MT793X IoT SDK for AIA User Guide

Version: 0.1

Release date: 2022-09-13

Version History

Version	Date	Description
0.1	2022-09-13	Initial draft

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1 Overview

To brings AVS (Alexa Voice Service) to IoT devices which have constrained resource, MT793x adopts AIA (Alexa Voice Service for AWS IoT) as a solution. AIA leverages AWS IoT to offload intensive computational and memory audio tasks from the device to the cloud. Thus, AIA enables AVS functionality on MCUs. Please refer to AWS website for more details. (https://docs.aws.amazon.com/iot/latest/developerguide/avs-integration-aws-iot.html)

2 Code Structure

This chapter shows the code structure of AIA, as shown in Figure 2-1.

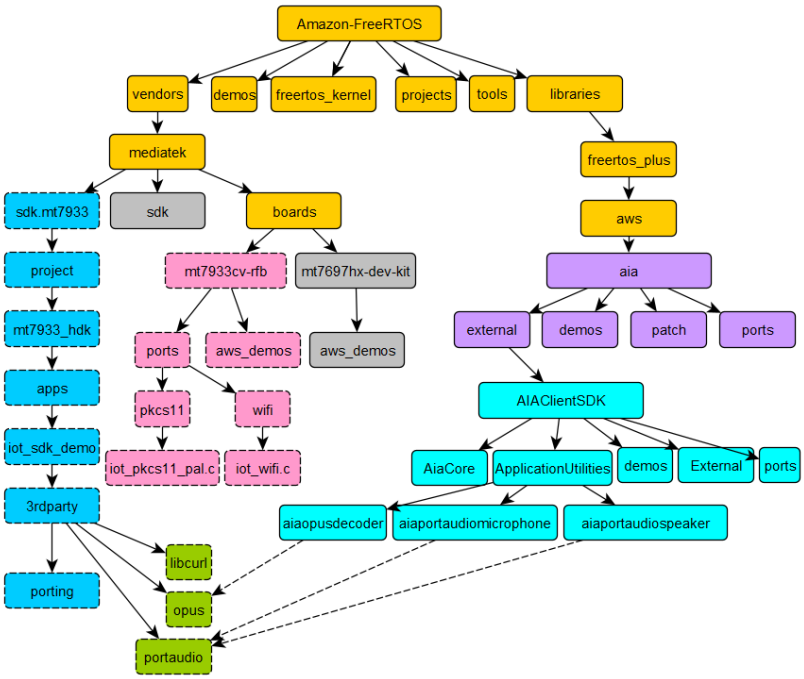

Figure 2-1. AIA code structure

AIA can be roughly divided into 4 parts.

- Amazon-FreeRTOS: Contains AIA demo runner and essential libraries
- AIA FreeRTOS porting layer
- AIA Client SDK: The SDK implements AIA protocols and core functions
- Hadron SDK

3 Build Flow

Please follow all the steps below to build AIA images.

1. Download aia-shell-m2.tar.gz and decompress it
2. Fetch Hadron SDK from Release Branch

- **cd aia-shell-m2/aia-demo/afr/vendors/mediatek**
- **mkdir sdk.mt7933**
- **cd sdk.mt7933**
- **repo init -u https://git01.mediatek.com/hadron-mcuiot/manifest -b miot-release-sdk3.mt793x.mp1 -m 202x_xx_xx_xx.xml --no-repo-verify**
- **repo sync -j8 --no-tags --no-clone-bundle -c**

3. Build aws_demos.bin

- **cd aia-shell-m2/aia-demo**
- **./1_build_iot_sdk_demo_lib**
- **./2_cmake_aws_demos**
- **./3_build_aws_demos**

