

AlexaPi on Amazon Ecosystem for Home Assistant Environment and IFTTT recipes

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Abstract - Voice-driven technology has created awe-inspiring interaction on the whole natural way possible. With the popularity of speech-driven Artificial Intelligent (AI) assistants like Google Home, Apple's Siri, Amazon Echo, the ability to not just listen the question but also understand and reply in seconds has brought illusion into reality. This paper attempts to develop customized skilled speech-driven AI assistant AlexaPi using Amazon Ecosystem platform, to monitor and control the Home Assistant events and also to trigger If This Than That (IFTTT). The proposed paper shows the straightforward way to develop speech-driven Artificial Intelligent (AI) Assistant.

Key Words: Voice-driven technology; Artificial Intelligent Assistant; Amazon Alexa; Alexa Skills Kit; AlexaPi Amazon Ecosystem; Home Assistant; IFTTT

1. INTRODUCTION

Today we live in era driven by various innovative technologies from touch to voice. It all began to ease the human efforts by automating things and now we have reached to self learning machines. The machine which was seen to relieve human efforts has become intelligent and can not only act in accordance with human voice instructions but also endow with intelligent solutions. This is all because of self learning algorithms and inevitable architecture incorporated within. Artificial Intelligence (AI) has created an amusement for technology with machine learning (ML) and deep learning. Gone are the days where we had to type the search input and wait for the results to be loaded. Now with years of research, the figment of imagination has come into reality where we can monitor and control things by voice and also it gives intelligent answers. The researchers at Google, Apple, Amazon, Facebook have built their speech-driven personal AI assistants such as GoogleHome, Siri, Alexa, Jarvis respectively. Surrounded by top competitors Amazon is heading the race, as it has created a platform where the developers can create, certify and publish new chatbots and skills for Amazon Echo on their cloud service, Amazon Web Service (AWS) and it is all for free.

Amazon Echo, an AI personal assistant, invoke by wake word Alexa, runs in the cloud, converts voice into text, infers the text and act in response verbally, musically or can also

trigger other smart device like Wi-Fi enabled devices. It is not only capable to interact with voice, play music, provide weather forecast, traffic information, flash news, set alarms, remind to-do tasks, order dinner but also can monitor and control the smart devices at premises. Amazon Ecosystem platform is building block for Alexa where we can develop customized skills for Alexa using speech recognition and natural language processing technology. Alexa has endless abilities, and so do AlexaPi. It can behave as both personal assistant and home assistant with help of HassbianPi environment for Home Assistant and recipes for IFTTT. Home Assistant is a platform to monitor, automate and control the smart devices without cloud developed in python. IFTTT is web based service to create chains of tasks such that they interact with each other which is otherwise tough to do so.

2. LITERATURE SURVEY

In [1] author has presented the idea to build Amazon Alexa on Raspberry Pi using the open source code made available by Amazon on GitHub. Author has also highlighted the need of high quality audio input microphones for Alexa to respond precisely. In [2] author has in detail explained about the digital forensics of cloud and client-centric artifacts pertaining to IVA Alexa's Ecosystem. Based on deep learning, author has proposed proof-of-concept, CIFT tool to support identification, acquisition and analysis of the same. In [3] author has presented modeled approach to develop personal assistant with remote access as an additional feature. In thesis [4] details about web tasking and end user interaction (EUI) has been discussed with IFTTT high and low complexity task breakdown and comparison with other interfaces.

3. IMPLEMENTATION

AlexaPi has been developed on Raspberry Pi and it runs on the Amazon Web Service (AWS). The interface connection made is as shown in Fig.1. The customized skills are developed for AlexPi using Amazon Skills Kit (ASK) and Amazon Lex and skills have been hosted on Amazon Lambda and HTTPS endpoint for execution. The AWS platform uses speech recognition and natural language understanding to interpret the code execution. HassbianPi is also parallel

executed to launch Home Assistant at fixed port 812. Using intents and utterances, see Fig.2, the skill on ASK is customized to glow the LEDs alongside HassbianPi. The wake word Alexa is invoked using java script on companion service of Amazon Voice Service (AVS) to respond to voice commands.

