

ZLK38AVS User Guide
Microsemi AcuEdge™ Development Kit for Amazon
AVS



Contents

1	Revision History	1
1.1	Revision 2.0	1
1.2	Revision 1.0	1
2	Overview	2
2.1	Other References	2
3	ZLK38AVS Development Kit Contents	3
3.1	Hardware Provided	3
3.2	Hardware Not Provided	3
3.3	Software	4
4	Hardware Assembly	5
4.1	Pillar Assembly	5
4.2	Raspberry Pi Connections	6
5	ZLK38AVS Software Installation	8
5.1	Creating Raspbian Image	8
5.2	Raspberry Pi Software Installation	9
5.2.1	Downloading ZLK38AVS Software	9
5.2.2	Installing ZLK38AVS Software	9
6	Amazon Developer Account Creation	16
7	Demonstrating the ZLK380AVS (software)	22
7.1	Starting AVS Software Demo	22
8	Microphone Configuration	26
8.1	Microphone Array Overview	26
8.2	Changing ZL38063 Microphone Mode	26
8.2.1	Runtime Selection	26
8.2.2	Boot Selection	27
9	Uninstalling the ZLK38AVS Software	28

Figures

Figure 1	ZLK38AVS development kit contents	3
Figure 2	Raspberry Pi and ZLE38AVS evaluation board	3
Figure 3	Mounted Raspberry Pi with standoffs attached	5
Figure 4	ZLE38AVS board with standoffs attached	5
Figure 5	ZLE38AVS board attached to mounted Raspberry Pi	5
Figure 6	Pillar with speaker attached	6
Figure 7	Speaker plugged in to ZLE38AVS board	6
Figure 8	Raspberry Pi connections	7
Figure 9	Raspbian download page	8
Figure 10	Win32 Disk Imager example	8
Figure 11	Downloading ZLK38AVS software	9
Figure 12	“make all” command running	10
Figure 13	Alexa app installation example	10
Figure 14	Amazon Developer Account ID example	11
Figure 15	License and agreement verification	11
Figure 16	Amazon developer account verification	12
Figure 17	User Credentials verification	12
Figure 18	Setting Locale	13
Figure 19	Setting Audio Output	13
Figure 20	Alexa Wake Word Detection installation verification	14
Figure 21	Completed installation	14
Figure 22	Raspberry Pi reboot command	15
Figure 23	Alexa Voice Service website	16
Figure 24	Amazon sign-in	16
Figure 25	Apps distribution agreement	17
Figure 26	Get Started	17
Figure 27	Register a Product	18
Figure 28	Create a New Device Type	18
Figure 29	Create New Profile	18
Figure 30	Create New Security Profile	19
Figure 31	Security Profile	19
Figure 32	Edit Security Profile	19
Figure 33	Allowed Origin and Return URLs	20
Figure 34	Device Details	20
Figure 35	Registration confirmation	21
Figure 36	ZLK38AVS directory	22
Figure 37	Login to Register/Authenticate Your Device	22
Figure 38	Privacy error	23
Figure 39	Amazon sign-in	24
Figure 40	Device token confirmation	24
Figure 41	Registration/Authentication confirmation	24
Figure 42	Bearer token	25
Figure 43	Raspberry Pi and ZLE38AVS evaluation board with microphones for 180° far-field pick-up	26
Figure 44	Raspberry Pi and ZLE38AVS evaluation board with microphones for 360° far-field pick-up	26

1 Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision 2.0

Revision 2.0 was the first publication of this document.

1.2 Revision 1.0

Revision 1.0 was the preliminary publication of this document.

2 Overview

Microsemi AcuEdge™ Development Kit for Amazon AVS is engineered to help you evaluate voice-enabled front-end audio systems for your Alexa-enabled products. This kit features Microsemi's ZL38063 voice processor powered by Microsemi's proprietary AcuEdge™ technology for front-end audio clean-up and Sensory's TrulyHandsFree™ "Alexa" wake-word engine. Two separate microphone configurations allow you to test applications with 180° or 360° far-field pick-up.

This document walks you through all the steps of building an Alexa-powered prototype using Microsemi's ZLK38AVS development kit and a Raspberry Pi. It takes you from setting up the ZLK38AVS kit, integrating it with an 'Alexa' wake word engine and connecting to the Alexa Voice Services (AVS) cloud. Once completed you will have an Alexa-enabled application that will function like an Amazon Echo.

2.1 Other References

The following are documents you may want to refer to when using this guide. These documents can be found on the Microsemi Audio Processing GitHub for the ZLK38AVS:

- ZLK38AVS Quick Start Guide
- ZLK38AVS Product Brief
- ZLE38AVS Evaluation Board Hardware Guide
- ZL38063 Product Brief
- ZLS38100 Microsemi VProc SDK Documentation

3 ZLK38AVS Development Kit Contents

The ZLK38AVS development kit is shipped with some of the required hardware while other hardware must be provided by the user. All the software for the ZLK38AVS development kit is provided through GitHub.

3.1 Hardware Provided

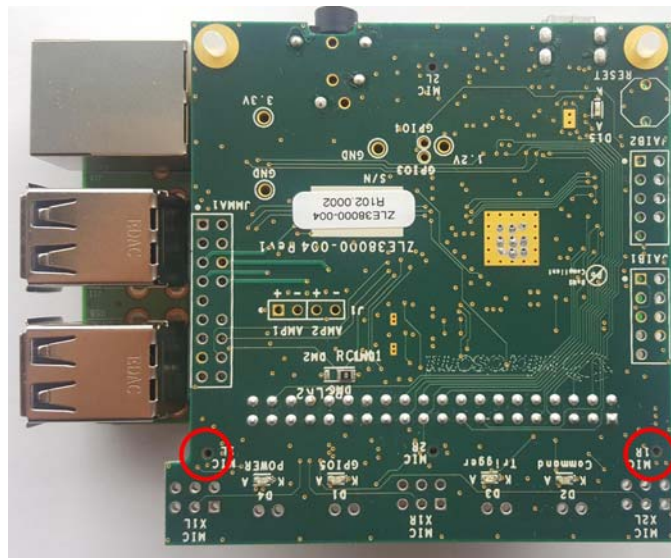
The following hardware is provided in the ZLK38AVS Development Kit:

1. ZLE38AVS evaluation board
2. Pillar (speaker and Raspberry Pi plastic stand)
3. Plastic standoffs and screws

Figure 1 • ZLK38AVS development kit contents



Figure 2 • Raspberry Pi and ZLE38AVS evaluation board



3.2 Hardware Not Provided

The following hardware is needed to run the ZLK38AVS demonstration and needs to be provided by the user of the development kit:

1. Raspberry Pi 3
2. 2 A or greater power supply for the Raspberry Pi 3 (power can be provided via a USB3/Micro-USB connection from a PC).
3. Micro SD card (8 GB or higher; a card with a 90 MB/s or greater read speed is recommended)
4. External Speaker with a 3.5 mm jack (the example in Figure 6, page 6 is the JBL Clip Speaker, available from Amazon at <https://www.amazon.com/gp/product/B00KH636V2/>)
5. USB keyboard and mouse
6. HDMI monitor and cable
7. Ethernet Cable (or WiFi) for Internet connection

Note: The monitor, keyboard, and mouse connections are optional if using VNC (or similar) to connect to the Raspberry Pi.

3.3 Software

The following software for the ZLK38AVS Development Kit is provided through GitHub:

1. A make file which installs all the required software
2. The latest Timberwolf device series Voice Processing Software Development Kit (SDK). The Voice Processing SDK is a collection of software, tools, code examples, and documents for rapid development with the Microsemi's Timberwolf device series.
3. A Firmware Loader Application: This application makes use of the Voice Processing SDK functions to load the firmware into the ZL38063 device.

Note: During the ZLK38AVS installation, the software will download the sample application "alexa-avs-sample-app" from Amazon. The Amazon sample application will download all prerequisite files, drivers, and applications needed by the Alexa Voice service, including the Sensory Library.

4 Hardware Assembly

To assemble the ZLK38AVS kit the following instructions should be followed:

4.1 Pillar Assembly

1. Screw in the Raspberry Pi onto the front side of the Raspberry Pi mounting ring and add the 2nd set of standoffs

Figure 3 • Mounted Raspberry Pi with standoffs attached



2. Add the standoffs to the ZLE38AVS evaluation board

Figure 4 • ZLE38AVS board with standoffs attached



3. Plug in the ZLE38AVS evaluation board and add the remaining screws

Figure 5 • ZLE38AVS board attached to mounted Raspberry Pi



4. Place the speaker facing downwards into the lower plastics

Figure 6 • Pillar with speaker attached



5. Plug in the speaker to the ZLE38AVS evaluation board

Figure 7 • Speaker plugged in to ZLE38AVS board

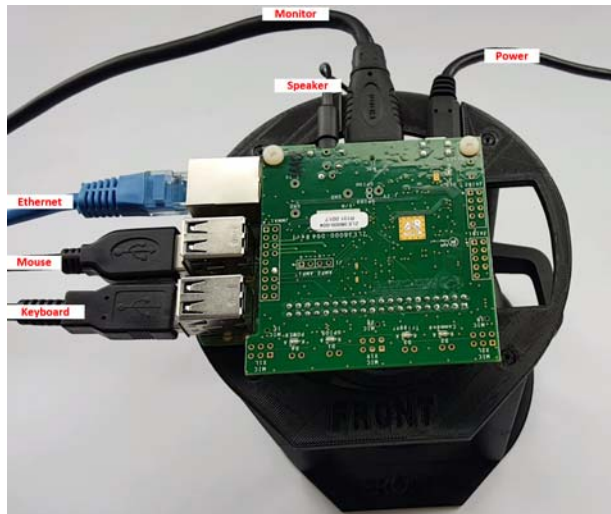


4.2 Raspberry Pi Connections

1. Connect an HDMI monitor to the Raspberry Pi
2. Connect a USB mouse and keyboard to USB ports of the Raspberry Pi
3. Connect the Raspberry Pi to your network with an Ethernet cable or Wi-Fi
4. Flash image onto the SD card using the Wind32Diskimager application (see [Creating Raspbian Image](#), page 8)
5. Insert the SD card into the SD card slot of the Raspberry Pi
6. Connect a compatible 5V power supply to the Raspberry Pi's Micro-USB port in order to power up the Raspberry Pi

