Embedded Systems

**Amazon Echo - Alexa Home Assistant Using Raspberry Pi Model B**

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**User Requirements**

The system aims to be a homebrewed, fully-featured, speech enabled home assistant by making use of Amazon public services such as Alexa Skills Kit, Alexa Voice Service and AWS Lambda. The system does not aim to reach people with non-technical background, but rather to impress and encourage developers or hobbyists to get engaged in the community by contributing for further development of such projects.   In order to accomplish this goal this system has to provide the following features:

1. The system **must** be independent of proprietary hardware (such as the featured version of Amazon Echo).
2. The system **must** have a latency less than 5 seconds between the request-response cycle.
3. The system **should** be open for extension eg. adding new hardware controlled by additional Alexa skills such as locking and unlocking a speech enabled door.
4. The system **should** provide a concrete use cases for different levels of interaction between the software and the hardware eg. blinking a voice enabled led, recording temperature, rfid authentication.
5. The system **may** be autonomous.
6. The system **may** be secure.

**System overview**

**Hardware design**

Raspberry Pi 3 Model B

Arduino with RFID

**Software design**

Alexa Skills Kit

Alexa Skills Kit (ASK) is a collection of self-service APIs, tools, documentation, and code samples that makes it fast and easy for you to add skills to Alexa. With ASK, you can leverage Amazon’s knowledge and pioneering work in the field of voice design.

Alexa Voice Service

The Alexa Voice Service ([AVS) API](https://developer.amazon.com/public/solutions/alexa/alexa-voice-service/content/avs-api-overview) is a programming language agnostic service that makes it easy to integrate Alexa into your devices, services, and applications. You can use the Alexa Voice Service (AVS) to add intelligent voice control to any connected product that has a microphone and speaker.

AWS Lambda

AWS Lambda is a compute service that lets you run code without provisioning or managing servers. AWS Lambda executes your code only when needed and scales automatically, from a few requests per day to thousands per second.

Firebase

Websockets

JavaScript Application

NodeJS Application

**Results and further work**

The submitted version of the project offers the following functionalities:

The following list of extensions and/or improvements are planned for the next iteration:

**References**