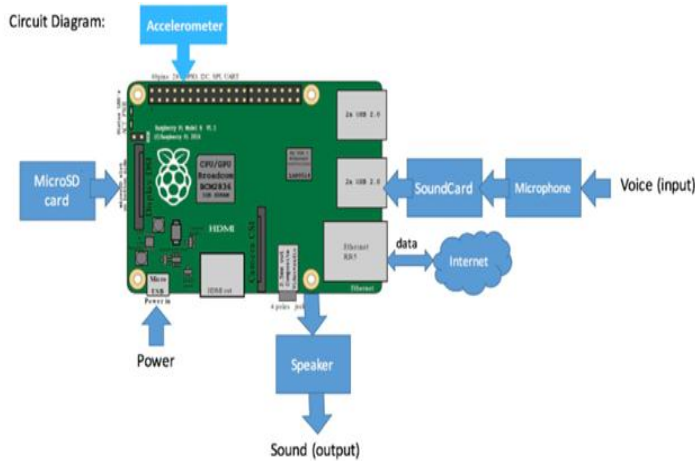


Fig - 1: Circuit diagram for AlexaPi

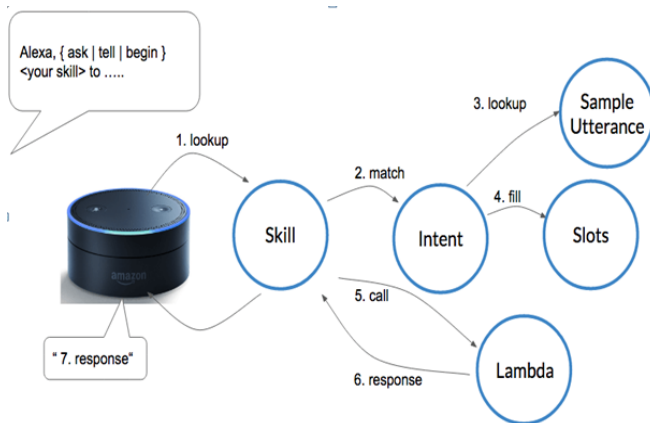


Fig - 2: ASK working flow

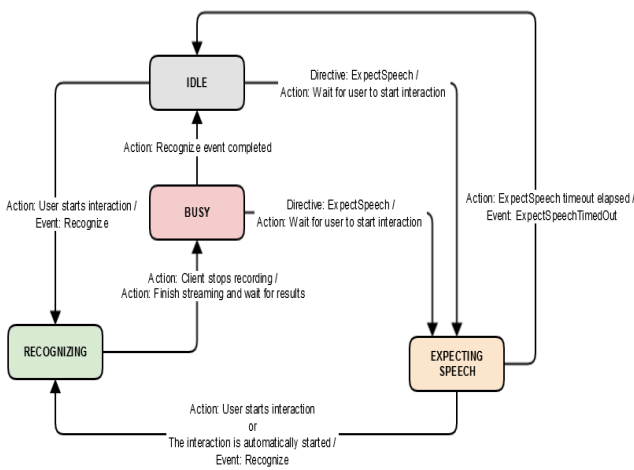


Fig - 3: Action and Events flow

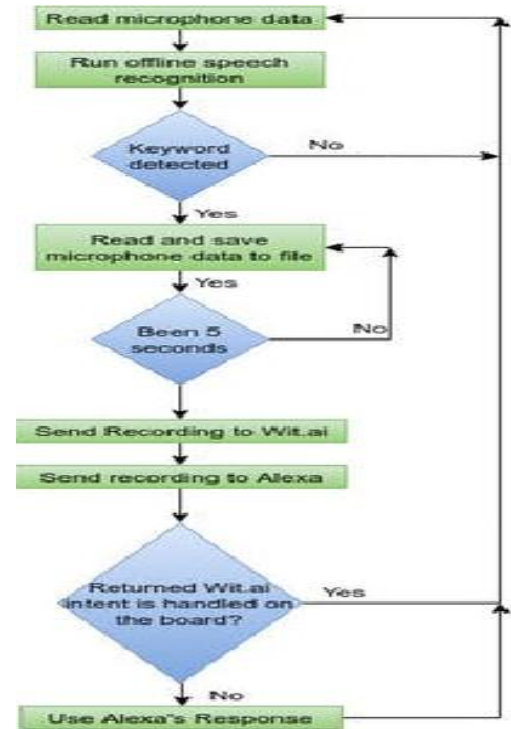


Fig - 4: Flow chart of Weather forecast command on AlexaPi

4. RESULTS

SSH network protocol is used to accept connections and sessions from remote computers, established using PuTTY configuration see Fig.6. VNC (Virtual Network Computing), graphical computer is used to view the sessions of AlexaPi and HassbianPi on Raspberry Pi. AlexaPi is initiated by companionService, javaclient and wakeWordAgent sessions are running parallelly in background Fig.5. Home Assistant is launched on port 8123, it displays two LEDs also we can see the states, how LEDs are mapped, action and event logs, and history, see Fig.7. The monitor and control of LEDs is done using voice commands given to AlexaPi. IFTTT recipes are triggered using AlexaPi commands refer Fig.8.