4. Flash aws_demos.bin

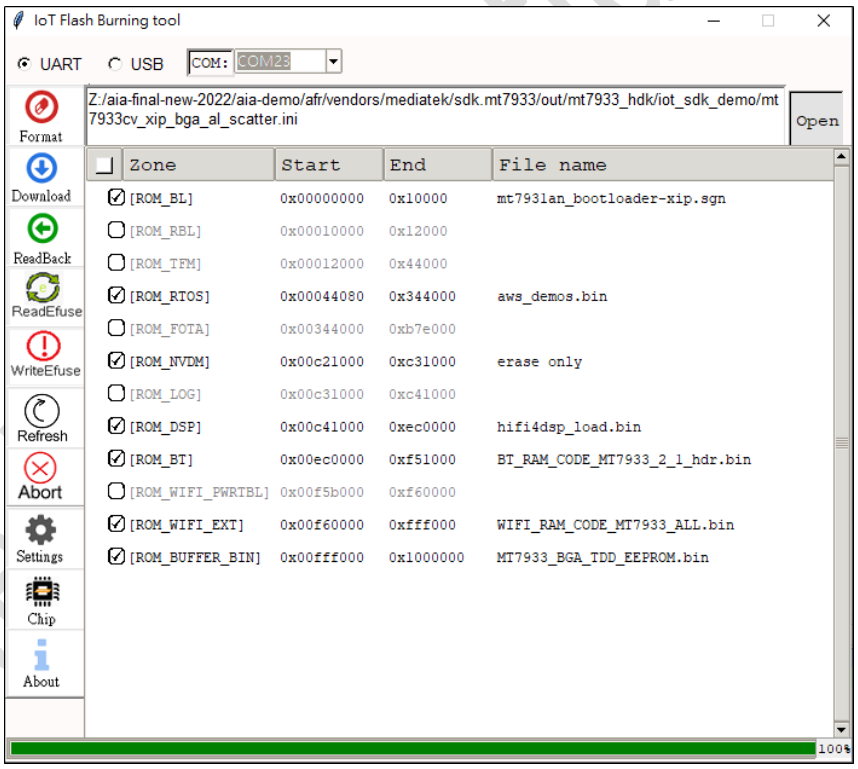

Figure 3-1. flash tool & scatter file

4 AIA Demo

This chapter goes through the flows, prerequisites and commands of running AIA.

4.1 Introduction

MT793x AIA provides 2 ways to initiate an interaction.

1. Push to talk
2. Wake word 'Alexa'

After initiating an interaction, there are 2.5 seconds for users to ask their questions. MT793x receives the pcm data and send to cloud. Then, MT793x receives Alexa's response and plays the response. After MT793x finish playing Alexa's response, the state of AIA returns to IDLE. When the state of AIA is IDLE, it is ready for next initiation.

