Synthia Anatomy Guide

Synthia's anatomy

Explore the board

Welcome to Synthia's anatomy guide!

Whether you have already assembled your Synthia or not, this is going to be a helpful guide where you'll learn a bit more about the soldered components, small connections, and drivers.

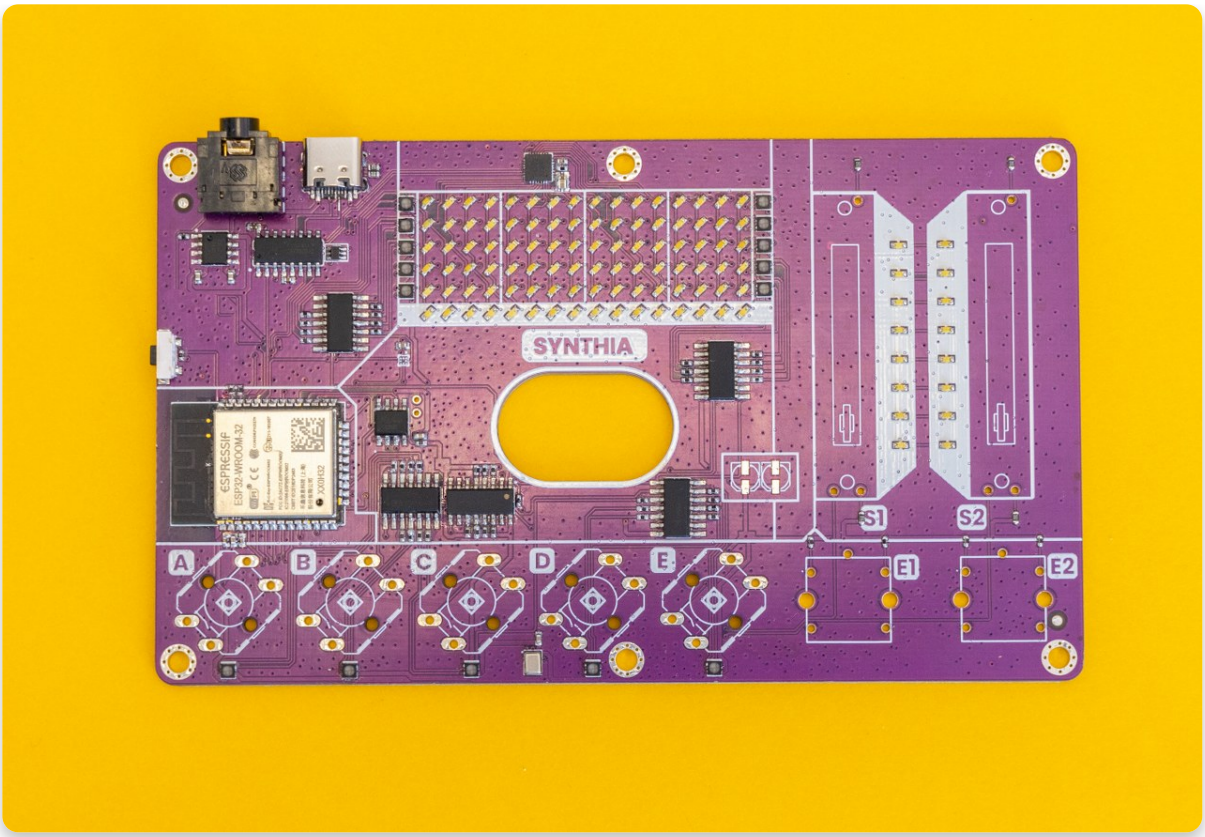
We'll start with bigger components and cover smaller components later in the guide.