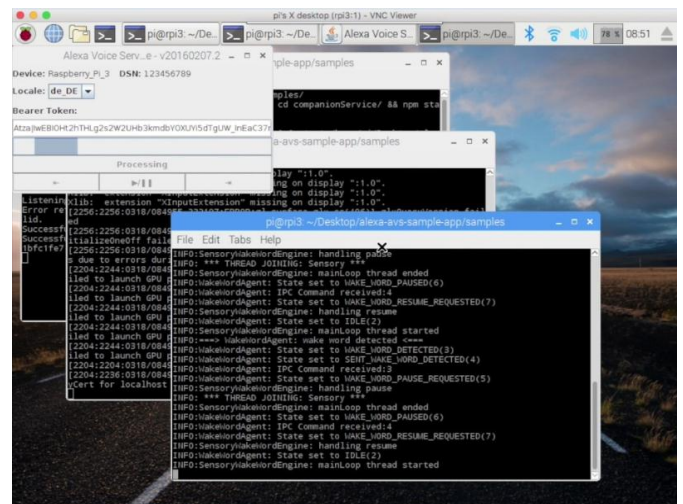


Fig - 5: AlexaPi virtually viewed on VNC

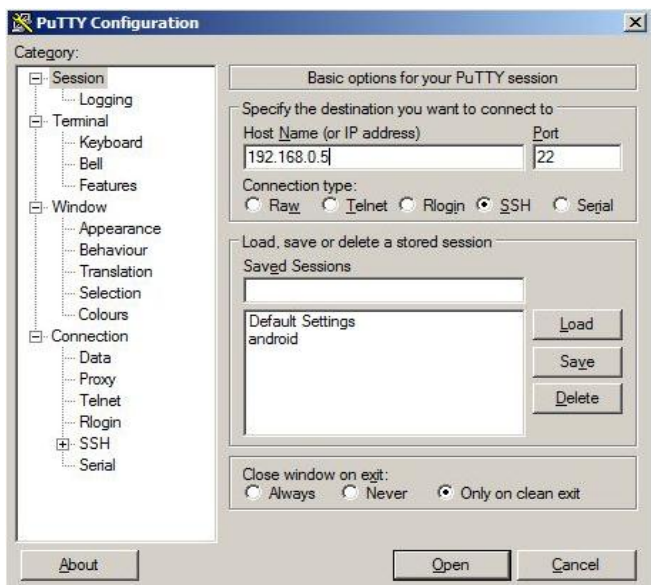


Fig - 6: SSH configuration to start session on AlexaPi

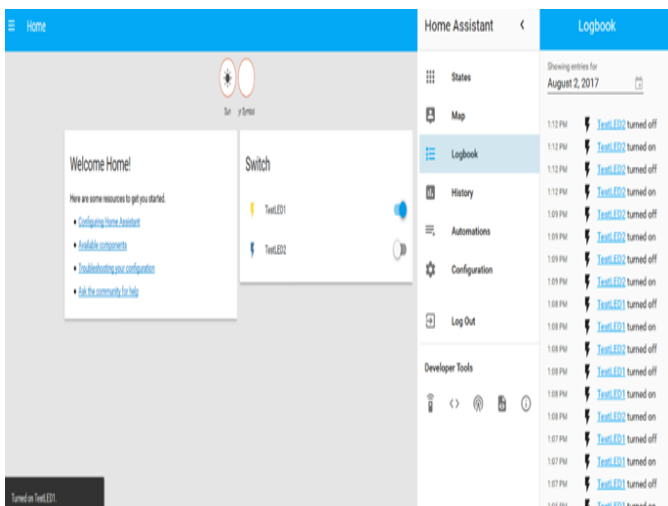


Fig - 7: Home Assistant with display of LED switch and logbook

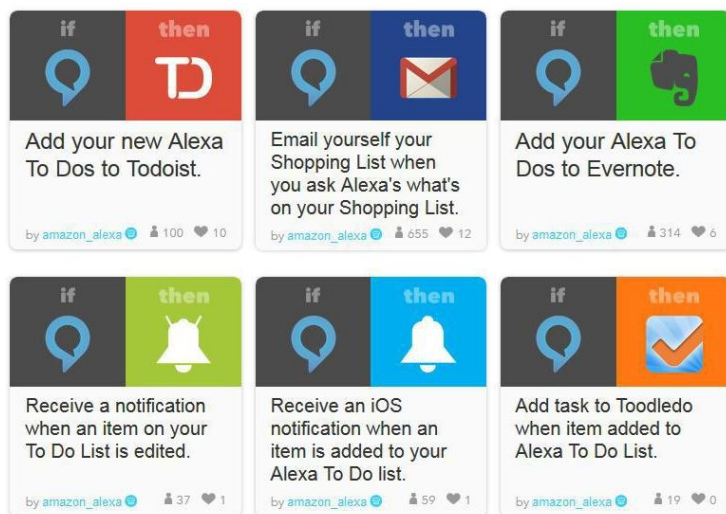


Fig - 8: AlexaPi FTTT recipes

5. CONCLUSION AND FUTURE SCOPE

Using the natural language understanding and speech recognition with AI, and with intents and utterances customized for skills to instigate Home Assistant to glow the LEDs and IFTTT recipes to trigger the tasks such as send email, notify to-do lists, etc using AlexaPi have been implemented using Amazon Skills Kit and AWS Lambda. Google Home and Microsoft Cortana can also be built on Raspberry Pi. AI assistants in future can create more amusements with voice-driven technology in automation and also in self learning algorithms, by adding deep learning and intelligence to machines.

REFERENCES

- [1] W. Wayt Gibbs, "How to build your own Amazon Echo", IEEE spectrum, April 2017
- [2] Hyunji Chung, Junghum Park, Sangjin Lee, "Digital Forensic Approaches for Amazon Alexa Ecosystem", pre-print paper accepted to appear at DFRWS USA 2017.