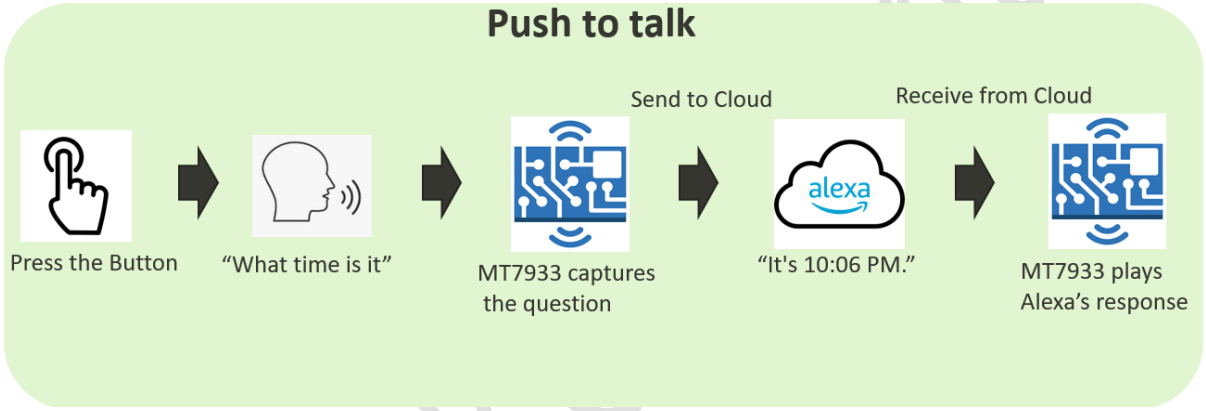

Figure 4-1. Push to talk flow

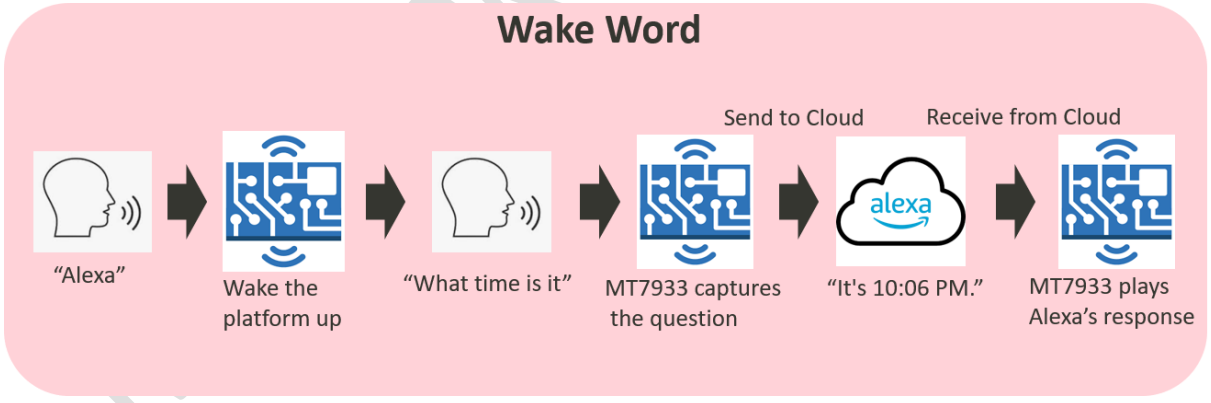

Figure 4-2. Wake Word flow

4.2 Prerequisites

Please prepare the items listed below before running AIA.

- 1 speaker
- 1 antenna

Figure 4-3 indicates the elements used by AIA. Please attach speaker and antenna to the corresponding positions.

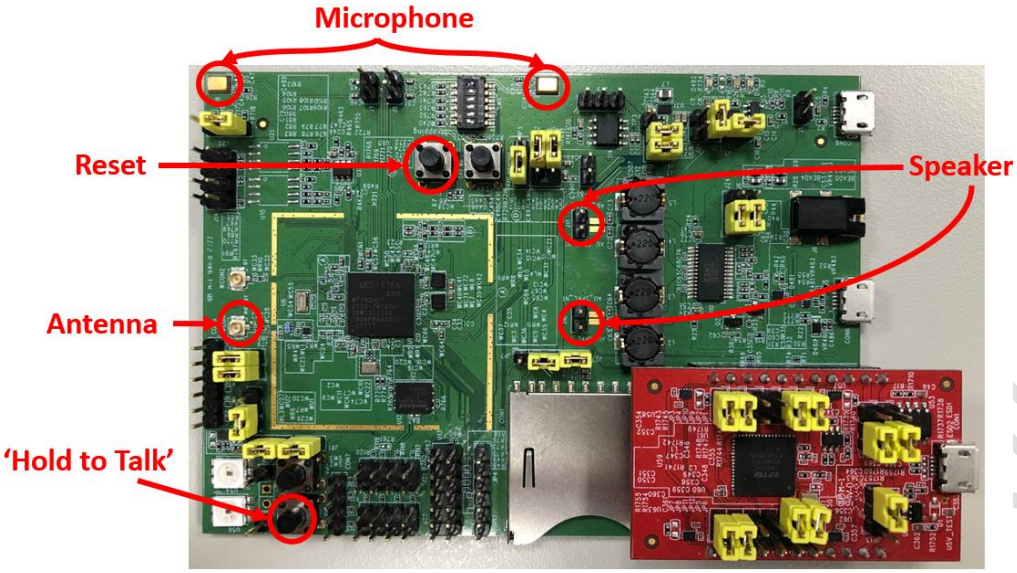

Figure 4-3. MT793x elements

4.3 CLI Commands to Start AIA

Please execute the following commands to run AIA.

1. WIFI connection

- wifi init
- wifi config set ssid 0 <your-ssid>
- wifi config set sec 0 7 6
- wifi config set psk 0 <your-password>
- wifi config set reload
- wifi config get ssid 0
- wifi config get sec 0
- wifi config get psk 0

```
[237851]<682>[minisupp][I][print_log][207]State: 4WAY_HANDSHAKE -> GROUP_HANDSHAKE
[237853]<683>[minisupp][I][print_log][207]WPA: Key negotiation completed with 36:c2:13:85:c7:bb [PTK=CCMP GTK=CCMP]
[237853]<684>[minisupp][I][print_log][207]State: GROUP_HANDSHAKE -> COMPLETED
[237855]<685>[minisupp][I][print_log][207]CTRL-EVENT-CONNECTED - Connection to 36:c2:13:85:c7:bb completed [id=0 id_str=]
[237881]<686>[WIFI][I][wifi_evt_handler_gen4m][584][gen4m]======== [SET_LISTEN] !! =======
[240931]<687>[WIFI][I][ip_ready_callback][181]**********************
[240932]<688>[WIFI][I][ip_ready_callback][182]DHCP got IP:172.20.10.2
[240932]<689>[WIFI][I][ip_ready_callback][184]**********************
[240932]<690>[WIFI][I][lwip_get_ipmode][98]get ip mode 1
[240933]<691>[WIFI][E][cnmChMngrAbortPrivilege][924]rStatus 0
```