Exploring the board

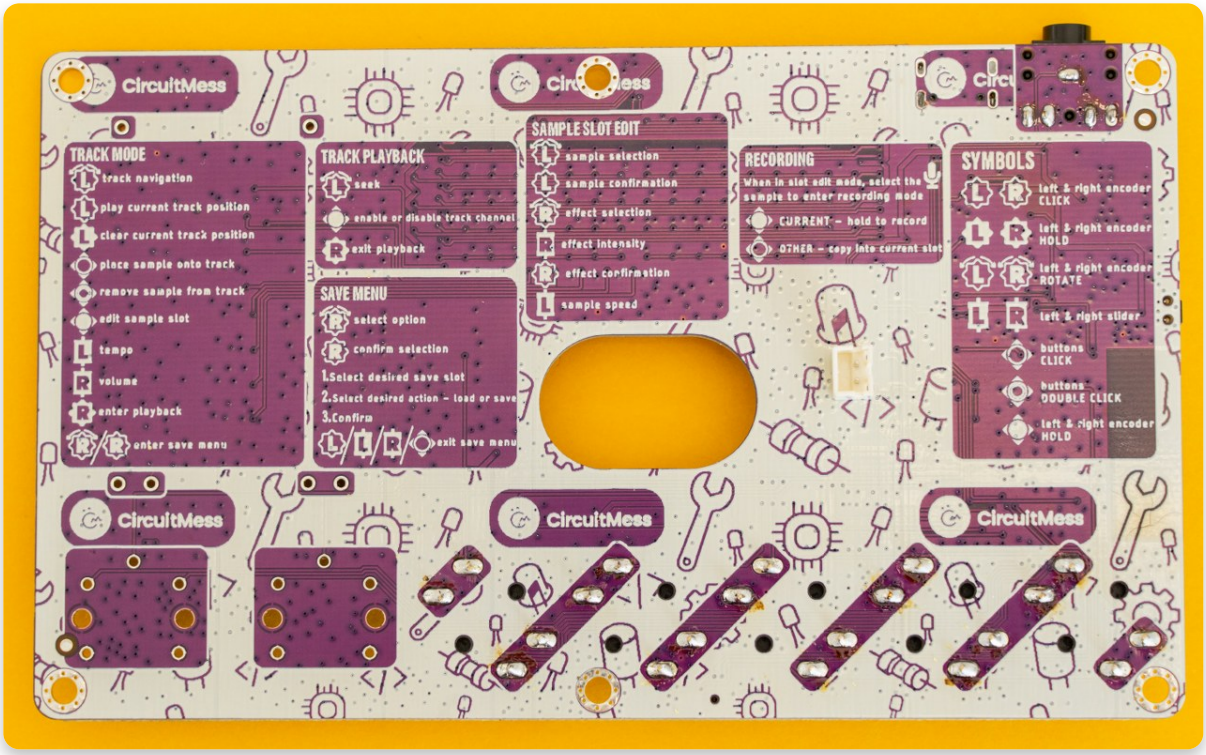
Starting with anything else but the PCB board itself would be wrong. Therefore, we present you the star of the night...

PCB stands for a printed circuit board. This fiberglass board has copper traces, protective paint, and insulating material.

Thanks to all the copper lead on the board, all the connected or soldered components can communicate with each other.



Just like with other CircuitMess devices like Nibble or Spencer, we want our components not only to work wonders but to look cool as well! Therefore, we designed some pretty fun patterns you can see on the back of the board.



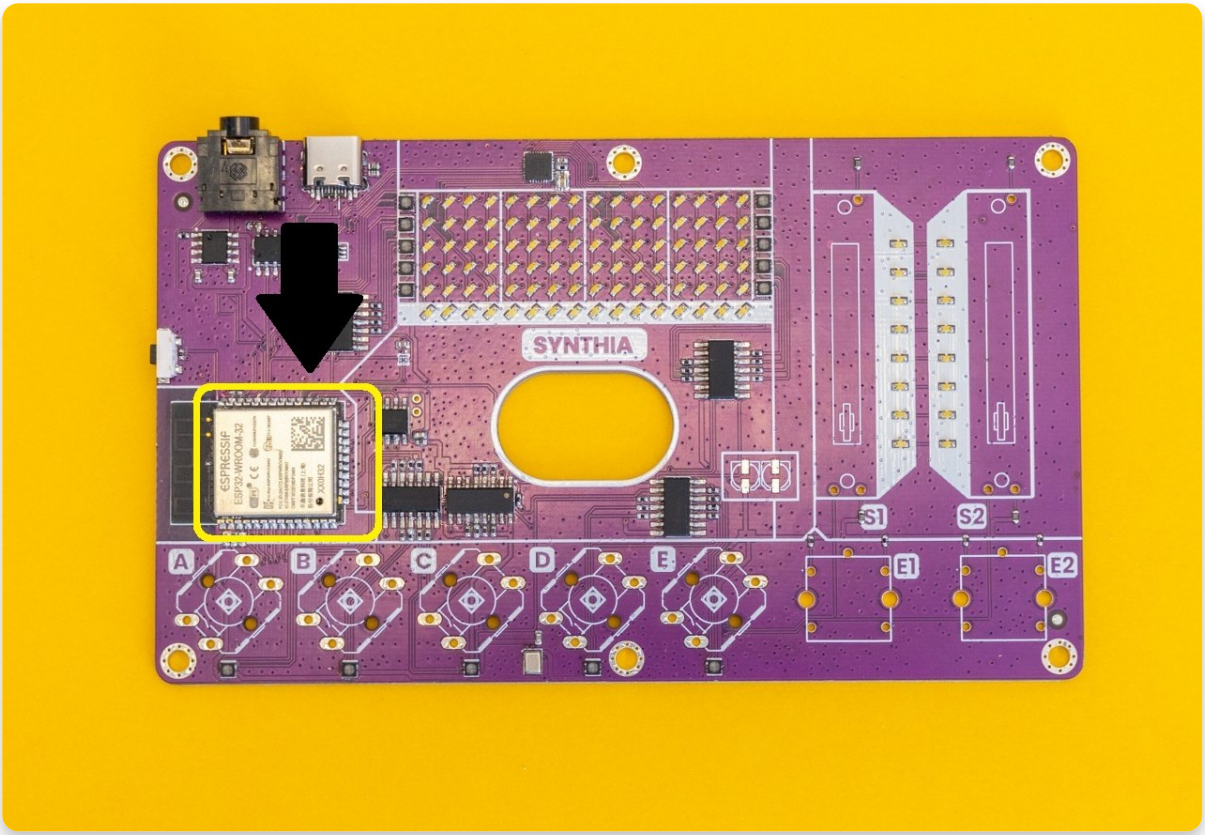
ESP-WROOM-32

This microcontroller runs everything, and you could say that this is Synthia's brain. ESP-WROOM-32 is a powerful module mainly used for sound encoding and streaming music. It is reasonably priced considering all its abilities.

