JUST A RATHER VERY INTELLIGENT SYSTEM (JARVIS) DIGITAL ASSISTANT

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Abstract

The paper deals with the use of the Android Things platform to implement a primitive Artificially Intelligent System. The system that is implemented is called Just A Rather Very Intelligent System(JARVIS) which is an integration of four different modules i.e., JARVIS Things, JARVIS Brain, JARVIS Web, JARVIS Mobile and can be used for various applications like playing music, Weather Forecasting, Welcome greeting, Random Web Search, Home AutomationandMathematicalComputations.Eachmoduleareuniqueandhave their importance: 1) JARVIS-Components This module acts as an interface and control unit, its input is the human voice that is converted to text and is sent to JARVIS Brain through JSON fileformat,2)JARVIS Brain uses Natural Language Tool Kit(NTLK) and Python Packages to identify the type of response that has to be reciprocated and has predefined commands,3) JARVIS Web-This module is used when the input is random search or anythingotherthanPre-feedcommands,4)JARVISM obile-This module is a mobile app that is interfaced to JARVIS Brain through local servers, this module is similar to JARVIS Things. The Raspberry pi3 has been installed with Android OS version 7 and used for implementing the modules with required samples to support the specified applications.

Keywords: Automation, Artificially Intelligent, Integration, Mathematical Computation, Modules

Introduction

Artificial Intelligence is a technology where intelligence is introduced into a system artificially to make the system smart enough to work without human intervention. Predictive analytics which predict the behavior of the system outcomes has several disadvantages such as speed lagging, scale, and delayed response that is optimized with the use of Artificial Intelligence technology. In the coming years, AI will be a part of our day-to-day life making life simple with much ease to accomplish everyday jobs. In an AI, samples are added to the systems that it becomes self-learning, self-reasoning, decision making, and problem-solving.

JARVIS is a primitive AI system formed by integrating four modules that acts as a virtual personal assistant. Samples are fed into the Brain Module, inducing intelligence artificially into the system to make it independent. Samples are the real-time instances with the specific response that could be added to the system to give a clear-cut response to the real-time input fed into the system. More the number of samples better will be the response from the system. Adding enough samples plays a major role in developing an AI system. The local Flask server is hosted using ngrok software where in all four modules interact with the Brain to provide an effective response to the user.

We are using Android Things as a platform to develop the JARVIS system to overcome these curity issues witnessed in a normal IoT system. This platform uses Android OS to develop an IoT embedded system with top-class trusted security a sit uses Java as the development language. Android Things is compatible with many hardwareplatformslikeRaspberrypi3,NXPPico, and Intel Edison which supports the integration of Android and IOS devices through weave protocol, which is introduced to communicate with Android devices, as the weave API automatically recognizes the Android devices. Android apprised eveloped to link smart phones to the system.

Jarvis features

The project entitled JARVIS establishes the use of different, dissimilar technologies and their integration to build a smart intelligent system that will in terrelate and support human activity in their everyday jobs. It mainly focuses on voice control, Home Automation, Welcome greetings, and Mathematical Computation. This Project Version Currently has four main modules with respective sub-modules embedded in them. Each module has its importance. Below gives one brief description of each module and demonstrates the integration of all four modules to become a smart intelligent system.

JARVISBrain

JARVIS Brain is one of the main important core modules of the system. Its prime function is to control and coordinate all the activities of the system. It has necessary sub-modules which use NLTK(Natural Language Tool Kit)[1]most popular library for natural language processing(NLP)[2] and is based on Scikit-learn. It has NLP which is a collection of samples, practical techniques, machine skills, and strategies that are easy to learn, and that can lead to a real intelligence system. The programming language we used is python, the NL Pengine is written in this language to differentiate, classify the input speech, and process it by converting it from speech to text where in the text is recognized by the brain and responds depending on the classification of the input speech. Presently we have trained the engine to classify and categorized into three forms

1) Welcome greetings like "hello" from the user

2) The basic mathematical expression for computing(+, %, -, *,/,square, square root, cube root)

3) Commands and instructions to do tasks that are given by the user

If the input speech was given by the user in which the result is not found out from the classifier module, then It is accessed to the online web search using the "duck duck go" web search API.

