

# Wheelson Anatomy Guide

## Wheelson's anatomy

### Explore the board

## Welcome to Wheelson's anatomy guide!

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

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

### Exploring the board

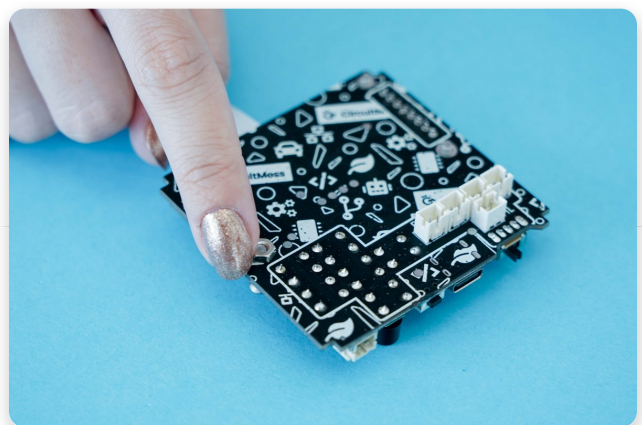
Starting with anything else but the PCB board itself would be wrong. Therefore, we present you the star of the night...

**PCB stands for a printed circuit board.** Basically, this fiberglass board has copper traces on it, some protective paint, and insulating material.

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

Without it, Wheelson couldn't move his motors, the display wouldn't react after any input from the buttons and we wouldn't be able to read the camera feed.

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 that you can see on the back of the board.



Take a closer look at the design on the back of the board

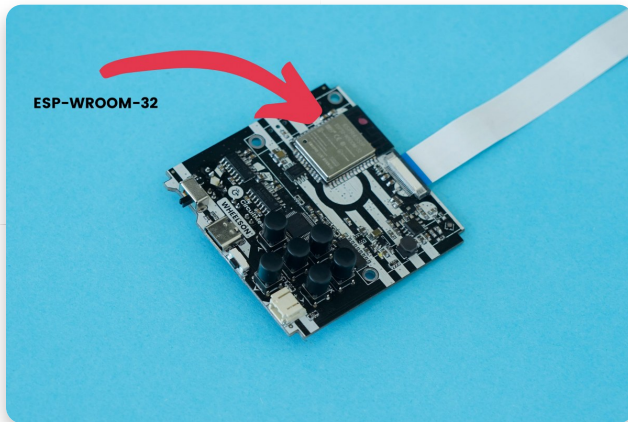
## ESP-WROOM-32

This microcontroller runs everything, and you could say that this is Wheelson'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, including the ability to connect to Wi-Fi.

ESP-WROOM-32 also controls pictures on display and LED lights.

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

- [ESP-WROOM-32 data sheet](#)



## Reset Button

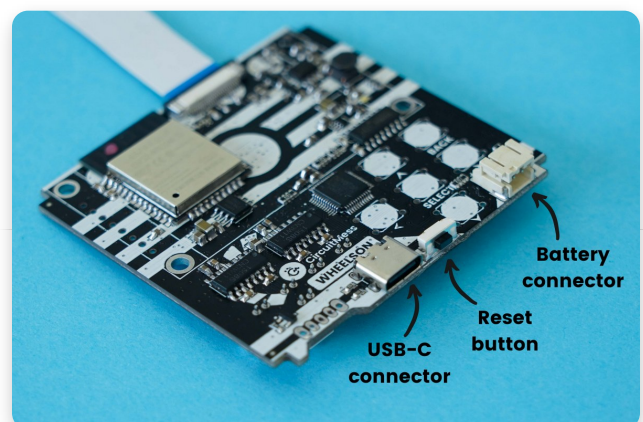
This one's pretty self-explanatory - the reset button is used for resetting your Wheelson. You can find this useful in case something gets frozen (which is hopefully never).