Note: The monitor, keyboard, and mouse connections are optional if using VNC (or similar) to connect to the Raspberry Pi

Figure 8 • Raspberry Pi connections



5 ZLK38AVS Software Installation

There are two steps to installing the software on the Raspberry Pi:

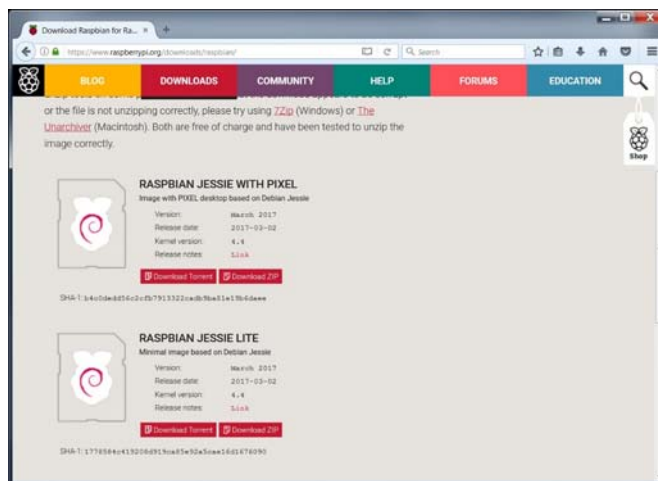
1. Creating Raspbian image: This step is performed on a separate PC.
2. Raspberry Pi Software Installation: This step downloads the installation scripts and installs the Microsemi, Amazon, and Sensory software onto the Raspberry Pi. This step requires a monitor, keyboard, and mouse connected to the Raspberry Pi, or a VNC (or similar) connection to the Raspberry Pi in order to control and monitor the installation process.

5.1 Creating Raspbian Image

Raspbian Jessie with Pixel is the operating system that will be installed on the SD card. On a separate PC, follow the steps below:

1. Format the SD card to FAT32 to ensure you are starting with an empty card.
2. Download and install Win32DiskImager from <https://sourceforge.net/projects/win32diskimager/>.
3. Download Raspbian Jessie with Pixel from <https://www.raspberrypi.org/downloads/raspbian>.

Figure 9 • Raspbian download page

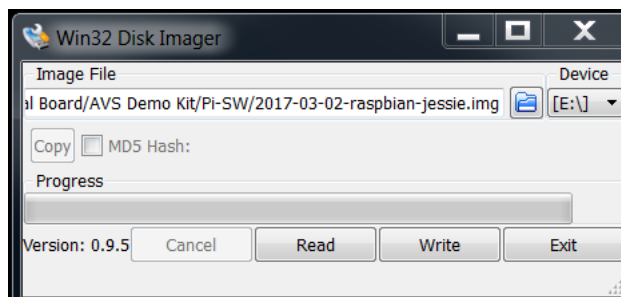


4. Unzip the downloaded image.
5. Write the image to the SD card using Win32DiskImager:
 - a. Select the downloaded image.
 - b. Select the SD card device in the Device drop down menu.

Note: Ensure the correct device is selected as all data on the selected device will be overwritten.

- c. Select write to save the image to the SD card. This process will take approximately 6 minutes.

Figure 10 • Win32 Disk Imager example



6. Once the card has been written, exit Win32 Disk Imager and install the SD card into the Raspberry Pi.

5.2 Raspberry Pi Software Installation

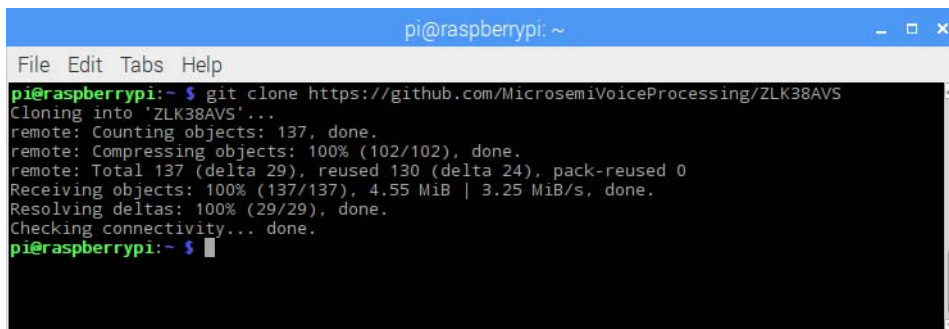
Once the Raspberry Pi is up and running, make sure the it is connected to the Internet by opening up the web browser. Open a terminal window and change into your desired working directory, or create one.

5.2.1 Downloading ZLK38AVS Software

The Microsemi software for the ZLK38AVS kit can be found on the Microsemi Voice Processing GitHub repository. To download the repository on your Raspberry Pi run the following command:

```
git clone https://github.com/MicrosemiVoiceProcessing/ZLK38AVS
```

Figure 11 • Downloading ZLK38AVS software



```
pi@raspberrypi: ~  
File Edit Tabs Help  
pi@raspberrypi:~ $ git clone https://github.com/MicrosemiVoiceProcessing/ZLK38AVS  
Cloning into 'ZLK38AVS'...  
remote: Counting objects: 137, done.  
remote: Compressing objects: 100% (102/102), done.  
remote: Total 137 (delta 29), reused 130 (delta 24), pack-reused 0  
Receiving objects: 100% (137/137), 4.55 MiB | 3.25 MiB/s, done.  
Resolving deltas: 100% (29/29), done.  
Checking connectivity... done.  
pi@raspberrypi:~ $
```

Note: git is installed by default with the Latest Raspian Jessie, but it can also be installed using the command:
`sudo apt-get install git`

5.2.2 Installing ZLK38AVS Software

1. Cd into the location where the GitHub package was downloaded.
`cd ZLK38AVS/`
2. Run “make all” command.
 - a. During “make all” the software will download the headers for the current kernel running into the Pi. This step can take as long as 30+ minutes.
 - b. If the Pi seems to be staying on a message saying “Unpacking and installing raspberrypi-Kernel-headers ...” and shows no progress for a long time (~20-30+ minutes), this does not indicate a problem with the installation or the Pi. This is the correct behavior because this processing of unpacking kernel headers takes time. If there is a problem an error message will be shown.

While this step is running, it may be a good time to create your Amazon account. You will need information from the creation of your Amazon account later in the software installation (See [Amazon Developer Account Creation](#), page 16)

Figure 12 • “make all” command running

```

pi@raspberrypi: ~/ZLK38AVS
File Edit Tabs Help
pi@raspberrypi:~$ cd ZLK38AVS/
pi@raspberrypi:~/ZLK38AVS$ make all
kernel headers do not exist, fetching and installing kernel headers...
Get:1 http://mirrordirector.raspbian.org jessie InRelease [14.9 kB]
Get:2 http://archive.raspberrypi.org jessie InRelease [22.9 kB]
Get:3 http://mirrordirector.raspbian.org jessie/main armhf Packages [8,981 kB]
Get:4 http://archive.raspberrypi.org jessie/main armhf Packages [145 kB]
Get:5 http://archive.raspberrypi.org jessie/ui armhf Packages [57.9 kB]
Ign http://archive.raspberrypi.org jessie/main Translation-en_GB
Ign http://archive.raspberrypi.org jessie/main Translation-en
Ign http://archive.raspberrypi.org jessie/ui Translation-en_GB
Ign http://archive.raspberrypi.org jessie/ui Translation-en
Get:6 http://mirrordirector.raspbian.org jessie/contrib armhf Packages [37.5 kB]
Get:7 http://mirrordirector.raspbian.org jessie/non-free armhf Packages [70.3 kB]
Get:8 http://mirrordirector.raspbian.org jessie/rpi armhf Packages [1,356 B]
Ign http://mirrordirector.raspbian.org jessie/contrib Translation-en_GB
Ign http://mirrordirector.raspbian.org jessie/contrib Translation-en
Ign http://mirrordirector.raspbian.org jessie/main Translation-en_GB
Ign http://mirrordirector.raspbian.org jessie/main Translation-en
Ign http://mirrordirector.raspbian.org jessie/non-free Translation-en_GB
Ign http://mirrordirector.raspbian.org jessie/non-free Translation-en
Ign http://mirrordirector.raspbian.org jessie/rpi Translation-en_GB
Ign http://mirrordirector.raspbian.org jessie/rpi Translation-en
100% [3 Packages xz 0 B]

```

3. “make all” will automatically download the Amazon Alexa Sample application and install it. The installation of the Amazon sample apps requires an Amazon developer account (see [Amazon Developer Account Creation](#), page 16).
4. When prompted, enter the following information from your Amazon Developer Account (see [Amazon Developer Account Creation](#), page 16):
 - a. Device Type ID
 - b. Client ID
 - c. Client Secret

