About This Guide

Release Notes

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Release Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018.03</td>
<td>V1.0</td>
<td>First release.</td>
</tr>
<tr>
<td>2018.04</td>
<td>V1.1</td>
<td>Updated section 1.1.</td>
</tr>
<tr>
<td>2018.04</td>
<td>V1.2</td>
<td>Added Appendix A with schematics.</td>
</tr>
<tr>
<td>2018.05</td>
<td>V1.3</td>
<td>Updated section 2.2.2.</td>
</tr>
<tr>
<td>2019.06</td>
<td>V1.4</td>
<td>Updated document cover and format.</td>
</tr>
<tr>
<td>2019.08</td>
<td>V1.5</td>
<td>• Added description of flashing in Chapter 2;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Updated description of voice recognition in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section 4.1.</td>
</tr>
</tbody>
</table>

Documentation Change Notification


Certification

### 目录

1. Overview ................................................................................................................. 1  
   1.1. ESP32-LyraT ....................................................................................................... 1  
   1.2. Hardware Resources ......................................................................................... 2  
   1.3. Software Preparation ....................................................................................... 3  

2. Flashing the Firmware ............................................................................................. 4  
   2.1. Driver Installation ............................................................................................. 4  
   2.2. Flashing ESP32 .................................................................................................. 5  
      2.2.1. ESP32 Download Tool ............................................................................... 5  
      2.2.2. Flashing Firmware into ESP32 ................................................................. 5  

3. Network Configuration ............................................................................................ 8  
   3.1. Wi-Fi Networking ............................................................................................. 8  

4. Interactive Function .................................................................................................. 10  
   4.1. Voice Recognition ........................................................................................... 10  
   4.2. Wake-up Button ............................................................................................... 10  
   4.3. Play Local Audio Files .................................................................................... 11  

A. Appendix – Schematics ......................................................................................... 12
The ESP32-LyraT development board is designed for the speech and voice recognition market. It integrates the ESP32-WROVER module, which includes a dual-core processor and 4.5 MB of operating memory. With this development board, only few peripheral devices are required for implementing a highly-integrated audio solution.

1.1. ESP32-LyraT

ESP32-LyraT has the following features:

- A variety of mainstream, both lossy and lossless, compressed audio formats, including M4A, AAC, FLAC, OGG, OPUS, MP3, etc.
- One-key configuration and wake-up from the standby mode.
- SoftAP and Station mode.
- Various wireless protocols: Wi-Fi 802.11b/g/n, Classic BT and BLE.
- A series of audio inputs, including Wi-Fi, BT-audio, DLNA, Line-in, etc.
- BLE network configuration, and smart network configuration such as WeChat.
- Two microphones for the development of near-field and far-field voice recognition applications.
- Peripherals for differentiated demands.
1.2. Hardware Resources

Figure 1-1. ESP32-LyraT Development Board

1. ESP32-WROVER Module

ESP32-WROVER is a powerful, general-purpose Wi-Fi+BT+BLE MCU module that targets a wide variety of applications, ranging from low-power sensor networks to the most demanding tasks, such as voice encoding, music streaming and MP3 decoding. For more information, please refer to the ESP32-WROVER Datasheet.

2. Micro SD Card

Supports SPI, 1-bit and 4-bit modes.

3. Audio Output AUX_IN

Works as the input to the ES8388 codec.

4. USB-UART Interface and USB Power Supply Interface

- USB-UART Interface: the integrated CP2102N-A01-GQFN28 chip is used to convert USB to UART and supports a baud rate of up to 3 Mbit/s.

- USB Power Supply Interface: the working current of the Wi-Fi module is very high at peak times. Therefore, a power supply with a capacity of more than 500 mA is recommended.
5. Touch Buttons

Four touch buttons are available on the development board: Play, Set, Vol+ and Vol−. Used as keys for audio functions, they bring such advantages as reduced BOM cost and design flexibility.

6. Speaker Interfaces

Supports two external speakers.

1.3. Software Preparation

1. Flash Download Tool

To flash firmware into the board, please download the Flash Download Tool.

2. App for Device Networking

To use the SmartConfig functionality and configure the ESP32-LyraT network, please download IOT Espressif for Android APK or ESP-TOUCH for iOS IPA at Espressif Apps.

3. Debugging Tool

Use a debugging tool that suits your development environment, such as Xshell or SSCOM, etc.

4. Hardware

- 1 x PC (Windows Operating System is recommended);
- 2 x Micro USB cables (one is for the USB power supply);
- 1 x Speaker.
2. Flashing the Firmware

ESP32-LyraT comes with factory firmware by default. Users do not need to flash once more and can start directly from the network configuration, then realize voice dialogue.

In case you still need to flash, see below:

2.1. Driver Installation

Connect the board to a PC with a Micro-USB cable to install the USB-to-UART driver.