JARVIS Components

JARVIS Components is another import an module that is used for interfacing and also acts as a controlling unit for specified applications. For this module, we use Raspberry pi 3 model B, installed with Android things OS version 7. Here Android things are the platform that makes embedded devices easy by developing and providing android development tools, Android based frame work, and Google API's which mark the developers effective in their work and market hem successful on mobiles and brings the developer closer to hardware peripherals and drivers. This platform is streamlined for single application use but still, it is in the preview mode and is regularly updated with new drivers, samples, and APIs by the developers which are available on the official website of Android things developed by Google. The main function of this module is to take the speech input from the user and this speech input is converted to the text version and is sent to the Brain module for further processing. The Brain module processes the text version based on its input speech and responds depending on its classification of input speech, it performs tasks. The speech input is given through a USB microphone which recognizes input speech andviagoogletexttospeechwhichconvertsitintotextthatissenttoBrain using Volley library. This volley is an HTTP library used for transmitting network data for android apps. The JSON (JavaScript Object Notation) is a text format completely language-independent, but it acts as a data-inter change format, generally used for parsing and generation. The JSON response obtained is analyzed and further processed to check what things must do. If the users ends a command type, then the respective task is performed like switching on the lamp, turning on a fan, etc. If the response from the Brain is a simple reply, then it uses built-in Text to speech conversion that is spoken out through the USB speaker connected to Raspberry Pi3.In this module, we also use MQTT(MessagingQueuingTelemetryTransport)messagingprotocol,designedforpublish/subscribe messaging transport, extremely lightweight and simple protocol. This MQTT issued for Lamp control wherein the lamp is based on theESP8266WIFImodule.It is programmed to control the lamp or fan or any other electrical AC appliance. The main aim of MQTT is to establish communication between the Things and the Lamp. MQTT protocol is also used for assisting and supporting the JARVIS Mobile module to control the Lamp based on the user input.

Jarvismobile

Jarvismobile is one of the user interface modules on Android platforms such as mobiles, tablets, laptops, and other end-user devices. This module is based on creating an android application that provides another user interface to establish communication with the Brain and to perform the tasks given by the user. The name of the android app is JARVIS Mobile. This module is almost like Jarvis Things. Here, in this module, there is a built-in speech to text and text to speech libraries where in the replies from the brain are read out audibly on the mobile device itself. This module interacts with the Brain and Things module to perform the tasks like Switching on the Lamp, Turning on Fan, etc. on the behalf of MQTT which is used to send data and instructions to the things and specified tasks are performed respectively.

JARVIS Interface

JARVIS Interface is another user interfaced module to interact via a web platform. This module is similar to Jarvismobile module. In this Web module, An HTML page is created which uses 'Web kit speech recognition" for speech to text conversion and also uses speech synthesis utterance' for text to speech conversion which is read out audibly to the user. AJAX (Asynchronous JavaScript and XML)is used for the exchange and interchange of data with the server, updating parts of a web page without reloading the whole page. AJAX is the simplest protocol that establishes a connection and helps to communicate with the Jarvis Brain. AJAX combines several programming tools like HTML, XML, and other objects. JARVIS Web module provides applications to be performed such as setting alarm, welcome greetings, mathematical computations, playing music, Fetching temperature, weather, and a random web search and many more. In This module, MQTT is not integrated hence MQTT does not carry any data regarding the Jarvis Web module.

Workflow-Diagram

The workflow diagram provides the graphical overview of the JARVIS system by illustrating each module in the system which represents the actual working model.

The below Flowchart depicts the interaction between the JARVIS modules as shown in figure1(a).
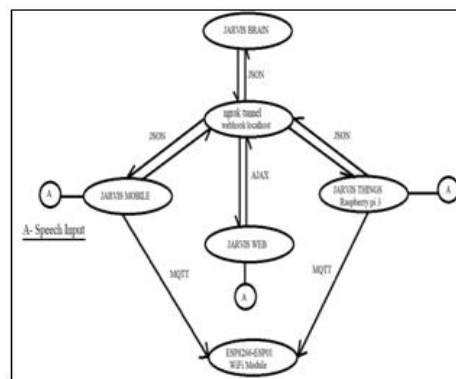

Fig.1(a): Interaction by using the local-host server and representing the use of messaging protocol

Conclusion and Scope in Future

This paper presents JARVIS as an artificially intelligent smartest AI system. It is a virtual personal assistant which is based on the integration of different technologies for to interact with humans. It is an efficient system indicating a way to organize users' schedules to support their day-to-day tasks. It is more portable and reliable that can be used by the user at anytime, anywhere as it is easily accessible through internet services. JARVIS is a digital assistant with artificial intelligence, it is a very flexible AI and is a useful technology. It provides a better conversational interface to deal with the global network for an information.

In the future, the next step will be to strip back the physical hardware as far as possible. We can expect this AI system to be implanted and permanent. It can be used for organizing business and delegate minor tasks. It acquires reliable manpower and more virtually enabled devices. The key feature in the future would be to pick up specific problems and build on them and then expand the horizon

Acknowledgment

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