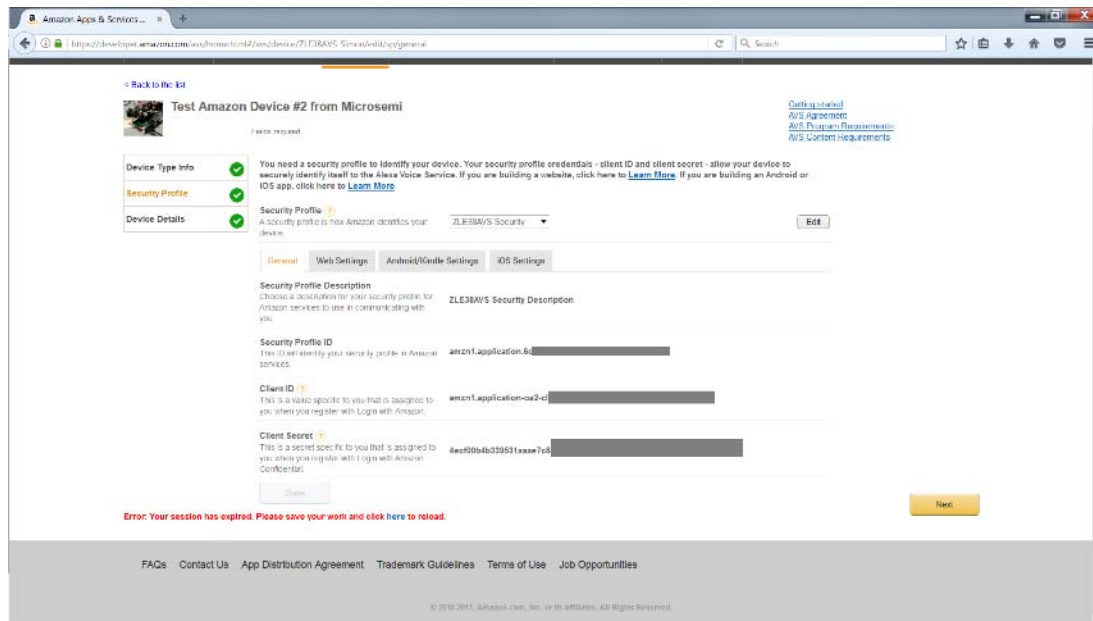
Figure 13 • Alexa app installation example

```

_*****_
_*****_
Downloading and installing Amazon Alexa Make sure you have the Amazon developer
account/product info needed to install the alexa sample app
_*****_
_*****_
sudo chmod 777 /home/pi/my_shares/ZLK38AVS/vproc_sdk/./amazon_avs/*.sh
sudo sed -i "/sudo apt-get upgrade -y/ d" /home/pi/my_shares/ZLK38AVS/vproc_sdk/./amazon_avs/automated_
install.sh
enter the device ID obtained from Amazon: z1380av
You entered AVS Device ID: z1380av
enter the Client ID obtained from Amazon: amzn1.application-oa2-client.d7fab983c96e4817829de
You entered AVS Client ID: amzn1.application-oa2-client.d7fab983c96e4817829de
enter Client Secret obtained from Amazon: b42b55e4da969469efbf229b07d3f3889357531f593db392f37749
8c

```

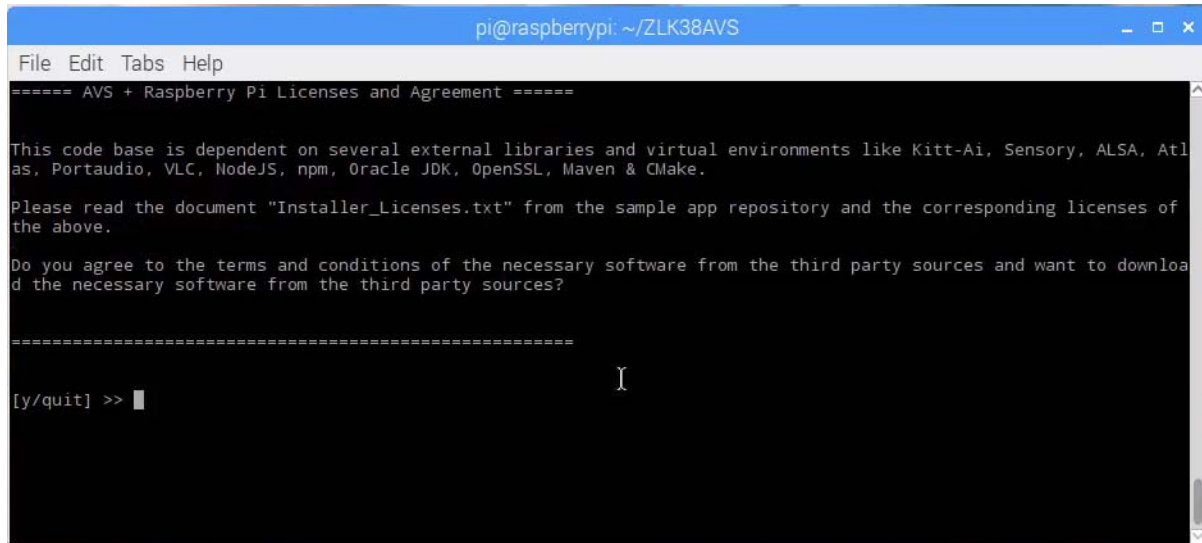
Figure 14 • Amazon Developer Account ID example



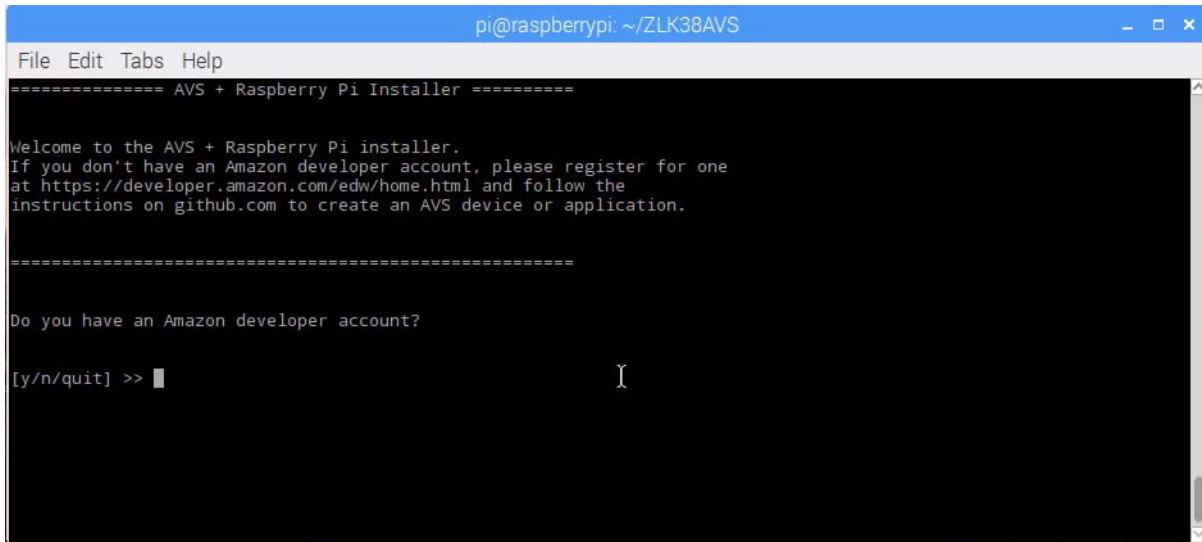
Note: The IDs shown above are only given as example and they are not valid, enter the correct information from your Amazon Developers Account.

5. After entering the requested IDs, the installation of the Amazon sample application will start. Further questions that require an answer from the user will be asked by the Amazon installation:
 - a. Continue Installation?

Figure 15 • License and agreement verification



- b. Do you have an Amazon developer account?

Figure 16 • Amazon developer account verification

```
pi@raspberrypi: ~/ZLK38AVS
File Edit Tabs Help
===== AVS + Raspberry Pi Installer =====

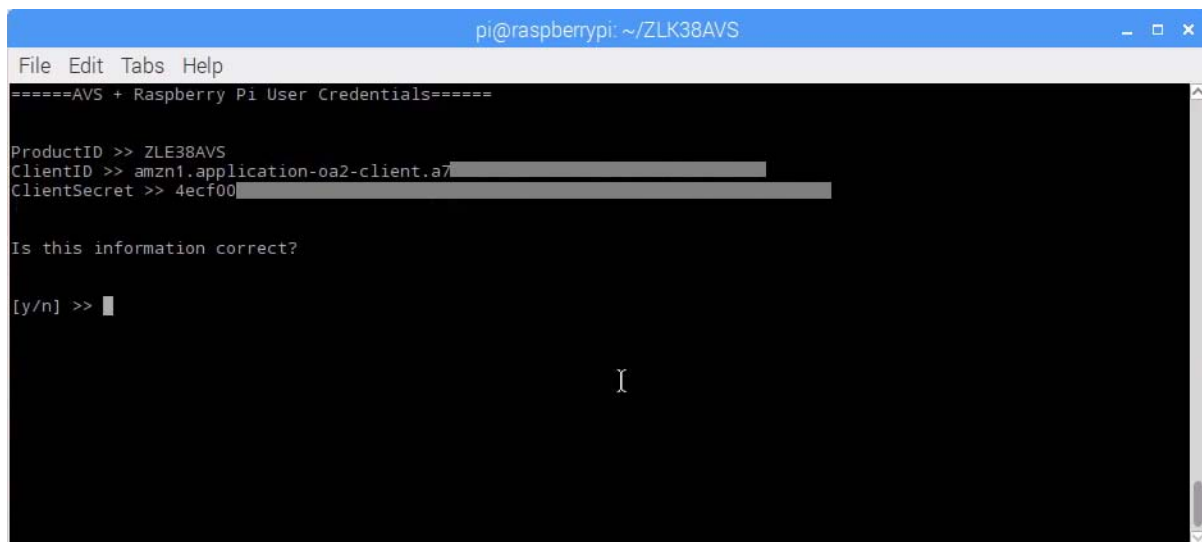
Welcome to the AVS + Raspberry Pi installer.
If you don't have an Amazon developer account, please register for one
at https://developer.amazon.com/edw/home.html and follow the
instructions on github.com to create an AVS device or application.

=====

Do you have an Amazon developer account?

[y/n/quit] >> |
```

c. Is this information correct? (Verify and reply with the appropriate answer.)