Apart from being famous for sound encoding, ESP-WROOM-32 also controls sliders, encoders, pushbuttons, and LEDs.

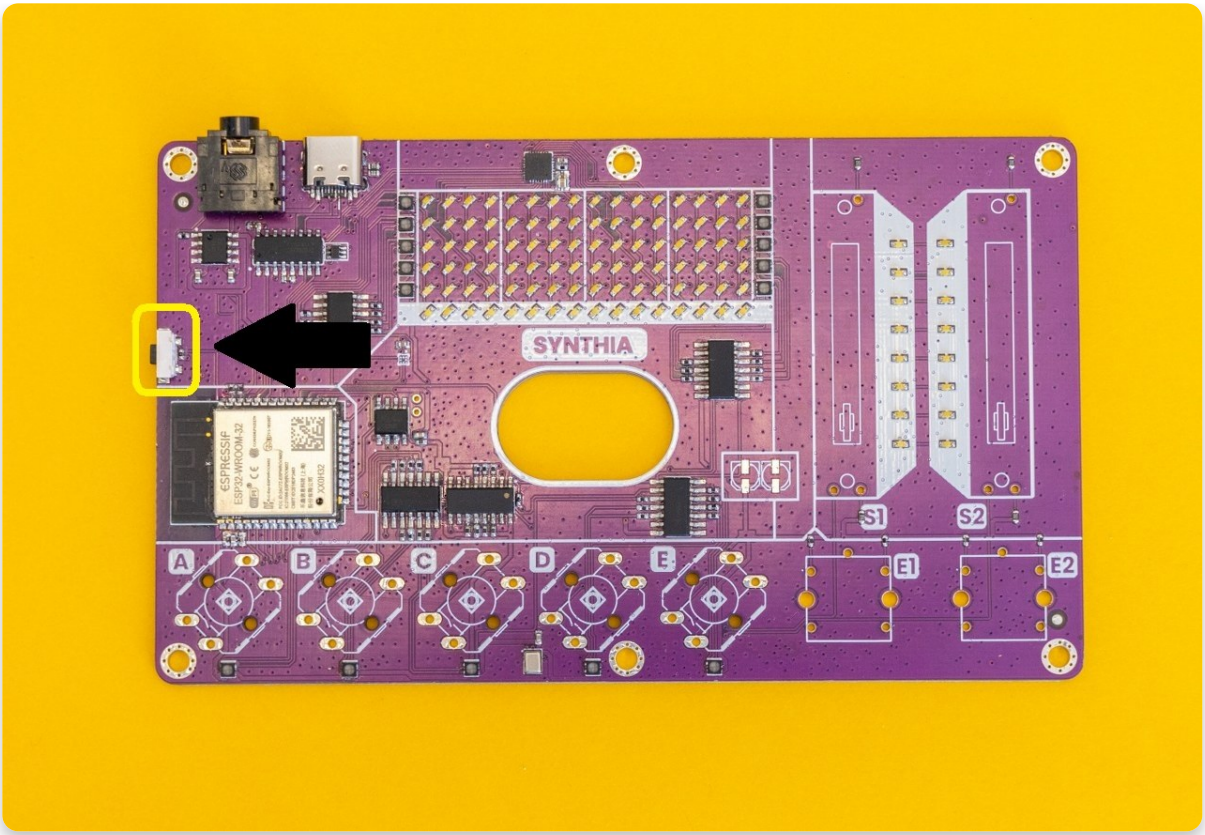
Due to its complexity and sensitivity, this module is already connected to Synthia's main board.