Figure 4-4. Success message of WIFI connection

2. DSP & VAD initialization

- aud_dbg cset ADSP_Enable 1 1
- aud_dbg va -v 1

3. Run AIA

- aia run

After executing 'aia run' command, AIA initialization will be done. During AIA initialization stage, the LED light is red. After initialization stage, AIA will enter IDLE state to wait for initiation of interaction, as shown in Figure 4-6 At this time, users can ask questions and wait for MT793x to play Alexa's response. To indicate the status, the LED light is blue during AIA listening stage and the LED light is green during AIA speaking stage.

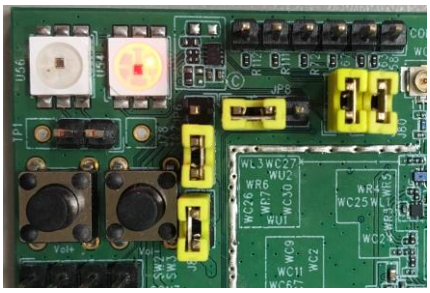

Figure 4-5. AIA initialization stage LED light (red)

```
[208561]: [INFO ][AIA][208561] Emitting JSON message chunk: {"header":{"name":"MicrophoneClosed","messageId":"}q!V3q73"},"payload":{"offset":76800}}
[208562]: [INFO ][MQTT][208562] (MQTT connection 0x10473568) MQTT PUBLISH operation queued.
[209152]: [INFO ][AIA][209152] ---- Current demo case = AIA_DEMO_CASE_HOLD_TO_TALK_START ----
[209152]: [INFO ][AIA][209152] Hold to talk
[211193]: [INFO ][AIA][211193] Message on directive topic sequenced
[211194]: [INFO ][AIA][211194] Total message size: 141, encrypted size: 109
[211194]: [INFO ][AIA][211194] Parsing {"directives":[{"header":{"name":"CloseMicrophone","messageId":"d3ad6309-bef9-4dd0-9df9-94c7f4a19b4f"}}]}
[211195]: [INFO ][AIA][211195] CloseMicrophone "d3ad6309-bef9-4dd0-9df9-94c7f4a19b4f"
[211195]: [WARN ][AIA][211195] Microphone not open
[213489]: [INFO ][AIA][213489] Message on directive topic sequenced
[213490]: [INFO ][AIA][213490] Total message size: 170, encrypted size: 138
[213491]: [INFO ][AIA][213490] Parsing {"directives":[{"header":{"name":"SetAttentionState","messageId":"1b1b1e47-dea3-42bc-afbf-445e35cb3f6d"},"payload":{"state":"IDLE"}}]}
[213491]: [INFO ][AIA][213491] SetAttentionState "1b1b1e47-dea3-42bc-afbf-445e35cb3f6d" {"state":"IDLE"}
[213492]: [INFO ][AIA][213491] **** UX state changed, state=IDLE ****
```

Figure 4-6. AIA IDLE state message

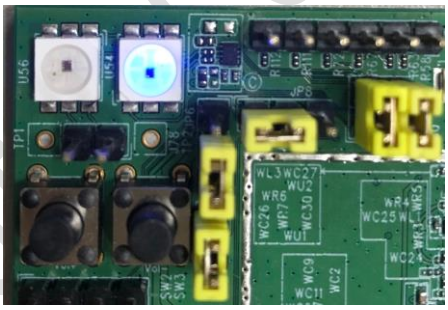

Figure 4-7. AIA listening stage LED light (blue)

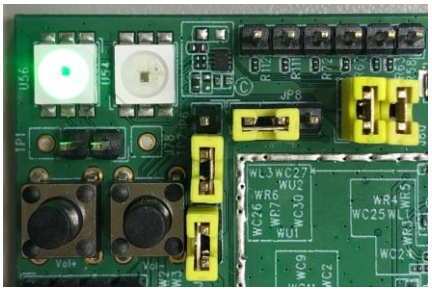

Figure 4-8. AIA speaking stage LED light (green)

4.4 Voice Command to Test AIA

Users can use the voice commands listed below to test the functionality of AIA.

- What is the weather?
- What is your name?
- What is the time?
- Tell me a joke.
- Flip a coin.
- Sing a song

5 Note

- All certificates in AIA SDK belongs to MTK. They are just for testing purpose. Customers should replace them with their own certificates.
- The microphones should be reworked for better VAD performance.

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