Figure 17 • User Credentials verification

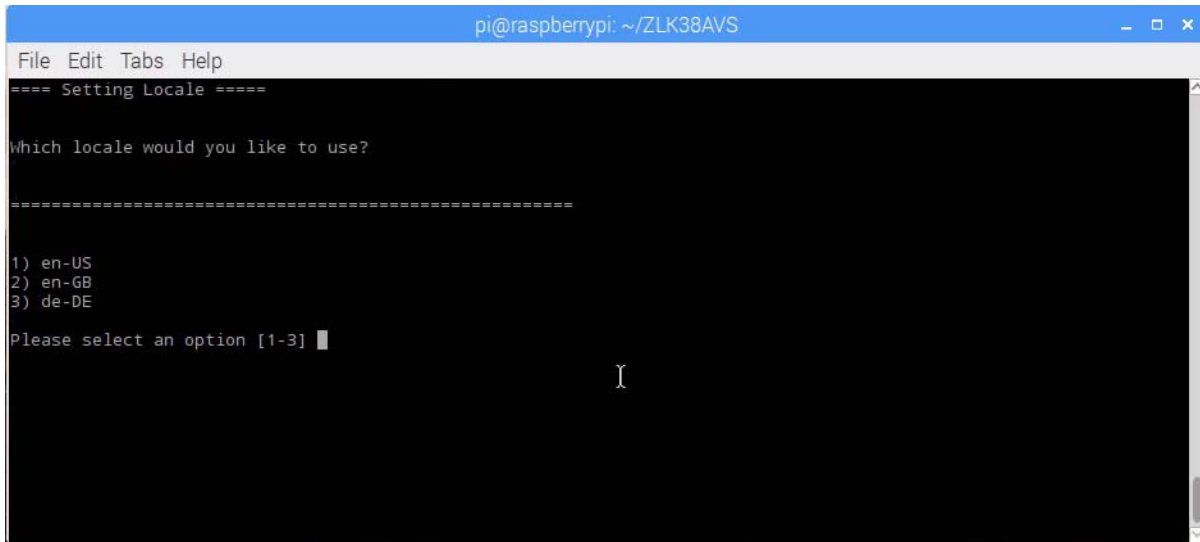
```
pi@raspberrypi: ~/ZLK38AVS
File Edit Tabs Help
=====AVS + Raspberry Pi User Credentials=====

ProductID >> ZLE38AVS
ClientID >> amzn1.application-oa2-client.a7...
ClientSecret >> 4ecf00...

Is this information correct?

[y/n] >> |
```

d. Which locale would you like to use?

Figure 18 • Setting Locale

```
pi@raspberrypi: ~/ZLK38AVS
File Edit Tabs Help
==== Setting Locale ====

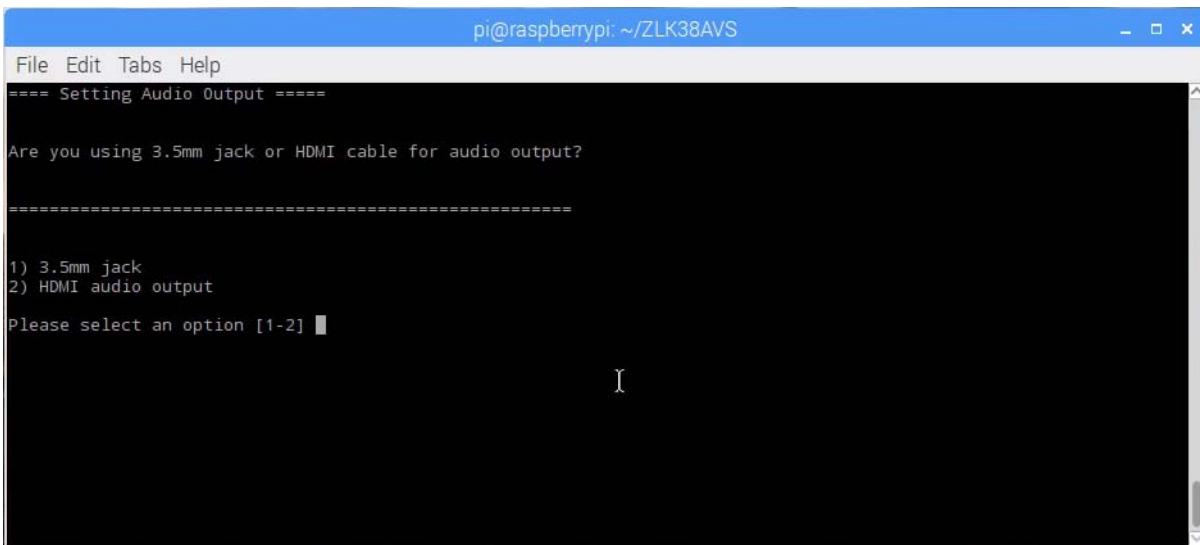
Which locale would you like to use?

=====

1) en-US
2) en-GB
3) de-DE

Please select an option [1-3] |
```

- e. Are you using 3.5mm jack or HDMI cable for audio output? (Since the audio will be generated and processed by the ZLK38AVS audio device, either option can be selected.)

Figure 19 • Setting Audio Output

```
pi@raspberrypi: ~/ZLK38AVS
File Edit Tabs Help
==== Setting Audio Output ====

Are you using 3.5mm jack or HDMI cable for audio output?

=====

1) 3.5mm jack
2) HDMI audio output

Please select an option [1-2] |
```

- f. Do you want to enable "Alexa" Wake Word Detection?

Figure 20 • Alexa Wake Word Detection installation verification

```

pi@raspberrypi: ~/ZLK38AVS
File Edit Tabs Help
=== Enabling Hands Free Experience using Wake Word "Alexa" ===

Do you want to enable "Alexa" Wake Word Detection?

=====

[y/n/quit] >> y

=====
Making sure we are installing to the right OS
=====

===== Installing Oracle Java8 =====
Distributor ID: Raspbian
Description:   Raspbian GNU/Linux 8.0 (jessie)
Version of Raspbian determined to be: jessie
Reading package lists... Done
Building dependency tree... 50%

```

Note: Installation of the Amazon Alexa application can takes as long as 45+ minutes.

6. A successfully completed installation should show the message in the image below:

Figure 21 • Completed installation

```

pi@raspberrypi: ~/shares/AVS_kit
File Edit Tabs Help
wakeWordIPCsocket.cpp.o
[100%] Linking CXX executable wakeWordAgentTest
make[3]: Leaving directory '/home/pi/shares/AVS_kit/amazon_avs/samples/wakeWordAgent/tst'
[100%] Built target wakeWordAgentTest
make[2]: Leaving directory '/home/pi/shares/AVS_kit/amazon_avs/samples/wakeWordAgent/tst'
make[1]: Leaving directory '/home/pi/shares/AVS_kit/amazon_avs/samples/wakeWordAgent/tst'

=====
***** Finished *****
=====

To run the demo, do the following in 3 separate terminals:
Run the companion service: cd /home/pi/shares/AVS_kit/amazon_avs/samples/companionService && npm start
Run the AVS Java Client: cd /home/pi/shares/AVS_kit/amazon_avs/samples/javaclient && mvn exec:exec
Run the wake word agent:
  Sensory: cd /home/pi/shares/AVS_kit/amazon_avs/samples/wakeWordAgent/src && ./wakeWordAgent -e sensory
  KITT_AI: cd /home/pi/shares/AVS_kit/amazon_avs/samples/wakeWordAgent/src && ./wakeWordAgent -e kitt_ai
  GPIO: PLEASE NOTE -- If using this option, run the wake word agent as sudo:
        cd /home/pi/shares/AVS_kit/amazon_avs/samples/wakeWordAgent/src && sudo ./wakeWordAgent -e gpio
-----
configuring the host ALSA relate sound configuration
-----
NOTE: For the change made to the host to take effect Please do a, sudo reboot
-----
pi@raspberrypi: ~/shares/AVS_kit $

```

7. Upon the completion of the ZLK38AVS kit installation, issue a reboot command to reboot the Raspberry Pi:
 sudo reboot

Figure 22 • Raspberry Pi reboot command

```

pi@jbrasperryip3: ~/shares/ZLK38AVS
File Edit Tabs Help

[100%] Linking CXX executable wakeWordAgentTest
make[3]: Leaving directory '/home/pi/shares/ZLK38AVS/amazon_avs/samples/wakeWordAgent/tst'
[100%] Built target wakeWordAgentTest
make[2]: Leaving directory '/home/pi/shares/ZLK38AVS/amazon_avs/samples/wakeWordAgent/tst'
make[1]: Leaving directory '/home/pi/shares/ZLK38AVS/amazon_avs/samples/wakeWordAgent/tst'

=====
*****
===== Finished =====
*****
=====

To run the demo, do the following in 3 separate terminals:
Run the companion service: cd /home/pi/shares/ZLK38AVS/amazon_avs/samples/companionService && npm start
Run the AVS Java Client: cd /home/pi/shares/ZLK38AVS/amazon_avs/samples/javaclient && mvn exec:exec
Run the wake word agent:
  Sensory: cd /home/pi/shares/ZLK38AVS/amazon_avs/samples/wakeWordAgent/src && ./wakeWordAgent -e sensory
  KITT_AI: cd /home/pi/shares/ZLK38AVS/amazon_avs/samples/wakeWordAgent/src && ./wakeWordAgent -e kitt_ai
  GPIO: PLEASE NOTE -- If using this option, run the wake word agent as sudo:
    cd /home/pi/shares/ZLK38AVS/amazon_avs/samples/wakeWordAgent/src && sudo ./wakeWordAgent -e gpio
..*****..
..*****..
..configuring the host ALSA related sound configuration
..*****..
..*****..
..*****..
..*****..
System setup completed successfully...
NOTE: For the changes made to the host to take effect Please do a: sudo reboot
..*****..
..*****..
pi@jbrasperryip3:~/shares/ZLK38AVS $

```

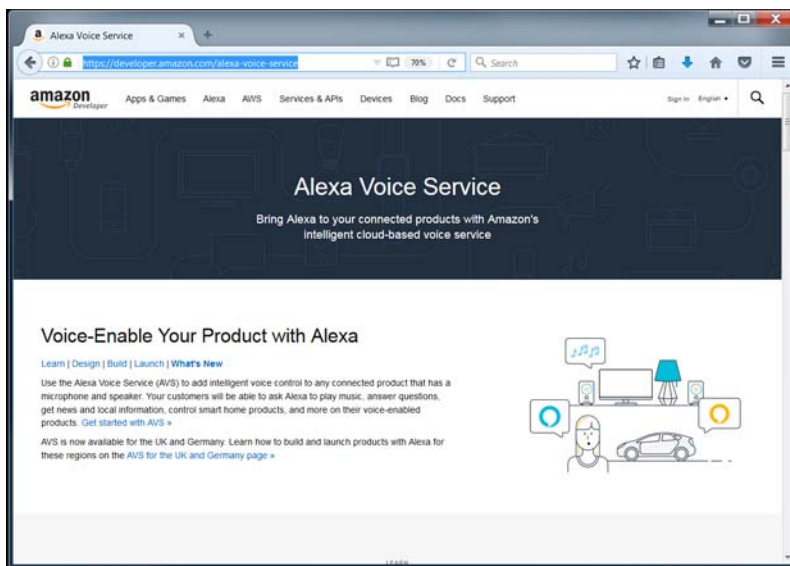
This completes the installation of the required software for the ZLK38AVS demonstration.