- ESP-WROOM-32 data sheet



Reset button

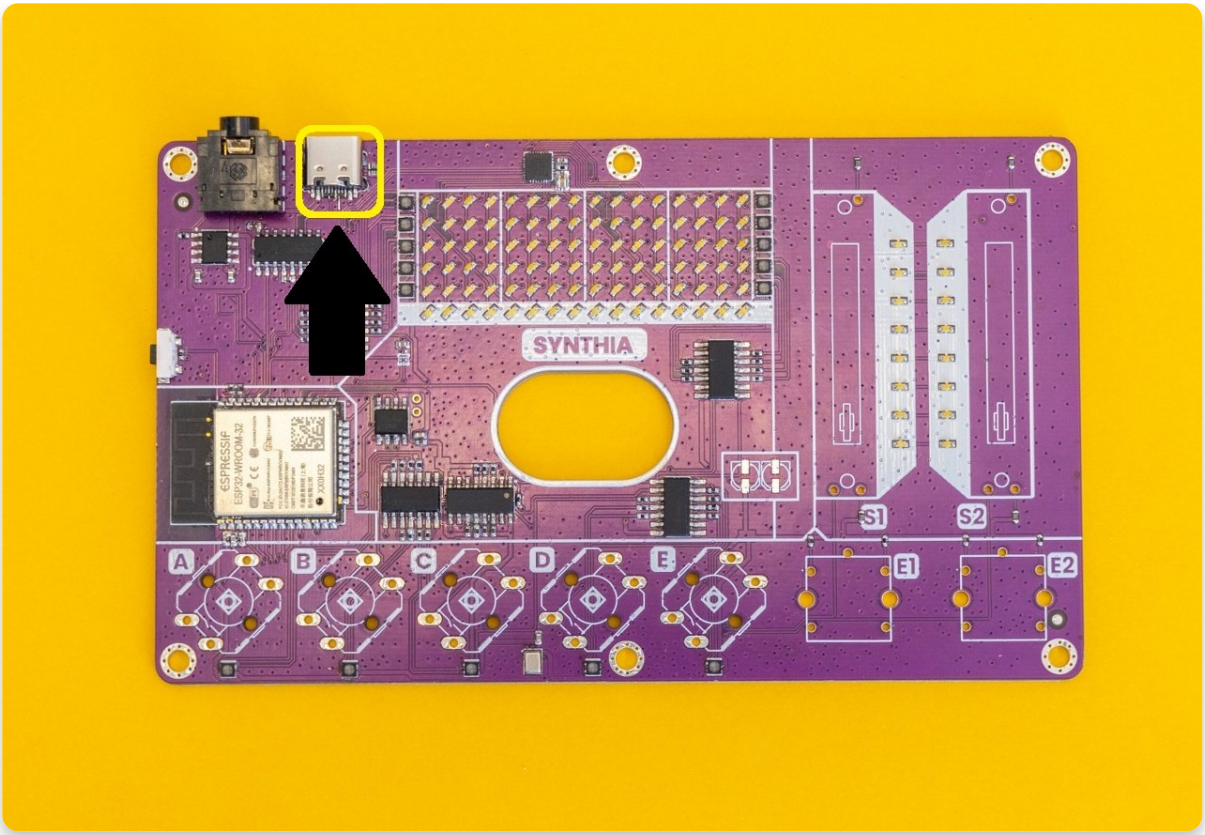
This one’s pretty self-explanatory - the reset button is used for resetting the whole device. You can find this useful in case something gets frozen (which is hopefully never).



USB-C connector

This connector on the top left side of the board is used for connecting Synthia to the computer. Once you connect it to your PC, you'll be able to program it in CircuitBlocks - a graphical programming interface that helps newbies get into embedded programming.

Also, you need to connect it with the PC in order to use it or to do a hardware test.

