

INTERACTIVE HOME AUTOMATION SYSTEM WITH GOOGLE ASSISTANT

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Abstract — This is an interactive home automation system that is unique in its own way that it is unlike any other existing home automation systems that have been made previously. Most of the existing systems that are available in the market use a Raspberry Pi or Arduino chipset that are programmed to control a set of devices inside a house, which are given instructions using a mobile application or a web-based UI. Unlike them, this device focuses on controlling the devices using voice recognition and artificial intelligence, while being interactive as well. This is achieved by utilizing the open sourced API of Google Assistant by Google Inc.

Keywords— Google Assistant, Home automation, Interactive, Artificial Intelligence, google, raspberry pi

I. INTRODUCTION

The purpose of this device is to reduce the effort put in by the user to control a device manually. This system uses Google Assistant SDK provided by Google, to communicate with the Raspberry Pi and the users. The users give voice commands to the device to control the appliances in their home, change the temperature of the thermostat if available, talk to the Google Assistant to get seamless information and news, and also use it to connect to the smart lights and smart TVs to use Chromecast or any other smart tech.

The rest of the paper is as following: section II gives the literature survey of the previous papers, section III describes the proposed model for the paper, section IV describes the methodology, section V presents the description of the hardware and software components and section VI the working model of the device, section VII the conclusion and future scope and lastly section VII provides the references.

II. LITERATURE SURVEY

Vamsi Krishna Patchava, Hari Babu Kandala, P Ravi Babu in [1], used the Raspberry Pi and

connected camera and motion sensors and created a web UI based home surveillance and automation system.

Sarthak Jain, Anant Vaibhav, Lovely Goyal in [2], explained the system that can be used to control home appliances by reading the commands the subject of an email received to the specifically programmed email address of the device.

Rajeev Piyare and Seong Ro Lee in [3], presented a flexible and low-cost home control and monitoring system using embedded micro server with IP connectivity for controlling devices remotely using an Android application.

Ronnie D. Caytiles and Byungjoo Park in [4], made use of the advancements of mobile IP and integrated it with the smart home system. They adopted the principles of mobile IPV6 to provide mobility on the design and architecture for MIP-based Smart home.

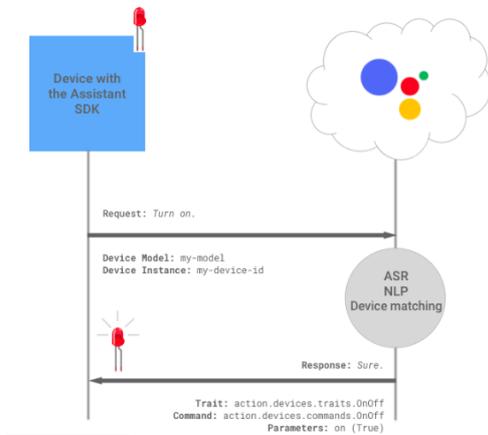
Ana Marie D. Celebre in [5], proposed a system that uses the Siri technology powered by Apple Inc., to control the system using in built voice commands provided with Siri. They used an unsupported server to get the functionality of Siri.

III. PROPOSED MODEL

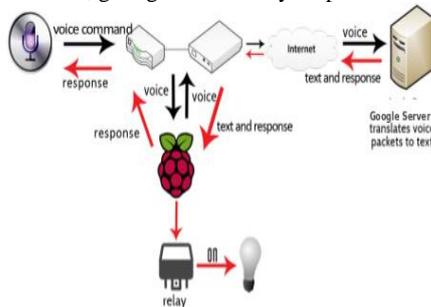
The idea of the project is to integrate the concept of **Google Assistant** into Raspberry Pi and control the appliances in the home that the device is installed. Google recently released an API for Google Assistant, for platforms other than Android, such as Linux and Windows, using Python language. This makes it simpler to program into the Raspberry Pi, and lighter compared to other programming languages.

IV. METHODOLOGY

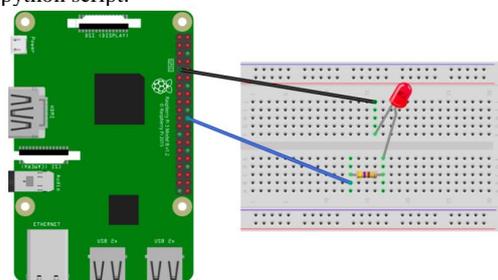
This device consists of a Raspberry pi, USB microphone, LED lights, speaker, bread board and jumper cables. This system works based on the Google Assistant SDK. The device is first registered in the Cloud console of the users' google account, and the SDK files are downloaded on to the Raspberry pi OS.



The USB microphone is essential to the device as it helps to listen the voice commands to the device. Since raspberry pi is based on Linux, it makes it easier to run certain scripts on start up. This helps the Google assistant to execute at the time of boot. A sound is played to acknowledge that the Google assistant is up and running. It can be activated by saying the hot word “Hey Google”, and given required commands based on the functionality. The commands are processed in the cloud, giving the necessary output.