6 Amazon Developer Account Creation

An Amazon developer account is needed in order to run the ZLK38AVS demonstration kit. The instructions below describe the steps required to create an account to use with the ZLK38AVS demonstration kit.

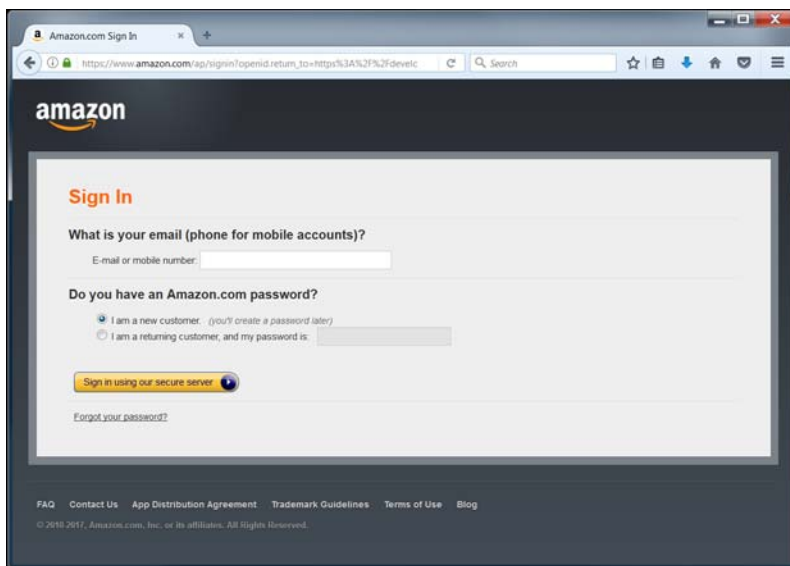
1. Go to <https://developer.amazon.com/alexa-voice-service>.

Figure 23 • Alexa Voice Service website

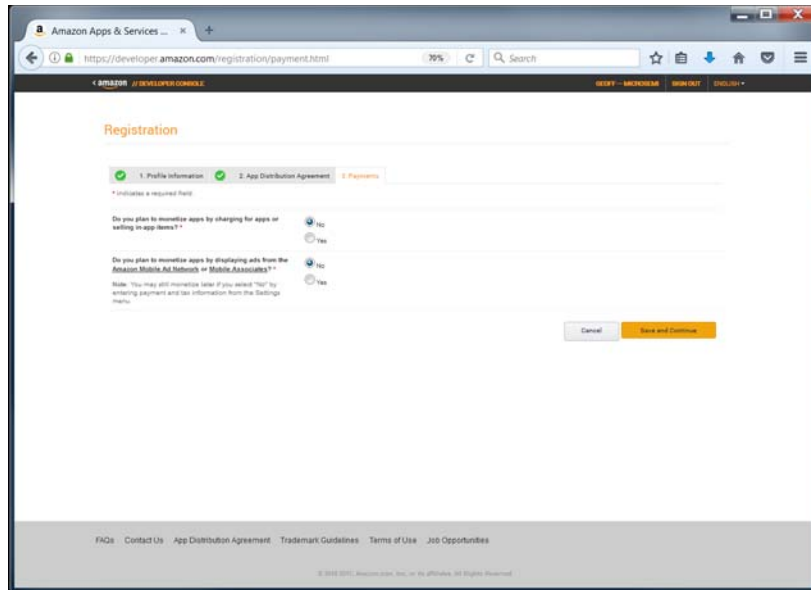


2. Click Sign-in on the top right of the screen.

Figure 24 • Amazon sign-in



3. Either sign-in with your account, or create a new account if a new customer. Fill out the registration forms as requested by Amazon.
4. When prompted for information on the Apps Distribution Agreement select No for both options:

Figure 25 • Apps distribution agreement


Amazon Apps & Services ...

https://developer.amazon.com/registration/payment.html

Registration

1. Profile Information 2. App Distribution Agreement 3. Payments

Do you plan to monetize apps by charging for apps or selling in-app items? *

Do you plan to monetize apps by displaying ads from the Amazon Mobile Ad Network or Mobile Associates? *

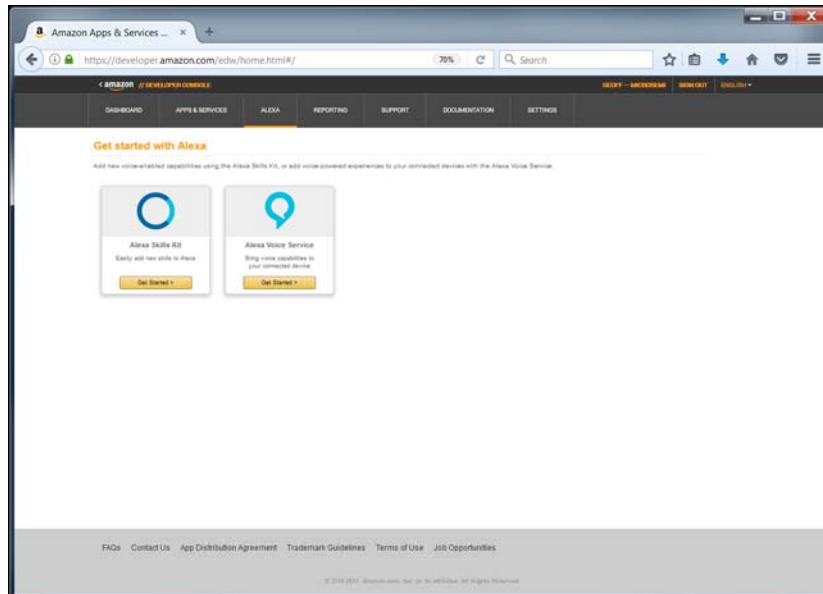
Note: You may still monetize later if you select "No" by enabling payment and tax information from the Settings menu.

Cancel Back and Continue

FAQs Contact Us App Distribution Agreement Trademark Guidelines Terms of Use Job Opportunities

© 2010-2017 Amazon.com, Inc. or its affiliates. All Rights Reserved.

5. Select Alexa on the top navigation bar, Select Alexa Voice Service, Get Started
- Figure 26 • Get Started**



Amazon Apps & Services ...

https://developer.amazon.com/eda/home.html#

Get started with Alexa

Add new voice-enabled capabilities using the Alexa Skills Kit, or add voice-powered experiences to your connected devices with the Alexa Voice Service.

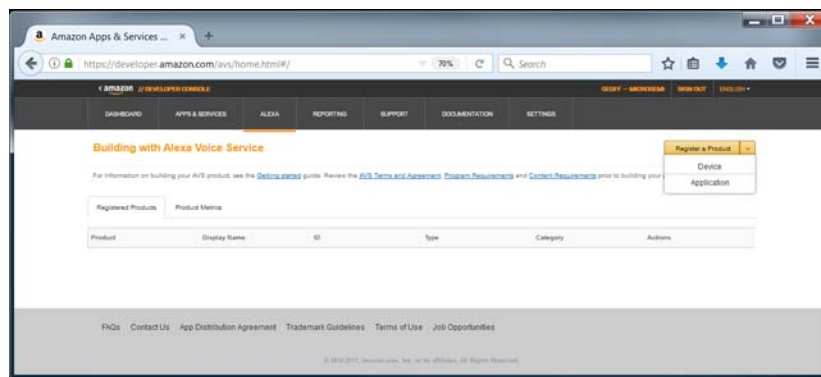
Alexa Skills Kit
Early and new skills to Alexa
Get Started

Alexa Voice Service
Bring voice capabilities to your connected device
Get Started