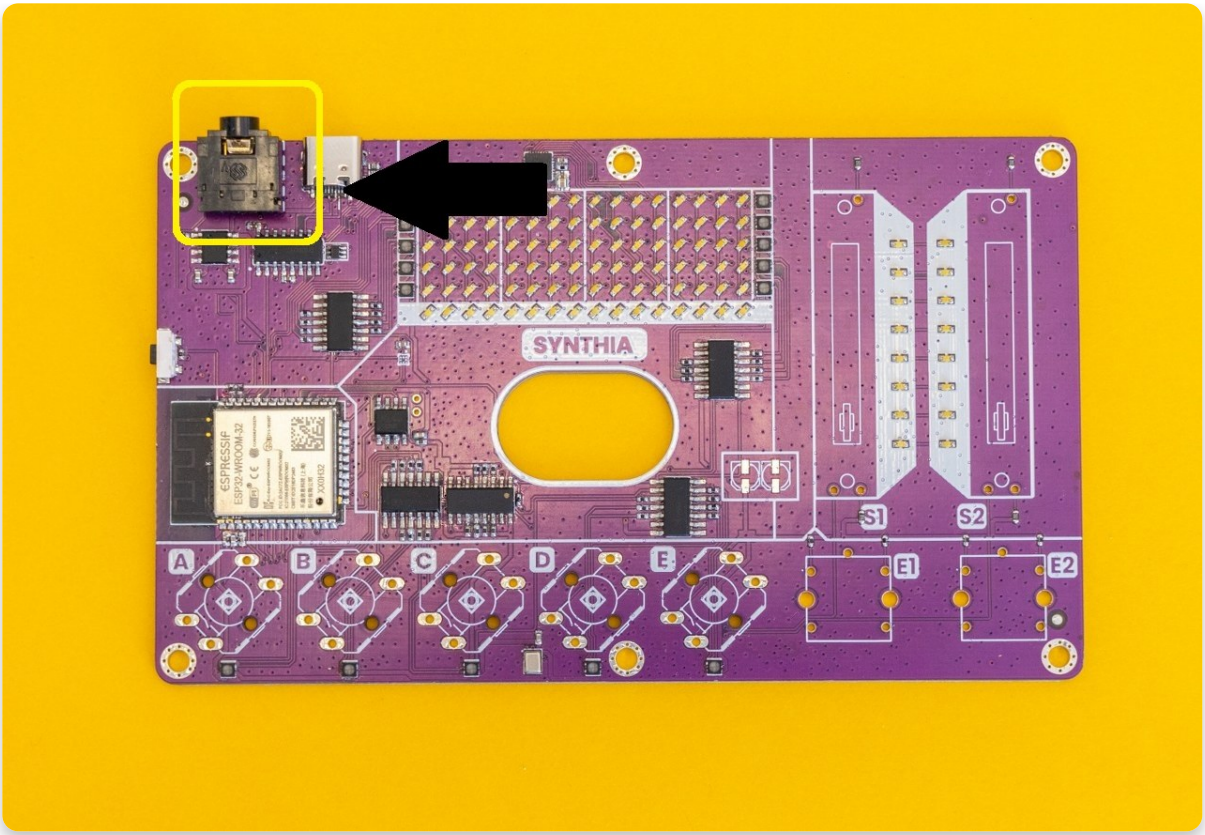


Headphone jack

This is a headphone jack for standard headphones/earphones.

Sorry - no wireless headphones here!

There is a headphone jack that's soldered to the upper left side of the board. Once you start mixing music on your Synthia, you can plug in the headphones, and the sound will automatically transfer from the speakers to the headphones.

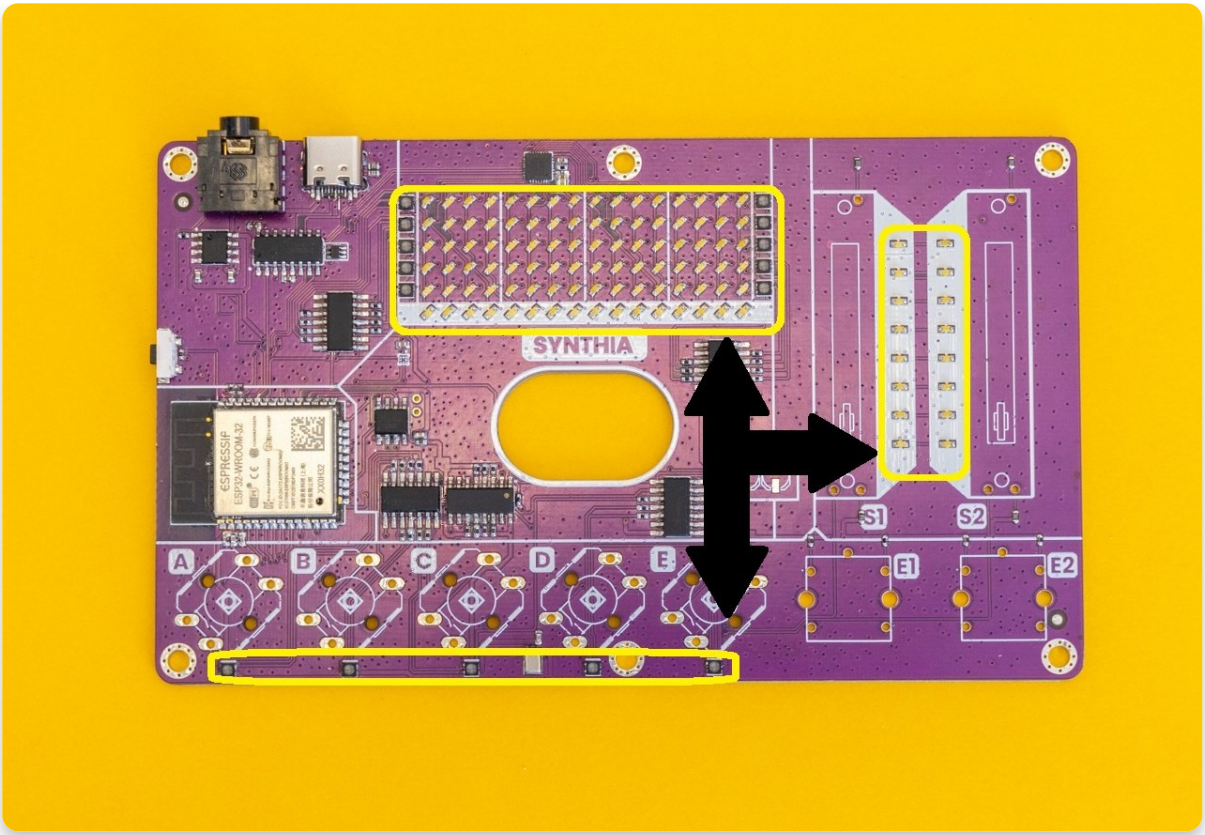


LED lights

Have a wild guess - how many LEDs are there on the board?

