Just a Rather Very Intelligent System

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Abstract— The Paper deals with the use of Android Things platform to implement a primitive Artificially Intelligent System. The system that is implemented is called as 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 Weather Forecasting, Welcome greeting, Random Web Search, Home Automation and Mathematical Computation. Each module are unique and have their own importance: 1) JARVIS Things-This module acts as interface and control unit, its input is human voice that is converted to text and is sent to JARVIS Brain through JSON format, 2) JARVIS Brain-This module utilises Natural Language Tool Kit(NTLK) and Python Packages to identify the type of response that has to be reciprocated and has commands which are predefined, 3) JARVIS Web-This module is used when the input is random search or anything other than Pre-feed commands, 4) JARVIS Mobile-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.
Key words: Automation, Artificially Intelligent, Integration, Mathematical Computation, Modules

I. INTRODUCTION

Artificial Intelligence is a technology where an intelligence is introduced into a system artificially in order to make the system smart enough to work without human intervention. The predictive analytics which predicts 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 coming years, AI will be the part of our day to day life making life simpler with much ease to accomplish the everyday jobs. In an AI, samples are added to the system so that it becomes self-learning, self-reasoning, decision making and problem-solving.

JARVIS is a primitive AI system formed by integrating four modules which acts as a virtual personal assistant[6]. Samples are fed into the Brain Module, inducing intelligence artificially into the system in order 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 a sufficient number of samples plays a major role in developing an AI system. The local Flask server is hosted using ngrok software wherein all four modules interact with the Brain to provide an effective response to the user. Nowadays, In an IoT system data breach has increased lacking security which has led to internet outrage making it vulnerable.

We are using Android Things[3] as a platform to develop the JARVIS system to overcome the security issues witnessed in a normal IOT system. This platform uses Android OS to develop an IoT embedded system with top-class trusted security as it uses Java as the development language. Android Things is compatible with hardware platforms like Raspberry pi 3, NXP pico 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 app is developed to link the smartphones to the system.

II. FEATURES

The project entitled JARVIS establishes the use of different, dissimilar technologies and their integration to build a smart intelligent system which will interrelate and support a 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 it. Each module has its own importance. Below gives the one by one brief description of each module and demonstrates the integration of all four modules in order to become a smart intelligent system.

A. JARVIS Brain

JARVIS Brain is one of the main important core module of the system. Its main 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 NLP engine is written in this language to differentiate, classify the input speech and process it by converting it from speech to text wherein 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 "duckduckgo" web search API. This engine uses python based services for building Flask Framework[5] which utilizes template and helps to create micro web framework and build our own web applications.

B. *JARVIS Things*

JARVIS Things is another important module which 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 is the platform that makes embedded devices easy by developing and providing with android development tools, Android-based framework and also google API's which mark the developers effective in their work and make them 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 API's by the developers which are available in 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 USB microphone which recognizes input speech and via google text to speech which converts it into text that is sent to Brain using Volley library. This volley is an HTTP library used for transmitting network data for android apps. The JSON(JavaScript Object Notation) is text format completely language independent but it acts as a data interchange format, generally used for parsing and generation. The JSON response obtained is analyzed and further processed to check what the things have to do. If the user sends 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 Pi 3. In this module, we also use MQTT(Messaging Queuing Telemetry Transport) messaging protocol, designed for publish/subscribe messaging transport, extremely lightweight and simple protocol. This MQTT is used for Lamp control where in the lamp is based on the ESP8266 WiFi module. 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 JARVIS Mobile module to control the Lamp based on the user input.

C. *JARVIS Mobile*

Jarvis mobile is one of the user interfaced module on Android platforms such as mobiles, tablets, and other end devices. This module is based on creating an android application which 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 similar to Jarvis Things. Here, In this module, there is a built-in speech to text and text to speech libraries wherein 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[4] which is used to send data and instructions to the things and specified tasks are performed respectively.

D. *JARVIS Web*

JARVIS Web is another user interfaced module to interact via a web platform. This module is similar to Jarvis mobile 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 exchange and interchange of data with the server, updating parts of a web page without reloading the whole page. AJAX is the simplest protocol which 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 welcome greetings, mathematical computations, Fetching temperature, weather and a random web search. In This module, MQTT is not integrated hence MQTT does not carry any data regarding Jarvis Web module.

III. WORKFLOW DIAGRAM

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

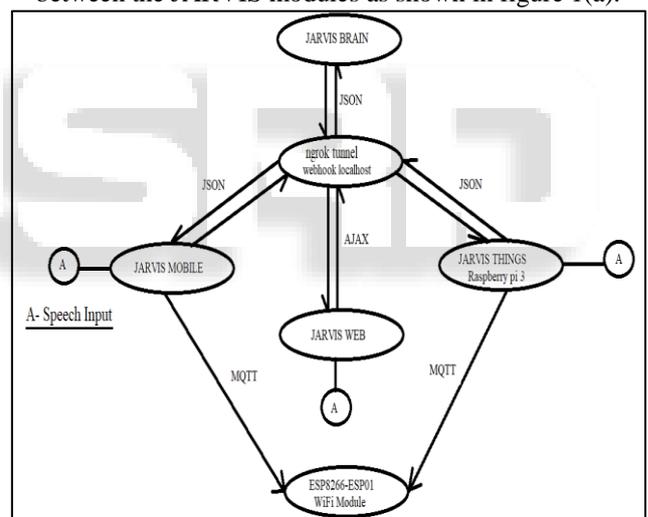The below Flowchart depicts the interaction between the JARVIS modules as shown in figure 1(a).

Fig. 1(a): Module Interaction using the localhost server and representing the use of messaging protocol via ESP8266 WiFi module.

IV. CONCLUSION AND FUTURE SCOPE

This paper presents JARVIS as an artificially intelligent smart AI system. It is a virtual personal assistant which is based on the integration of different technologies to interact with humans. It is an efficient system indicating a way to organize users schedule to support in their day to day tasks. This JARVIS system 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 and virtual assistant with artificial intelligence, it is a very flexible tool and is a useful technology. It provides a better conversational interface to deal with the global network for information and collaboration.

In 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 of virtually enabled devices. The key feature in future would be to pick up specific problems and build on it and then expand the horizon

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