Home Computerization framework is constrained by Arduino with the principle of giving a simpler life to incapacitated individuals. It utilizes Voice Acknowledgment module V3 and microphone. The detected voice command makes system to switch the relay and change the direction of motor due to which jack lifts the bed up or bring back bed to lower elevation angle, switch on/off the bulbs and rings the buzzer when disabled person needs help.

• Paper [5] The Home Computerization Framework is finished by Arduino UnoRev3 microcontroller and in place of the framework, to a Cell phone; the HC-05 Bluetooth module is utilized. Another advancement which is in this endeavour is ordinary language dealing with which controls contraptions. Voice controlled Home Computerization Framework impacts the intensity of the arduino uno which give a maximum vocalcontrolled robotization framework. By using Normal Language Processing and the diverse h/w in a smart phone, it forwards vocal to be utilized to oversee control of electrical contraptions.

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## III. METHODOLOGY

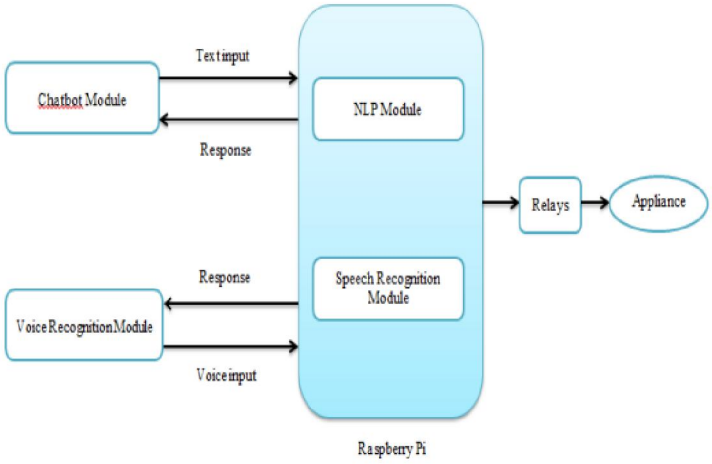


Fig 1: Architecture of Proposed System

The following architecture diagram shows the integrated working of all the modules in the Home Automation System : Chatbot module, Voice assistant module, Speech Recognition which is inclusive in the former module, and the NLP module. The Chatbot module provides input in textual format whereas the Voice Assistant module will provide the input as a voice command. These inputs will be sent to the Internet of Things ( IoT ) component, Raspberry Pi. The entire processing of the acquired input happens in this unit. The Raspberry Pi unit contains Natural Language Processing ( NLP ) unit. This unit is responsible for processing the textual input to find the intent. The speech input from the Voice Assistant module will undergo speech-to-text processing, hence providing a text input to the NLP module.

Inside the NLP module, the intent generated acts as the deciding factor for defining the actuations based on the rules and/or constraints defined. The NLP module leads two processes simultaneously:

• Actuation based on evaluation of input.

• The output response generated for the user

The output signals regarding the actions that need to be performed on the electronic devices are sent to them through the relays.

### A. Raspberry Pi:

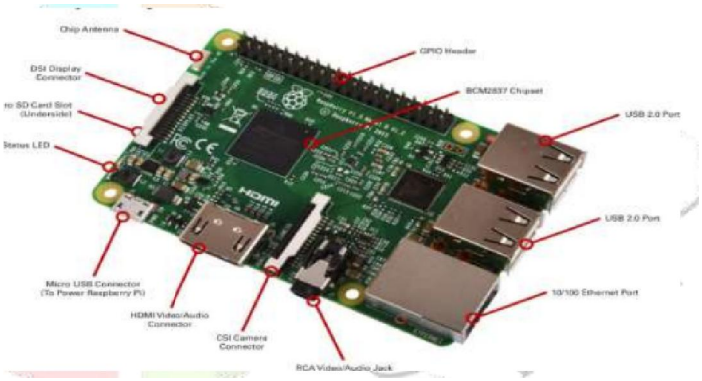

Fig 2: Raspberry Pi Module

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The proposed design used Raspberry Pi (Figure 3) as the microcontroller. Raspberry Pi is a mini-module devices with 32 GB memory. This module has a microUSB for a PC connection, external antenna, USB CP2104 to IC UART, and Wi-Fi with 802.11b/g/n | 2.4GHz. The module consumes approximately 700mA of the power. The programming language supported by this module is Python, C, C++, Ruby, etc. In this research, the Python language is used. Then the module is placed on Breadboard (Figure 4) that used to quickly build and test circuits before finalized in any actual circuit design.