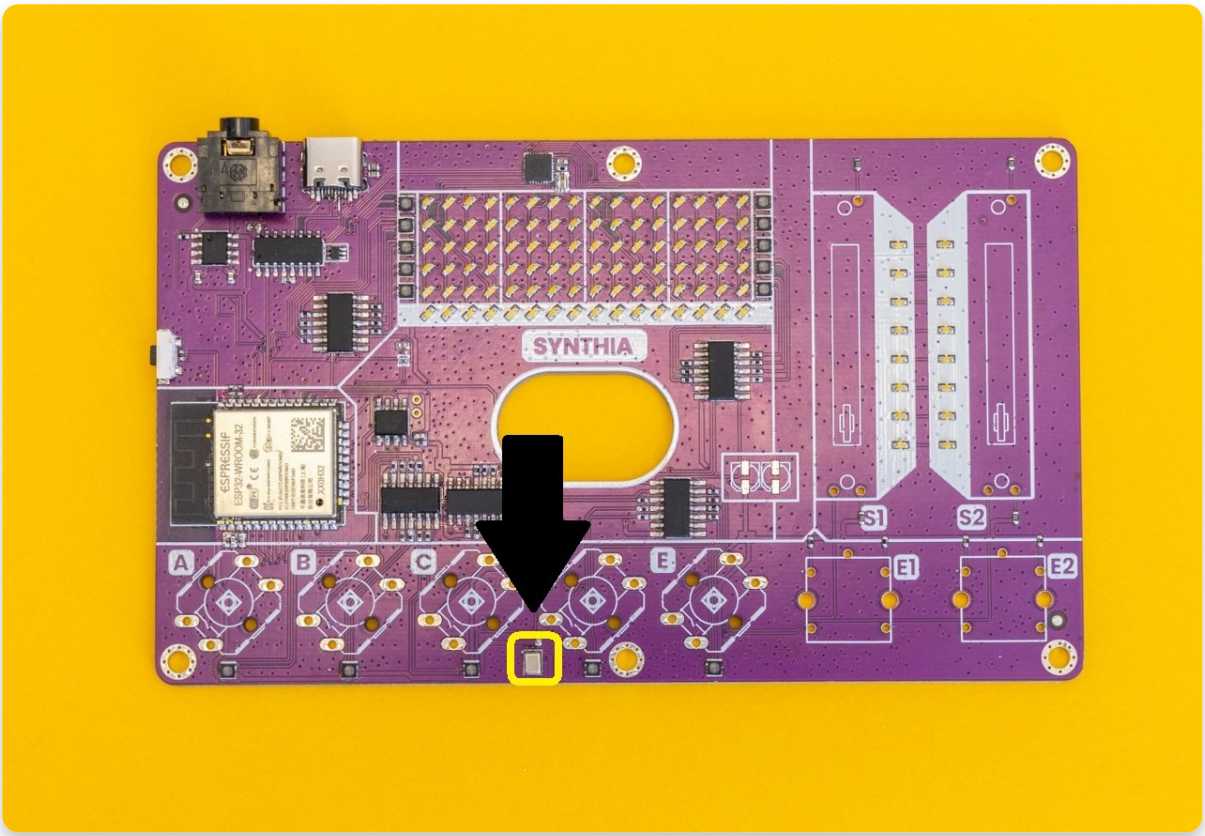
These LED lights are one of the most exciting components on Synthia's board. There are two types of LEDs on Synthia's PCB - the RGB and the regular white ones.

We use RGB lights under the pushbuttons and at the edges of the LED matrix (the darker ones). All of the other LEDs are regular white LEDs.