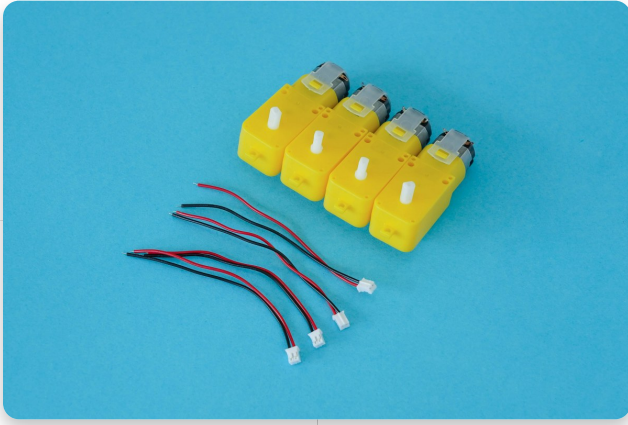
## USB-C connector

This connector on the top side of the board is used for charging and connecting Wheelson 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.

## Battery connector

This connector, on the right side of the board, is used for connecting the LiPo battery to your wheelson. Without the battery, it wouldn't be able to go on long drives!





## Motors + Motor Connectors

Motor connectors are located on the bottom side of the board. Each connector is connected to one motor that is later assembled.

The motors, one per wheel, is what gives Wheelson its ability to move around.

## White LED

These LED lights are what allows Wheelson to navigate in the dark. They are the headlights and are right next to the camera!

## OV2640 Camera

The OV2640 camera is the same as Wheelson's eyes - without it, he wouldn't be able to see. This allows Wheelson to look at his surroundings and decide which way to go. Without it, he would be driving blind.

It also allows Wheelson to be able to read and scan QR codes, recognize different simple objects using a camera and image processing algorithms and drive around autonomously.



## Display – 128\*160 TFT color display

Wheelson's display is connected to its own small board that is soldered to the mainboard. Many pins need to be connected due to the complexity of the component itself. Don't worry. Guides that explain this step are quite simple, so we hope you'll actually enjoy the process of soldering this one.

On this display, you'll be able to see what wheelson sees! When applying different filters and computer vision algorithms, you'll see a different output on the screen so that you can understand how robots see and interpret the world around them.

## Buttons

These buttons allow you to navigate through Wheelsons menu, send him in different directions and so much more!