**B. Software Requirement:**

• Python NLTK library : Natural Language Toolkit is a free and open source platform for building Python programs to work with human language data. It provides easy-to-use interfaces along with a suite of text processing libraries for classification, tokenization, stemming, tagging, parsing, and semantic reasoning and wrappers for industrial-strength NLP libraries.

• Python Pyaudio library: PyAudio provides Python bindings for PortAudio, the cross-platform audio I/O library. PyAudio uses Python to play and record audio on a variety of platforms.

• Python GPIO library: Used to control General Purpose Input Output devices using Python.

• Raspbian OS : Raspbian is a free operating system based on Debian, optimised for the Raspberry Pi hardware.

• Telegram Bot API : The Bot API is an HTTP based interface created for developers to build bots for Telegram.[3]

**C. Implementation**

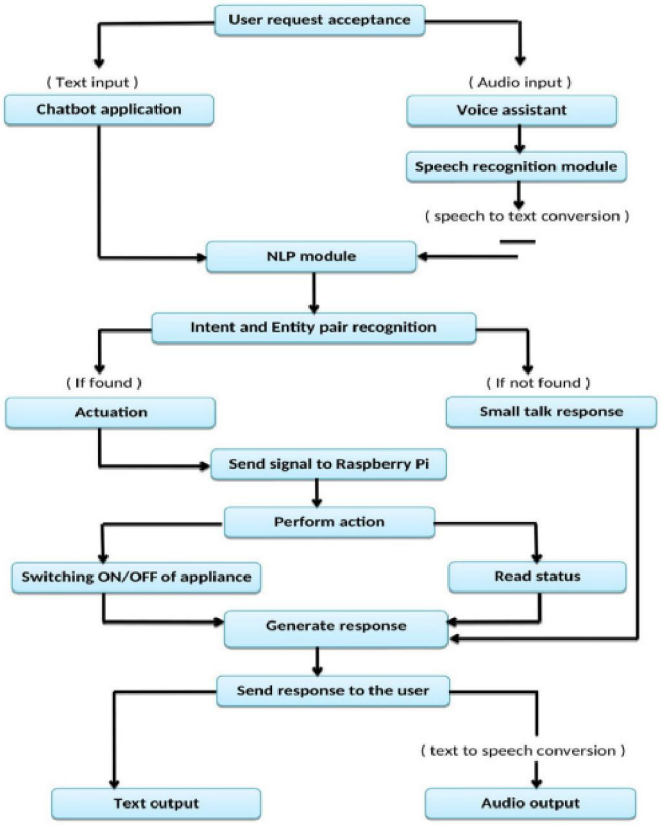


Fig 3: Flowchart of the System

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This Step1 : Setup and Installation of Raspberry Pi. This is followed by installing some necessary tools and libraries : Telepot required to build application for Telegram Bot API for to and fro of messages. NLTK (Natural Language Tool Kit) is a suite of libraries required for natural language processing. The working of Voice Assistant makes use of Speech Recognition, pyttsx/gTTS. Some of the machine learning techniques used require the installation of Scikit Learn.

- Telepot
- Speech Recognition
- NLTK
- scikit-learn
- pyttsx/gTTs

Step 2 : Implementation of a chatbot using Telegram server to control the home appliances via GUI( custom keyboard) and/or sending a sentential input.

Step 3 : Implementation of a voice recognition module to accept voice input via microphone. Convert this speech input to textual format via Speech recognition module which will undergo NLP processing to find intent. Output generated as a response to the input query will be converted from text to speech using pyttsx/gTTs.

Step 4 : Input from the user undergoes NLP processing as shown in figure 3 .

## IV. CONCLUSION

This research aims to create design of smart home system controller by using Raspberry Pi module. The connected home appliance then will be controlled from Telegram application. The result show that all the devices can be operated easily via chatbot system in Telegram application. The delay also quite small by only 0.47 seconds. Therefore, this solution can be an option for the home appliance controller by using Telegram application. There is still room for improvements in this research. In the future, the security function will be added to improve the security of the controller. The fire sensor and gas leak sensor could be added to create a notification from the chatbot in the Telegram application.

This project covers most simple pieces, to what end it can show tense positively sprightly place residence qualifications. Powerful bot ordered domicile motorization the use of raspberry pi is recommended to this extent enhance traditional wield and control of gadgets by older and handicapped individuals. This task gives a fundamental arrangement of home computerization which can be effectively executed and utilized adequately. This structure enables a client to make choices & to control the house apparatuses with help of an android apk, along this making people's life pleasant meanwhile remotely open through adaptable contraptions like mobile phones.

## ACKNOWLEDGMENT

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