- [3] Rasika Anerao, Utkarsh Mehta, Sharangdhar Vaze, G. Hrishikesh, "Personal Assistant to Facilitate User Task Automation", IJCTT, vol.15, number 4, Sept. 2014
- [4] Elizabeth Kittel, "An Investiation of End User Interaction for the Ideal Control Metaphor", Thesis presented to University of Waterloo, 2016
- [5] Shreta Sharma, S.K.Pandey, "Integrating AI Techniques in Requirements Phase: A Literature Review", International Journal of Computer Applications (0975-8887), 2013
- [6] K.Hema Shankari, Dr.R.Thirumalaiselvi, "A Survey on using Artificial Intelligence Techniques in the Software Development Process", IJERA, ISSN:2248-9622, Vol.4, Issue 12(Part 6), 2014, pp.24-33
- [7] James Wang, "Deep Learning: An Artificial Intelligence Revolution", Research White paper, June 2017
- [8] Fateme Behzadi, "Natural Language Processing and Machine Learning: A Review", IJCSIS, ISSN 1947-5500, Vol.13, No.9, Sept.2015
- [9] Abedallatif Baba, "A Literature Study of Deep Learning and its Application in Digital Image Processing", ResearchGate, DOI:10.13140/RG.2.2.17403.72480, June 2017
- [10] Yitaek Hwang, "Alexa skills Kit Tutorial- Building Custom Skills with Alexa", Article in IOT for all, February 2017
- [11] docs.aws.amazon.com