

Alexa-Enabled Universal Remote

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Abstract

The Alexa-Enabled Universal Remote leverages existing accessibility options within Amazon's Alexa voice assistant and pairs it with the hardware flexibility of a Raspberry Pi to control infrared (IR) and radio frequency (RF) enabled devices. The universal remote learns the signals of existing remotes and sends these signals to control devices hands-free by voice.

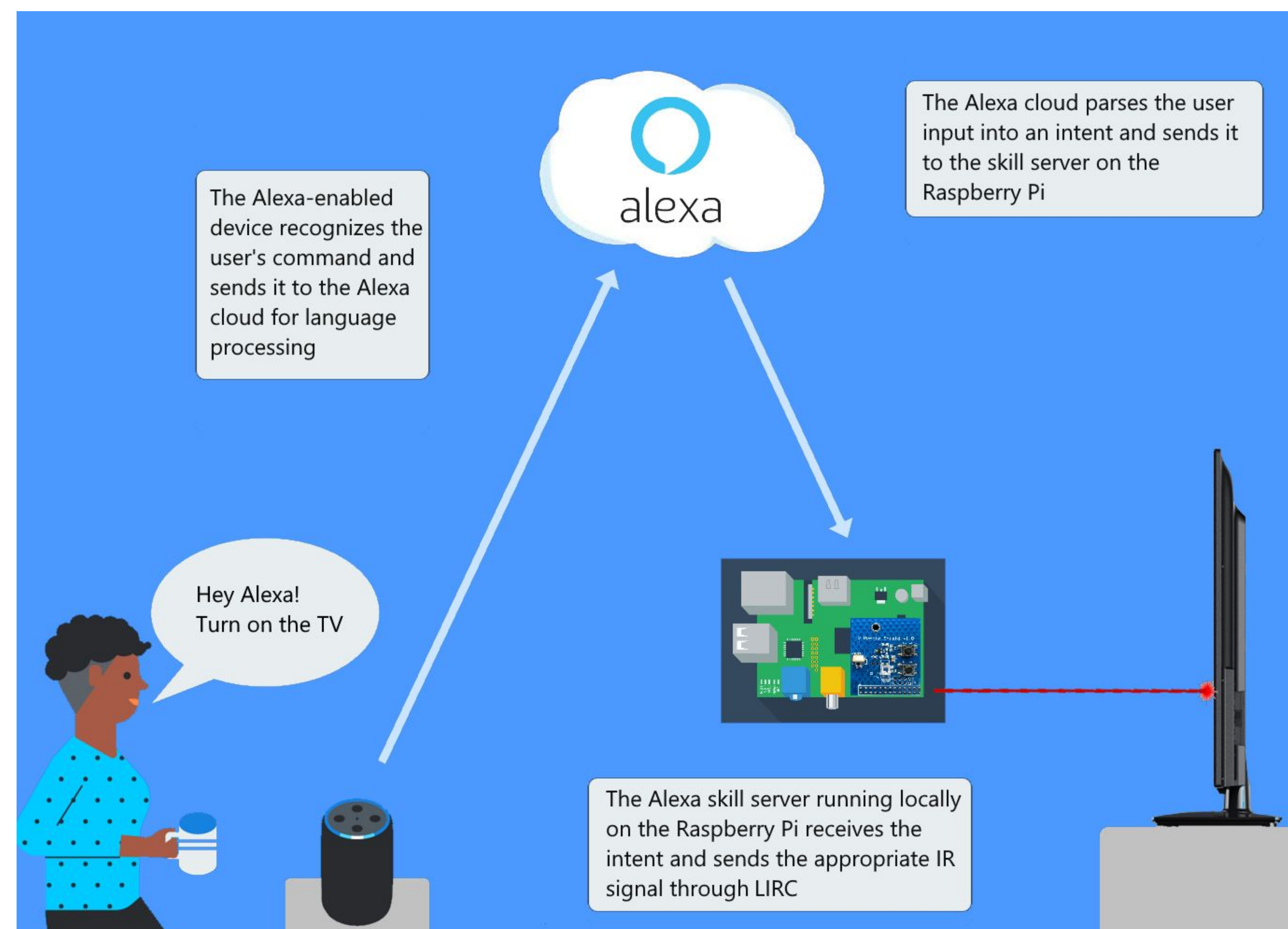
Approach

We use the Alexa Skills Kit SDK to build a custom skill. For this, we create a set of **intents** or actions that a user may perform using the skill, along with a set of **utterances** or words and phrases that may invoke said intents. In our case, we created "set up" intents for the training process and a "use" intent to transmit the recorded signals.

For hardware, we use a **Raspberry Pi 3 B+**, with an **IR/RF transceiver**, a module that allows us to transmit and receive IR signals, connected to the general-purpose I/O (**GPIO**) pins. The Linux program **LIRC** is used to send the appropriate IR signal when an intent is recognized.

Overview

A significant amount of people with disabilities use both regular and special-purpose devices that are controlled by handheld infrared (IR) and radio frequency (RF) remotes. Although these devices have a huge personal impact, they are restricted to those who could use handheld remotes. Voice is an empowering interface that could work around this problem. However, market solutions are low in volume and relatively expensive. The Alexa-enabled Universal Remote project aims to increase the number of devices that can be controlled by voice by recognizing the signals of existing remote controls. The cost-effectiveness of retrofitting existing devices, combined with the inexpensive hardware and the ease of not having to replace entire existing setups would make this product one of the easiest ways to enhance accessibility.



Training Remotes

The use of the **LIRC** program to parse and transmit IR signals came with the added advantage of easy access to their **community-sourced database** of remote configuration files that support an extensive number of devices.

The product also offers an **alternative interface** that allows the software to remember the signals of remotes through a **training routine**. While this does require the physical use of remote controls, which many among our target audience may not be able to do, it is a one-time process and is intended to be a **fallback** for rare situations.

Conclusion

The current version of our product allows users to record and use any remote control that uses infrared for communication. Future plans for the project include implementing a mesh network like system for the hardware, adding RF support and adding the ability to remember button sequences.

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