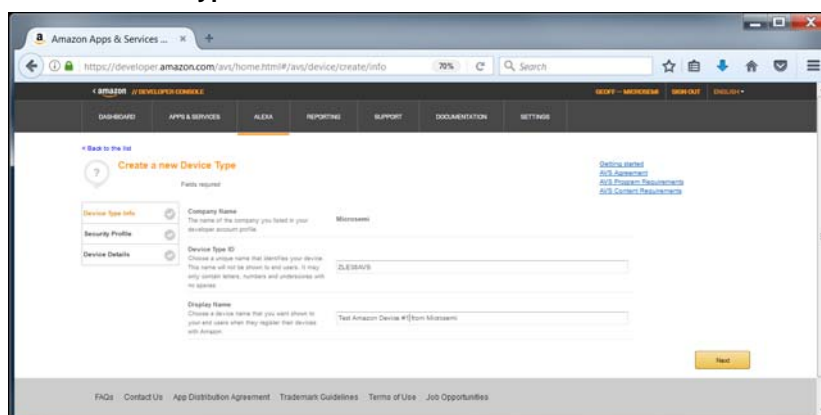
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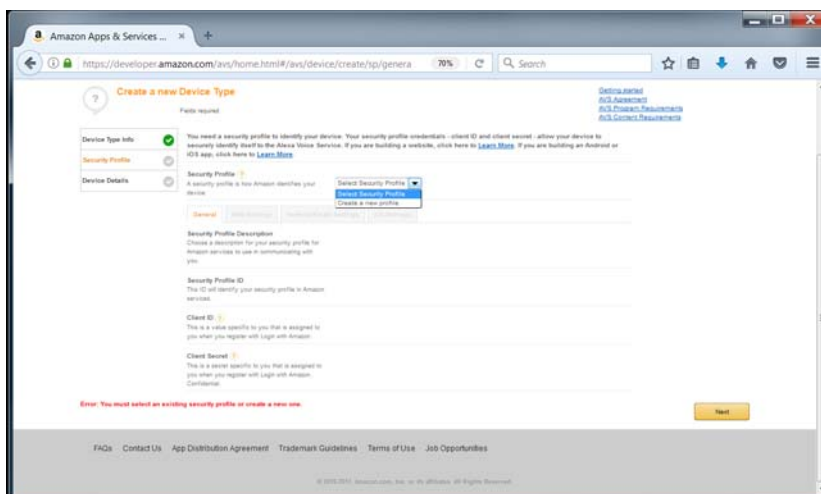
6. Select Register a Product, Device on the right side of the page. Provide a name and description and click next.

Figure 27 • Register a Product

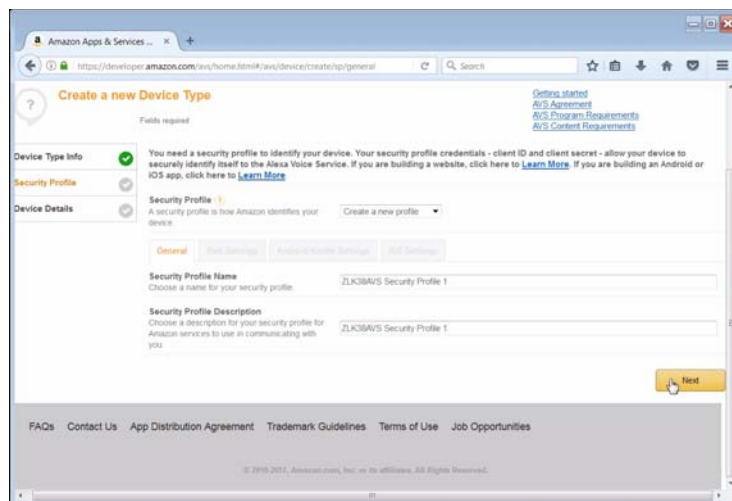
Note: Device ID is used when installing the Amazon software onto the Raspberry Pi.

Figure 28 • Create a New Device Type

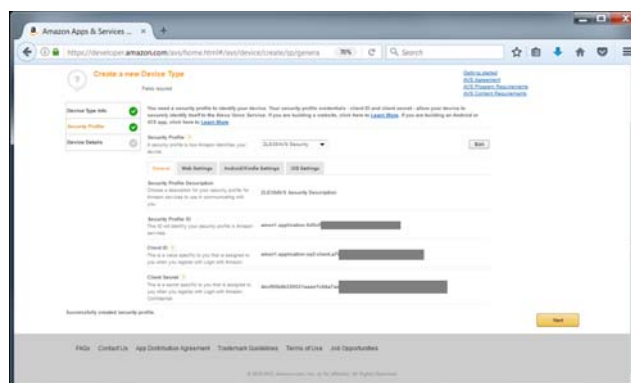
7. Select "Create a new profile" from the pull-down

Figure 29 • Create New Profile

8. Enter a Security profile name and description and click next.

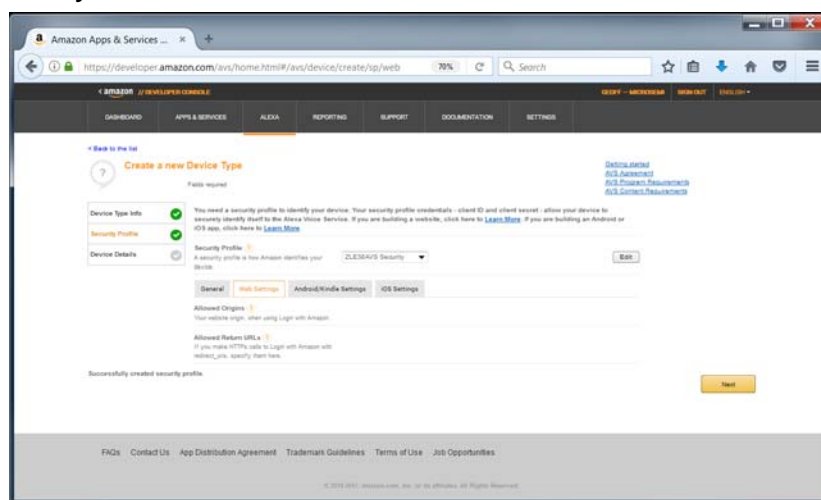
Figure 30 • Create New Security Profile


9. The Security profile will be displayed.

Figure 31 • Security Profile


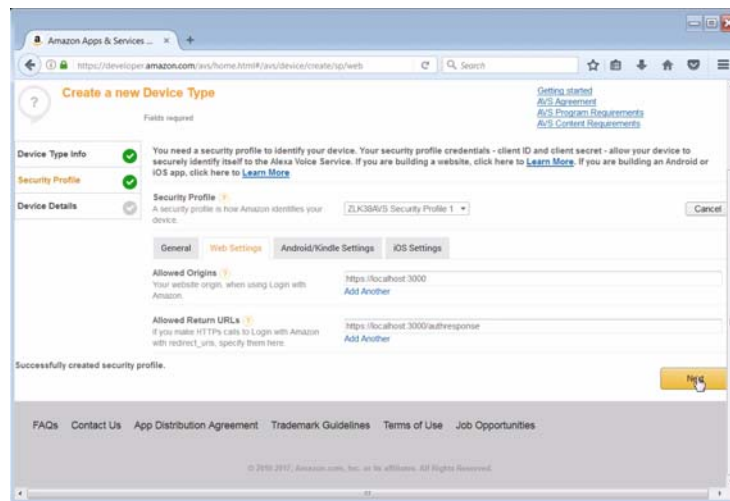
Note: The Client ID and Client Secret are used when installing the Amazon software onto the Raspberry Pi.

10. Select the Web Settings tab, then select Edit

Figure 32 • Edit Security Profile


11. Enter the following (click Add Another):
 - a. Allowed Origins: <https://localhost:3000>
 - b. Allowed Return URLs: <https://localhost:3000/authresponse>
 - c. Select Next

Figure 33 • Allowed Origin and Return URLs



Amazon Apps & Services ...

https://developer.amazon.com/avs/home.html#/avs/device/create/tp/web

Create a new Device Type

Fields required

Device Type Info ☒ You need a security profile to identify your device. Your security profile credentials - client ID and client secret - allow your device to securely identify itself to the Alexa Voice Service. If you are building a website, click here to [Learn More](#). If you are building an Android or iOS app, click here to [Learn More](#).

Security Profile ☒ A security profile is how Amazon identifies your device. ZLK38AVS Security Profile 1

Device Details ☒

General Web Settings Android/Kindle Settings iOS Settings

Allowed Origins Your website origin, when using Login with Amazon. [Add Another](#)

Allowed Return URLs If you make HTTP calls to Login with Amazon with redirect_uri, specify them here. [Add Another](#)

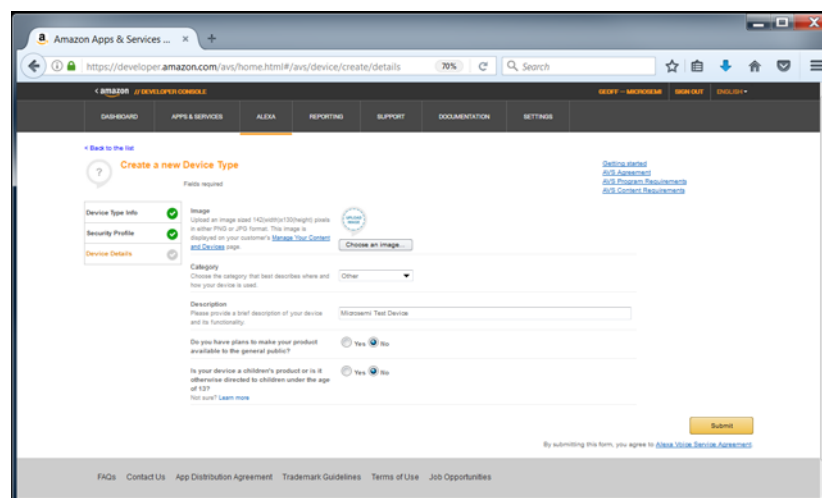
Successfully created security profile.