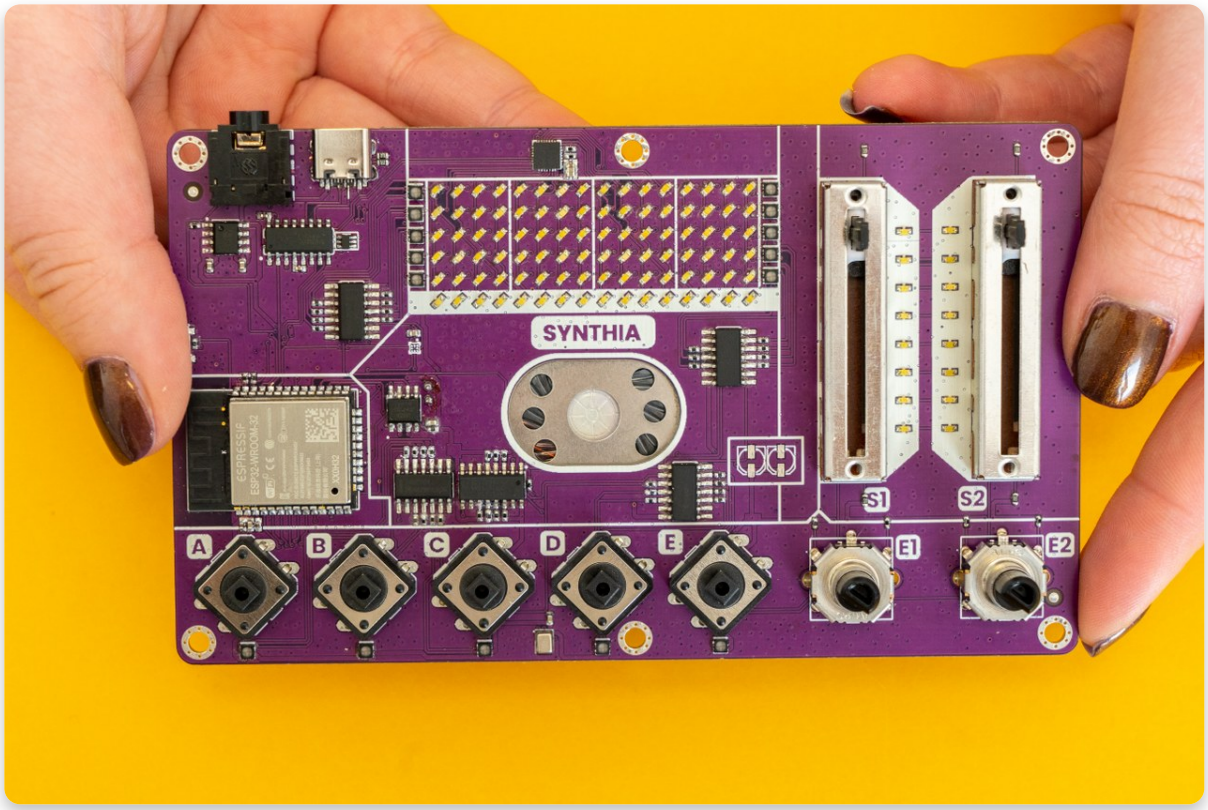
SPH microphone

The SPH is a miniature, high-performance, low-power, bottom port silicon digital microphone.



Speaker

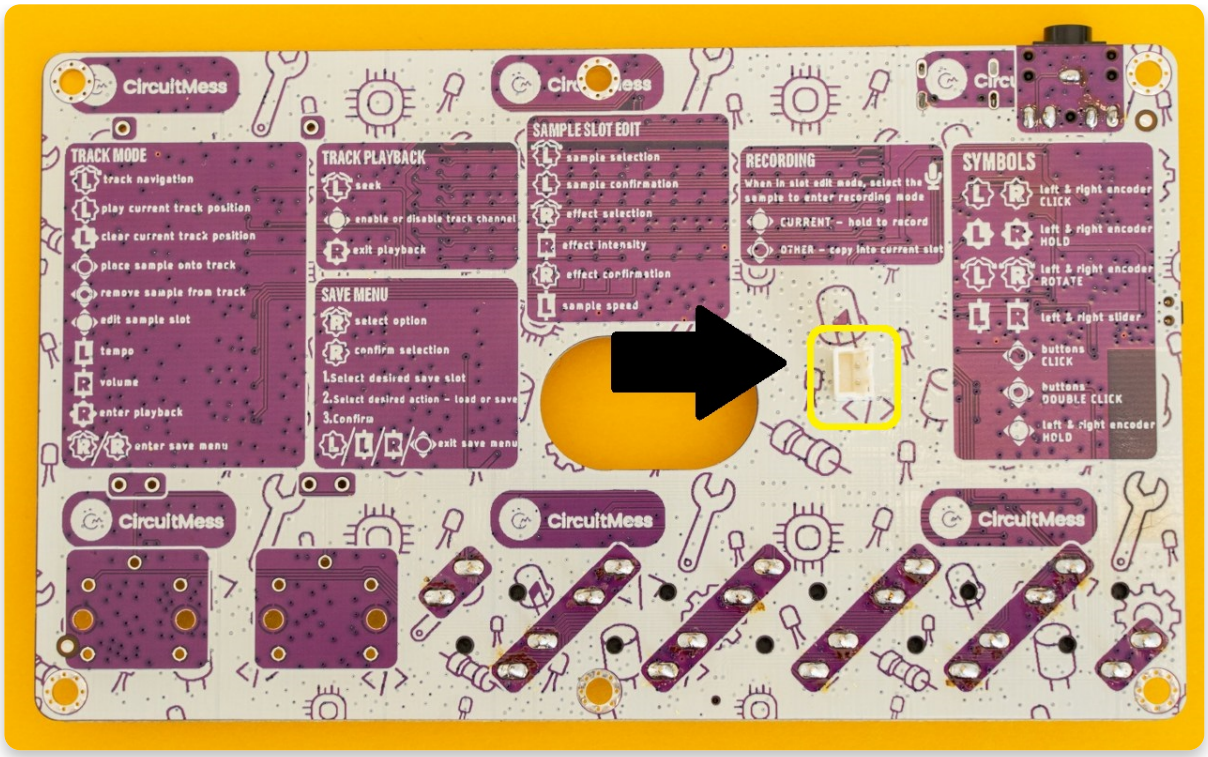
As you all probably already know, you'll use the speaker to listen to cool tracks you make.