In this project we are using LED lights connected to the raspberry pi using bread board and jumper cables. The bread board is connected to the raspberry pi using the GPIO pins, whose voltage is controlled using the python script.

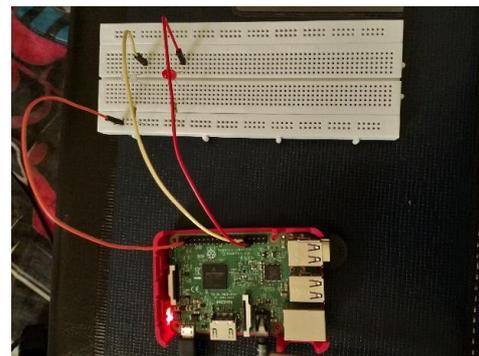


V.HARDWARE AND SOFTWARE COMPONENTS

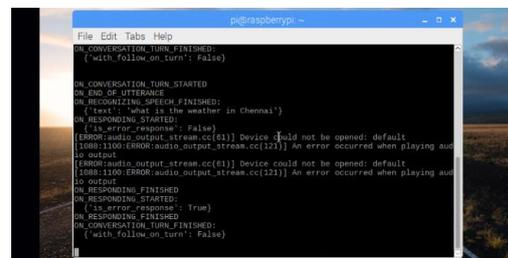
1. **Raspberry Pi 3:** Raspberry Pi is a miniature computer, powerful enough to perform the functions similar to a regular personal computer. We are using Raspberry Pi 3 Model B+ in this project. It has a 1 GB RAM, 16GB SD card acting as the internal storage, built-in Wifi and Bluetooth chipsets, HDMI, LAN ports, 3.5mm headphone jack and 4 USB ports.
2. **USB Microphone:** Since the Raspberry Pi does not have an inbuilt microphone, we use an external microphone that connects to USB.
3. **Google Assistant SDK:** The Google Assistant API has to be enabled in the cloud console of the user’s Google account.
4. **LED lights:** Two LED lights are used in this system, that are named as “Kitchen Lights” and “Bedroom Lights”.

VI.WORKING MODEL

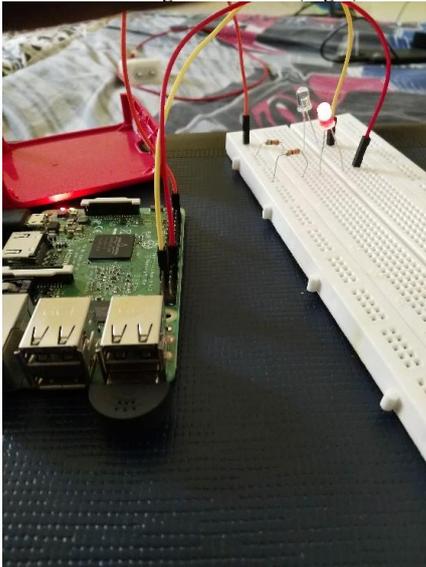
The working model (Fig 1) would look as follows:



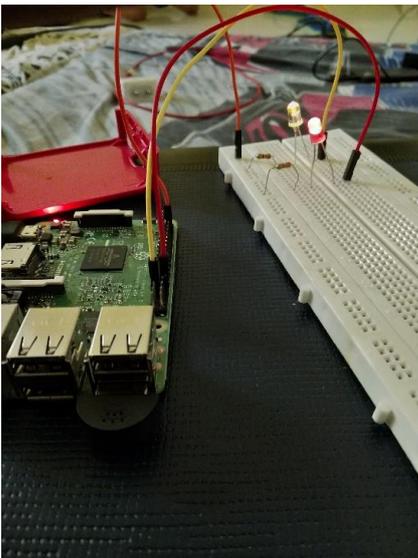
The Google Assistant is initiated on start up. The conversation can be started by saying “Hey Google” and a sound is prompted to acknowledge the same. If there is a display available for the raspberry pi, the voice is converted into text and is displayed on the screen too. Look at the following (Fig 2):



Here, we are using the keyword “bingo” to help the device recognize which command should be executed in order to achieve the desired output. For example, kitchen lights can be turned on by saying “Hey Google”, followed by “Bingo Turn on Kitchen lights”. The device gives a voice feedback saying “turning on kitchen lights”, and the light is turned on. The red LED acts as Kitchen lights as below (Fig 3):



Similarly, the bedroom light can also be turned on. The yellow LED in the below figure (Fig 4):



VII.CONCLUSION AND FUTURE SCOPE

Google Assistant is a fast-emerging technology. Currently most of the smartphone market is leading in Android which comes with Google Assistant technology. Even iPhones can be installed with Google Assistant from the App Store. This helps the device to be future-proof without becoming easily obsolete. However, there are constant updates coming to the Google Assistant SDK, making it much easier to register more and more devices in the cloud console without putting in a lot of effort.

VIII.REFERENCES

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