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13. Fill out the form, click Submit

Figure 34 • Device Details



Amazon Apps & Services ...

https://developer.amazon.com/avs/home.html#/avs/device/create/details

Create a new Device Type

Fields required

Device Type Info ☒ Image Upload an image sized 1400x1000 pixels in either PNG or JPEG format. This image is displayed on your customer's [Storepage, Your Content, and Device Info](#). [Choose an Image](#)

Security Profile ☒

Device Details ☒ Category Choose the category that best describes where and how your device is used. Other

Description Please provide a brief description of your device and its functionality. Microsemi Test Device

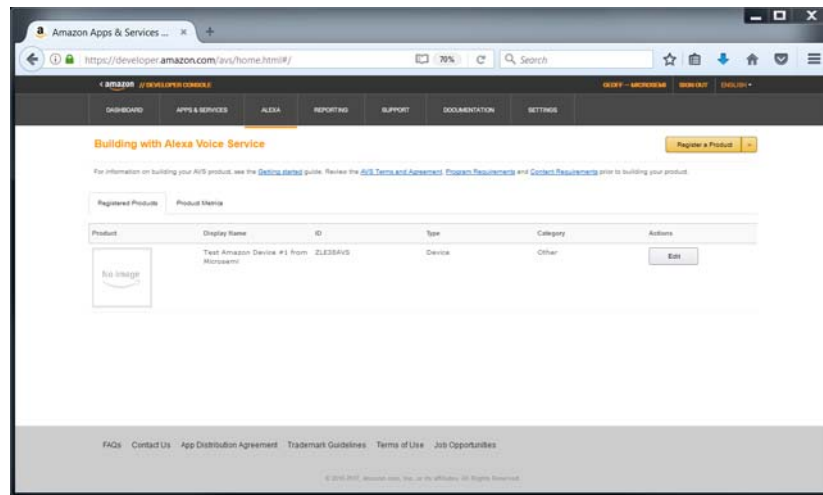
Do you have plans to make your product available to the general public? ☒ Yes ☒ No

Is your device a children's product or is it otherwise directed to children under the age of 13? ☒ Yes ☒ No [Learn more](#)

[Submit](#)

By submitting this form, you agree to [Alexa Voice Service Agreement](#)

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Figure 35 • Registration confirmation

This completes the registration for the Amazon Developer Account.

7 Demonstrating the ZLK380AVS (software)

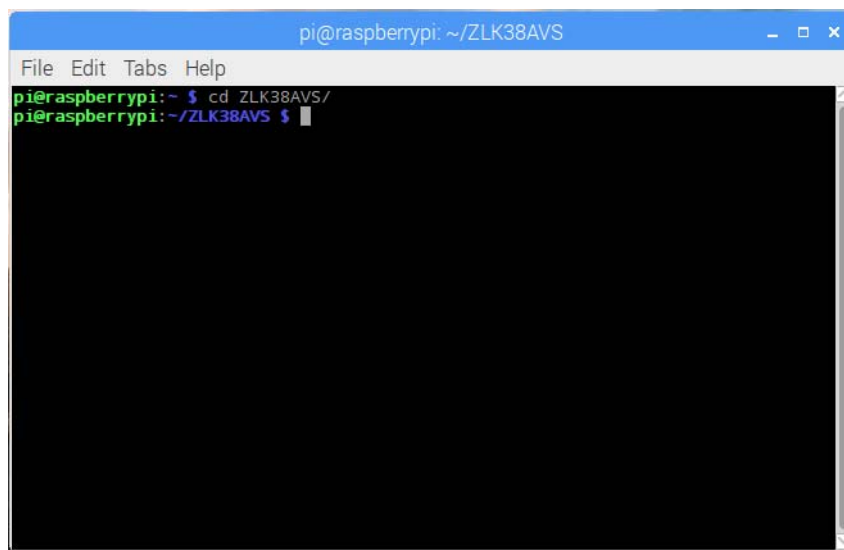
After installing the software (See [ZLK38AVS Software Installation](#), page 8) and rebooting the Raspberry Pi, you can now demonstrate Alexa Voice Services.

The ZLK38AVS supports two separate microphone configurations: 180° or 360°. The ZLK38AVS default installation uses the 180° configuration. To change the configuration, see [Changing ZLK38063 Microphone Mode](#), page 26.

7.1 Starting AVS Software Demo

1. Cd into the location where the GitHub package was downloaded. (eg: `cd ZLK38AVS/`)

Figure 36 • ZLK38AVS directory



2. Issue the following make command to start the AVS software:

```
make start_alexas
```

The command will open 3 terminals. Each of the terminal windows will start executing the appropriate command as required by the Alexa application

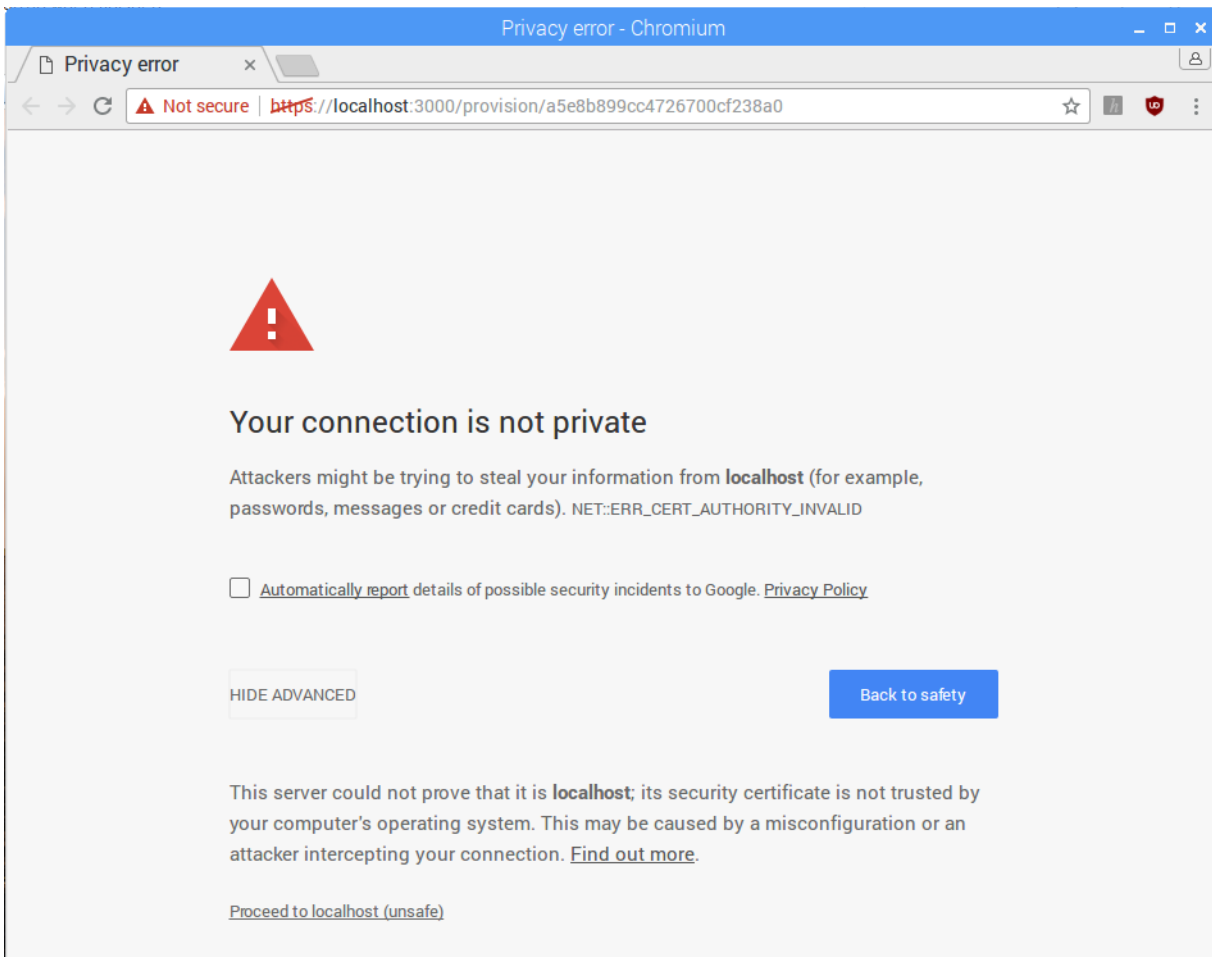
Note: An error in one of the terminals screen is not an indicator that Alexa failed to start. The error may be due to the fact that the Internet browser is not opened yet.

3. Open the default browser by clicking “Yes” when you see the pop-up window below:

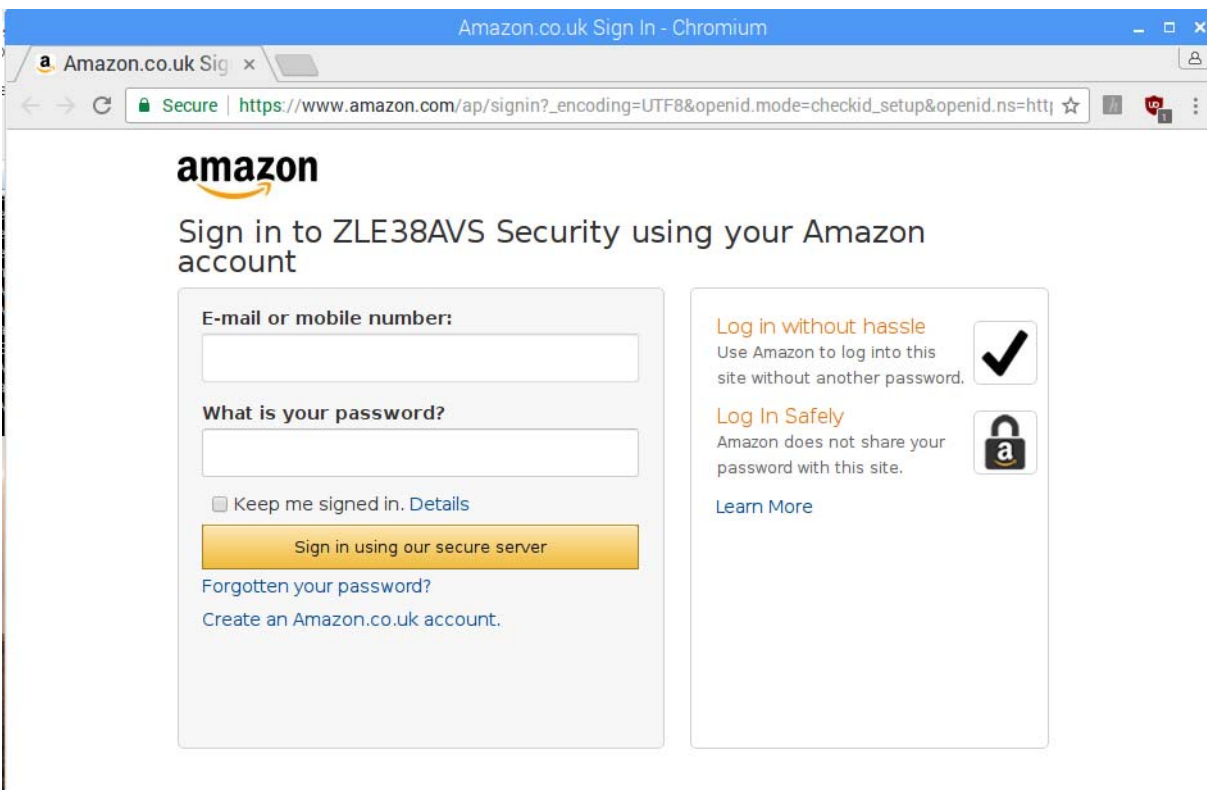
Figure 37 • Login to Register/Authenticate Your Device