![Figure 2-1. Installing the USB-to-UART Driver](image)
2.2. Flashing ESP32

2.2.1. ESP32 Download Tool

![Figure 2-2. ESP32 Download Tool](image)

Figure 2-2. ESP32 Download Tool

2.2.2. Flashing Firmware into ESP32

1. Double-click on the “ESP32 Download Tool” at the interface, as shown in Figure 2-2, after downloading the [Flash Download Tool](#). The following interface will be shown:
2. Configuration for Flashing Firmware

- Addresses for Downloading Firmware

<table>
<thead>
<tr>
<th>Bin Files</th>
<th>Address</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bootloader.bin</td>
<td>0x1000</td>
<td>Basic configuration</td>
</tr>
<tr>
<td>partitions_esp_audio.bin</td>
<td>0x8000</td>
<td>Basic configuration</td>
</tr>
<tr>
<td>esp32-audio-app.bin</td>
<td>0x10000</td>
<td>Audio application</td>
</tr>
<tr>
<td>audio-esp.bin</td>
<td>0x3A0000</td>
<td>Audio application</td>
</tr>
</tbody>
</table>

- The SPI Download configuration on the ESP32 Download Tool is shown in Figure 2-3.

- Select “80 MHz” by default for “SPI SPEED” (users can select other options as needed); select “DIO” by default for “SPI MODE” (users can select other options as needed); select the option for “FLASH SIZE” according to the actual condition, and here we select “32 Mbit” for demo.

- Select the COM port in line with the one used by the PC; select “1152000” for baud rate.
3. Power-on and Programming

• Power on ESP32-LyraT.

• Click the “Start” button on the ESP32 Flash Download Tool to start downloading the firmware.

• Press and hold the “Boot” button, and press the “RST” button on the board to enter the download mode.

• Wait for the download to finish.
3. Network Configuration

3.1. Wi-Fi Networking

1. After successfully downloading the firmware, power on the board again by pressing the RST button. In about 2 seconds, the green LED light on the board will flash, indicating that ESP32 is searching for a wireless network.

2. To configure the network for the first time (or to change the SSID of the network), press the “SET” button on the board for as long as 6 seconds.

   • Upon hearing the Chinese audio message “kai shi pei dui” (meaning “networking starts”) or when the green LED light starts blinking, release the “SET” key.

   • Connect ESP32-LyraT to the network, using the IoT Espressif app downloaded to your phone.

Figure 3-1. The LED Light on ESP32-LyraT
3. After connecting ESP32-LyraT to the network, the green LED light will be on steadily, and an audio message in Chinese “wang luo lian jie cheng gong” (meaning “successful network connection”) will be played.

4. Reboot the board after successful networking. The board will automatically connect to the network configured during the last connection.
4. Interactive Function

Key triggering and far-field voice triggering are supported by the wake-up function of ESP32-LyraT.

4.1. Voice Recognition

When ESP32-LyraTD-MSC is connected to DuerOS, ESP32 supports “Hi Le Xin” as a wake-up phrase. Saying “Hi Le Xin” to the board prompts the following response in Chinese: “nin hao you shen me fen fu,” (meaning: “Hi! How can I help?”). Users can talk to the board and instruct it to play songs and news, or they can perform other similar voice interactions. Operation sample:

- Say “Hi Le Xin” to the board, and it will respond in Chinese by saying: “nin hao you shen me fen fu.”
- Then, ask the following question in Chinese: “tian qi zen me yang” (meaning “How is the weather?”).
- The board will respond in Chinese by saying: “jin tian yin zhuan duo yun” (meaning “It’s getting from overcast to just cloudy today.”).

⚠ Notice:

- Please keep a distance of over 20 cm from the microphone when saying phrases to the board.
- If the board does not respond after you saying “Hi Le Xin” for many times, you can try the following buttons to wake up (early factory firmware versions may not support voice wake-up interaction).

4.2. Wake-up Button

When ESP32-LyraT is connected to DuerOS, users can press and hold the “REC” button, addressing a question or saying a song title to the audio-development board. The board will respond with a voice message. The precise operation steps are as follows:

- Press and hold the “REC” button, asking a question such as: “tian qi zen me yang” (meaning “How is the weather?”).
- Release the button and the board will respond with the following voice message: “jin tian yin zhuan duo yun” (meaning “It’s getting from overcast to cloudy today.”).

⚠ Notice:

After pressing the button, please wait for approximately 0.5 to 1 second before speaking.
4. Interactive Function

4.3. Play Local Audio Files

If the development board is not connected to the network, it supports playing audio files stored in the Micro SD card. The precise operation steps are as follows:

• Touch the “Play” button and the board will start playing audio files stored in the Micro SD card.

• Press momentarily the “Vol–” or “Vol+” button to adjust the volume to a lower or higher level, respectively. Repeat until you reach the desired sound volume.

• Press and hold firmly the “Vol–” or “Vol+” button to play the previous or next audio file, respectively.
A. Appendix – Schematics
Disclaimer and Copyright Notice

Information in this document, including URL references, is subject to change without notice.

THIS DOCUMENT IS PROVIDED AS IS WITH NO WARRANTIES WHATSOEVER, INCLUDING ANY WARRANTY OF MERCHANTABILITY, NON-INFRINGEMENT, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY WARRANTY OTHERWISE ARISING OUT OF ANY PROPOSAL, SPECIFICATION OR SAMPLE.

All liability, including liability for infringement of any proprietary rights, relating to use of information in this document is disclaimed. No licenses express or implied, by estoppel or otherwise, to any intellectual property rights are granted herein.

The Wi-Fi Alliance Member logo is a trademark of the Wi-Fi Alliance. The Bluetooth logo is a registered trademark of Bluetooth SIG.

All trade names, trademarks and registered trademarks mentioned in this document are property of their respective owners, and are hereby acknowledged.

Copyright © 2019 Espressif Inc. All rights reserved.