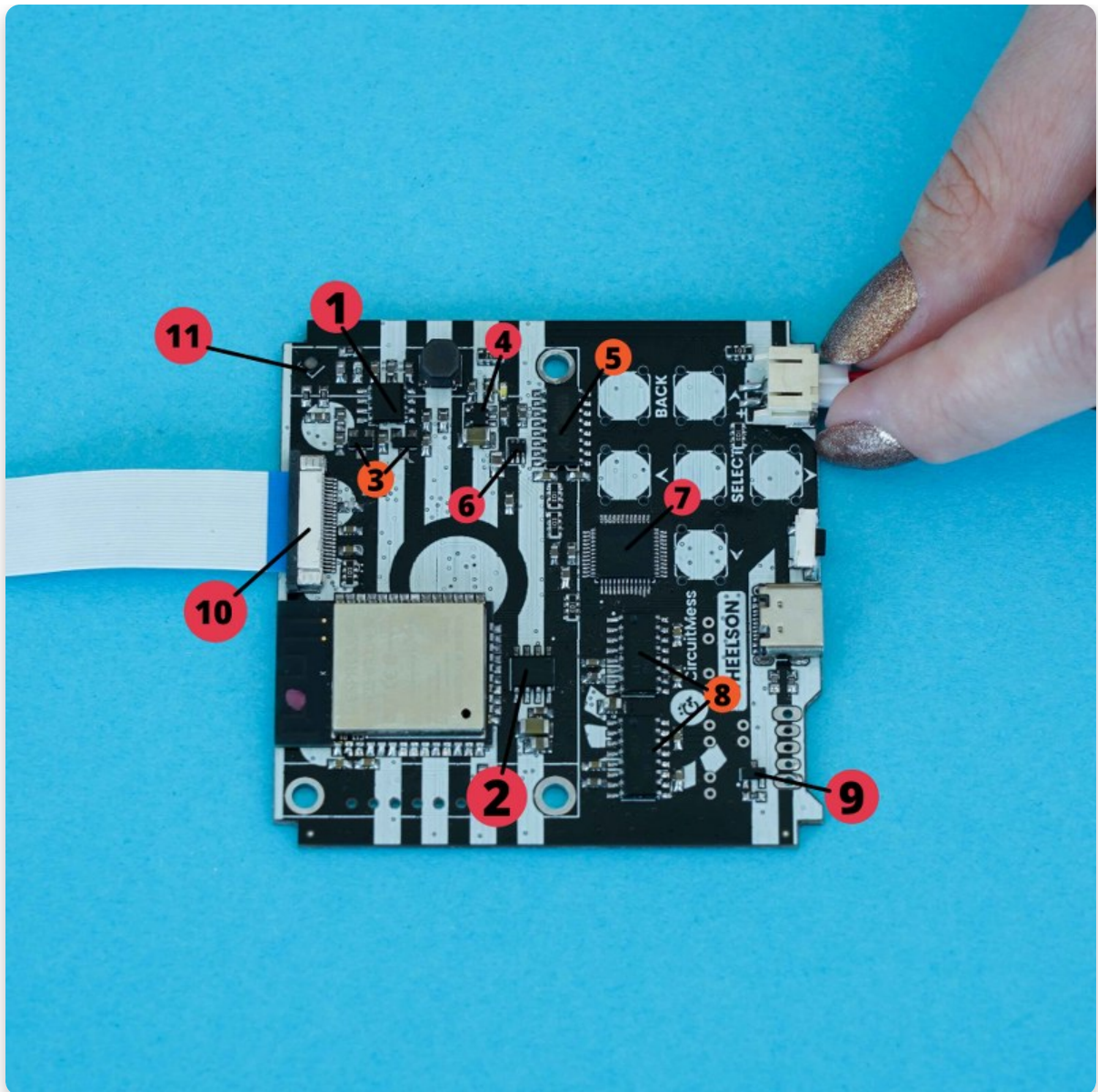


### Fun fact

The same display is used in the CircuitMess Ringo kit!

## Explore the chips





## 1. LY68L6400SLIT RAM Chip

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

## 2. PAM 2320

PAM 2320 is a Voltage Regulator outputting 3.3V to be used in the circuit!

## 3. Voltage Regulators

Here we have two different regulators outputting various voltages.

1. The one on the left - 1.2V
2. The one on the right - 2.8V

## 4. TP4054 Chip

This chip is what keeps your LiPo battery safely charged!

## 5. CH340CChip

Thanks to this little guy, Wheelson can communicate with your computer over USB!

## 6. UMH3N Chip

This chip allows Wheelson to switch between Run Mode and programming mode!

## 7. Co-Processor Chip (N76E616AL48)

The Co-Processor helps the main ESP-WROOM-32 chip out! It manages things like:

- Motor Drivers
- Buttons
- Measures battery voltage.

## 8. TC1508S Motor Drivers

These small components talk to the Motors and make sure they know what to do! Each chip can control 2 motors, with 2 different channels!

## 9. G3035 Mosfet

This component is like a little switch that we can control. This allows the processor to turn on/off our Wheelsons headlights automatically!

## 10. Camera (OV2640) + Camera Connector

The camera connector uses a ribbon cable to quickly receive what Wheelson is currently seeing from the OV2640 camera! This goes straight to the ESP-WROOM-32 for processing!

## 11. RGB Led

And finally, we have a simple RGB LED that can be directly programmed to turn into any colour you wish! Pretty cool right?

**Blocks... and more blocks**

# Wheelson's block diagram

**This is Wheelson's block diagram.**

Take a look at the scheme below and feel free to investigate in detail.

It shows how the components like EPS-WROOM-32, display, LCD screen, camera, motors and motor drivers are connected. It also explains how different inputs are accepted and processed by different drivers and how they affect the outputs.