4. When the web browser opens, which may take up to a minute, a warning page will be shown stating that a secure connection was requested but not available. As this connection is to the localhost, it is safe to proceed with an insecure connection. Click Show Advanced and “Proceed to localhost (unsafe)”

Figure 38 • Privacy error

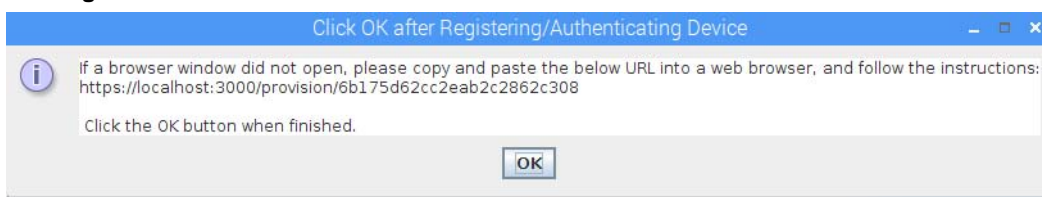
5. Sign into your Amazon developer account, entering the E-mail and password used when creating your Amazon developer account.

Figure 39 • Amazon sign-in

- After logging in, the browser will display a confirmation that device tokens are ready. Close the browser window.

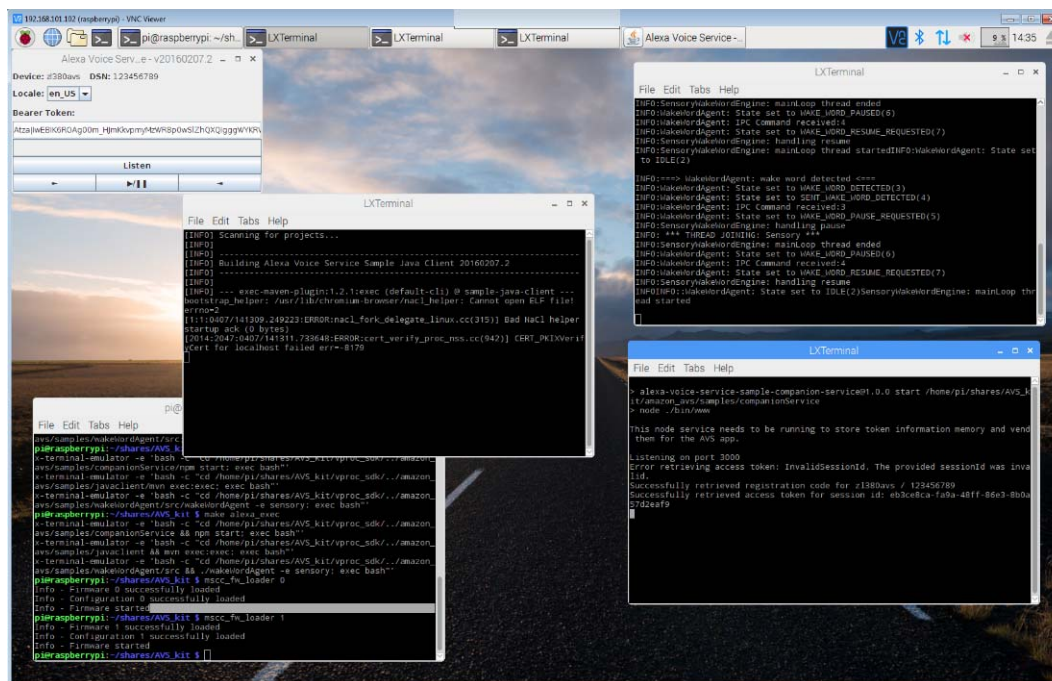
Figure 40 • Device token confirmation

- After closing the browser window, a pop-up window will appear. Click OK to confirm registration and authentication of the Alexa device.

Figure 41 • Registration/Authentication confirmation

- Once you have confirmed your Amazon account, Amazon will generate a Bearer Token that will be displayed in the Alexa Voice Service screen as shown below.

Figure 42 • Bearer token



9. Turn on the speaker (using power button on the speaker bezel) and set the volume to maximum using the “+” button on the bezel.

Note: The speaker has an auto-turn-off feature to save battery life, so before testing the unit, make sure turn the speaker on, if switched off

10. At this point Alexa is ready to accept commands. Try a few quick commands like “Alexa, what time is it?” or “Alexa, what is the capital of Peru?” to confirm the software and hardware are activated. A full list of Alexa Voice commands can be found at <https://www.cnet.com/how-to/the-complete-list-of-alexa-commands/>.

Note: Some commands listed on the above website require accounts on the desired services (eg. Pandora stations).

8 Microphone Configuration

8.1 Microphone Array Overview

This kit features Microsemi's ZL38063 voice processor powered by Microsemi's proprietary AcuEdge™ technology for front-end audio clean-up and Sensory's TrulyHandsFree™ "Alexa" wake-word engine. Two separate microphone configurations allow you to test applications with 180° or 360° far-field pick-up. The default configuration is 180° which can be changed following the steps below.

Figure 43 • Raspberry Pi and ZLE38AVS evaluation board with microphones for 180° far-field pick-up

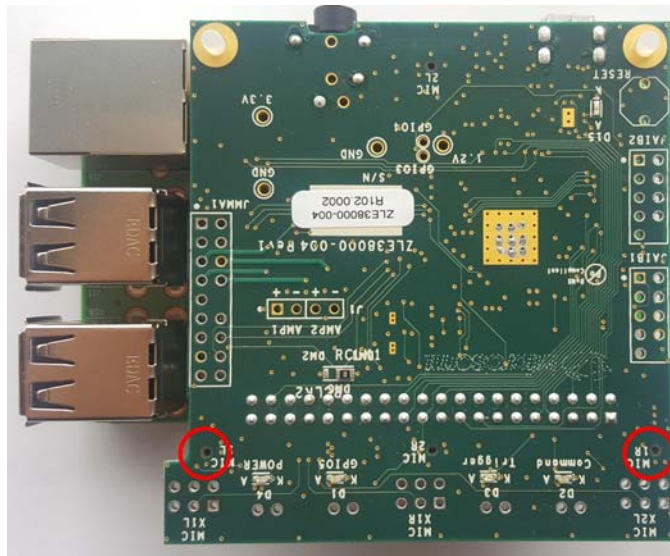
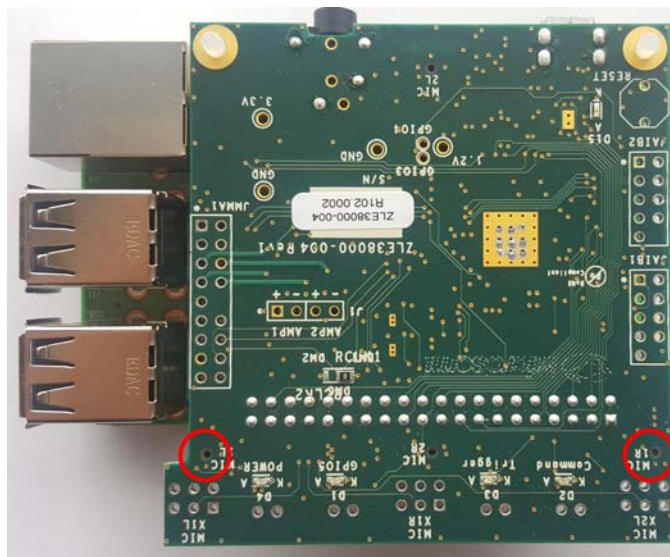


Figure 44 • Raspberry Pi and ZLE38AVS evaluation board with microphones for 360° far-field pick-up



8.2 Changing ZL38063 Microphone Mode

8.2.1 Runtime Selection

In order to change to or from 180° or 360° microphone modes the following steps should be followed:

1. Open a terminal instance on the Raspberry Pi.
2. Issue the following command for 180° sound pick-up mode:
`mscc_fw_loader 0`
3. Issue the following command for 360° sound pick-up mode:
`mscc_fw_loader 1`

8.2.2 Boot Selection

The selection of microphone modes 180° or 360° sound pick-up is configurable prior to installing the ZLK38AVS by editing the `MSCC_TW_CONFIG_SELECT` variable within the `/ZLK38AVS/config.mk` file.

- To use the 180° mode, set `MSCC_TW_CONFIG_SELECT=180`
- To use the 360° mode, set `MSCC_TW_CONFIG_SELECT=360`

9 Uninstalling the ZLK38AVS Software

The Pi can be returned back to its state prior to the installation of the ZLK38AVS SDK install. To do this run the following command in a terminal window from the installation directory:

```
make cleanall
```

Note: This command will undo everything that was done during the make all during the ZLK38AVS Software Installation (see [ZLK38AVS Software Installation](#), page 8).

To clean the ZLK38AVS installation without removing the Amazon Alexa software, run

```
make clean
```

To re-make the ZLK38AVS, without re-compiling/re-installing Amazon Alexa, run

```
make host
```



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