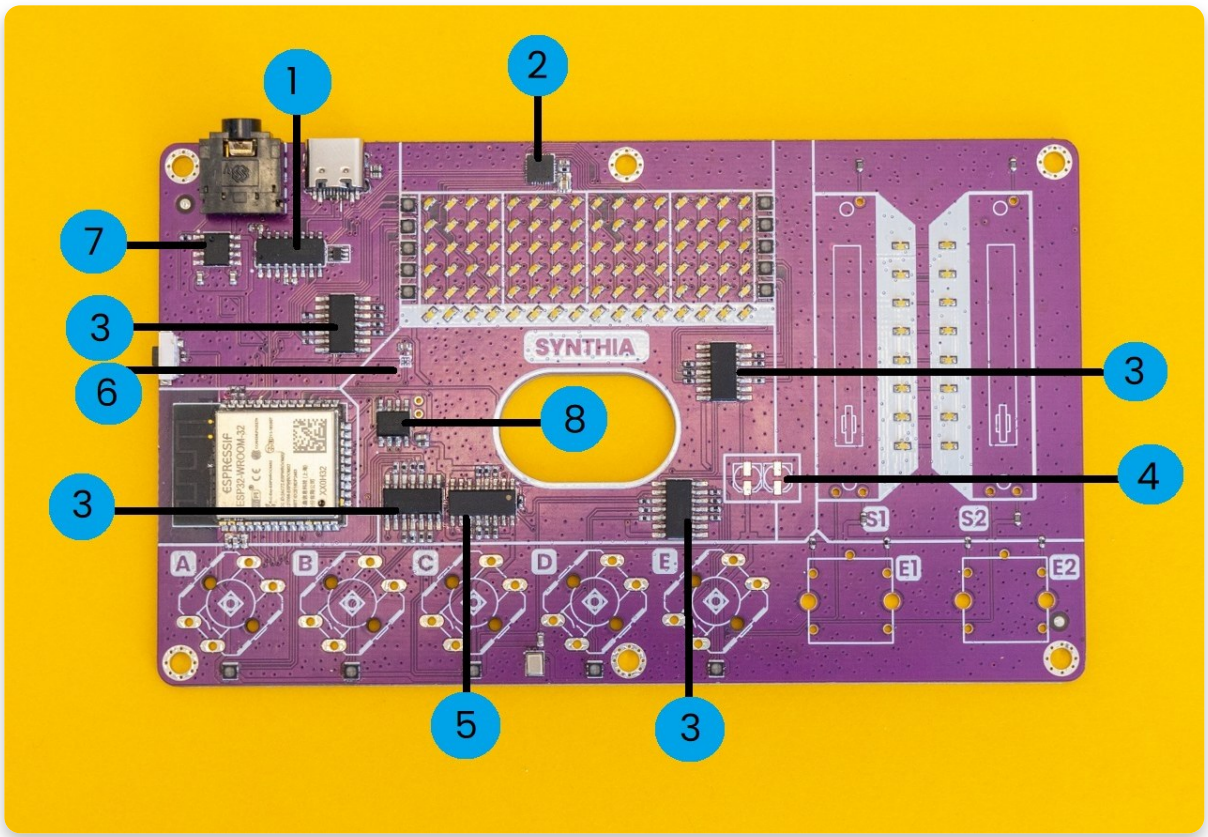
Speaker connector

Out of all of the components, only the speaker connector is located on the back side of the PCB.

This connector is used for manually connecting the speaker to the main board.



Explore the chips



1. Chip CH340C

Synthia can communicate with your computer over USB, thanks to this little guy!

2. Chip IS31FL3731

This chip called IS31FL3731 drives the LED lights!

Later, when you turn on your Synthia and start playing music, you'll also be able to see LEDs lightning up that are controlled by this chip.

3. Chip 74HC164D

This chip is a shift register used as an LED driver.

4. 47uF capacitors

Capacitors are widely used in switched-mode power supplies, DC-DC converters, and power supplies. This capacitor has a long life, low leakage current, and wide operating range.

5. Chip 74HC165D

These chips will make sure you can use the pushbuttons and play music with them.

6. MAX 98357AEWL+T chip

This is an audio amplifier, and it reproduces input audio signals at sound-producing output elements with desired volume and power levels.

7. Chip CN2626

This is a linear regulator used for supplying Synthia with power. Also, CN2626 adopts temperature regulation instead of over-temperature protection, which will regulate the output current to limit the die temperature during high power operation or high ambient temperature.

8. LY68L6400 RAM chip

This chip is called LY68L6400SLIT, and it handles any extra-quick tasks that the main process, ESP-WROOM-32, needs to be done!

Capacitors and resistors

These small components are the main parts of pretty much every electronic device in the world. They are used to control the flow of the current in a circle.

There are a few locations on the board where these components are located, mainly around the ESP-WROOM-32 module.

Synthia's block diagram