Introduction

this document aims to show one of the possible ways to make connections on the ochin_CM4 board, considered by the writer to be a good way. In addition, some aspects are brought to the attention of the reader that can help avoid the onset of problems of various kinds.

Power Supply

The card accepts input voltages up to 28V, its internal regulator supplies 5V with currents up to 8Amps, therefore it is advisable to use cables with an adequate section. Choosing a cable with an adequate section avoids too high voltage drops. It is advisable to choose a cable with a section no longer less than AWG14.

The pads on which the power cables are soldered are copper squares perforated by a matrix of 9 metallized holes. The purpose of these vias is to increase the conductive surface by putting the 4 layers of the pcb in contact and to provide more mechanical strength. In fact, once the wires have been soldered to the pcb, the tin that crosses the vias and reaches the bottom layer becomes a mechanical block through the pcb. This prevents the Top layer pads from tearing off the pcb following an accident. It is therefore advisable to verify that the pond has passed through the vias to the bottom layer.

GHS cables

Except for the two cameras, the USB Type-C and the power pads, all other interfaces are accessible via 4 or 6 pin GHS connectors. Whether the cables with the connectors are purchased separately or supplied by Seeedstudio together with the ochin_CM4 board, it is important to **NEVER TRUST THE COLOR CODE** , because the color sequence of the cables can change from one manufacturer to another and is often random. So before connecting anything to the board it is **important to check that the connections are correct regardless of the color of the cables.**

Eventually it is possible and advisable to move the cables in the connector to have the colors consistent with their function.
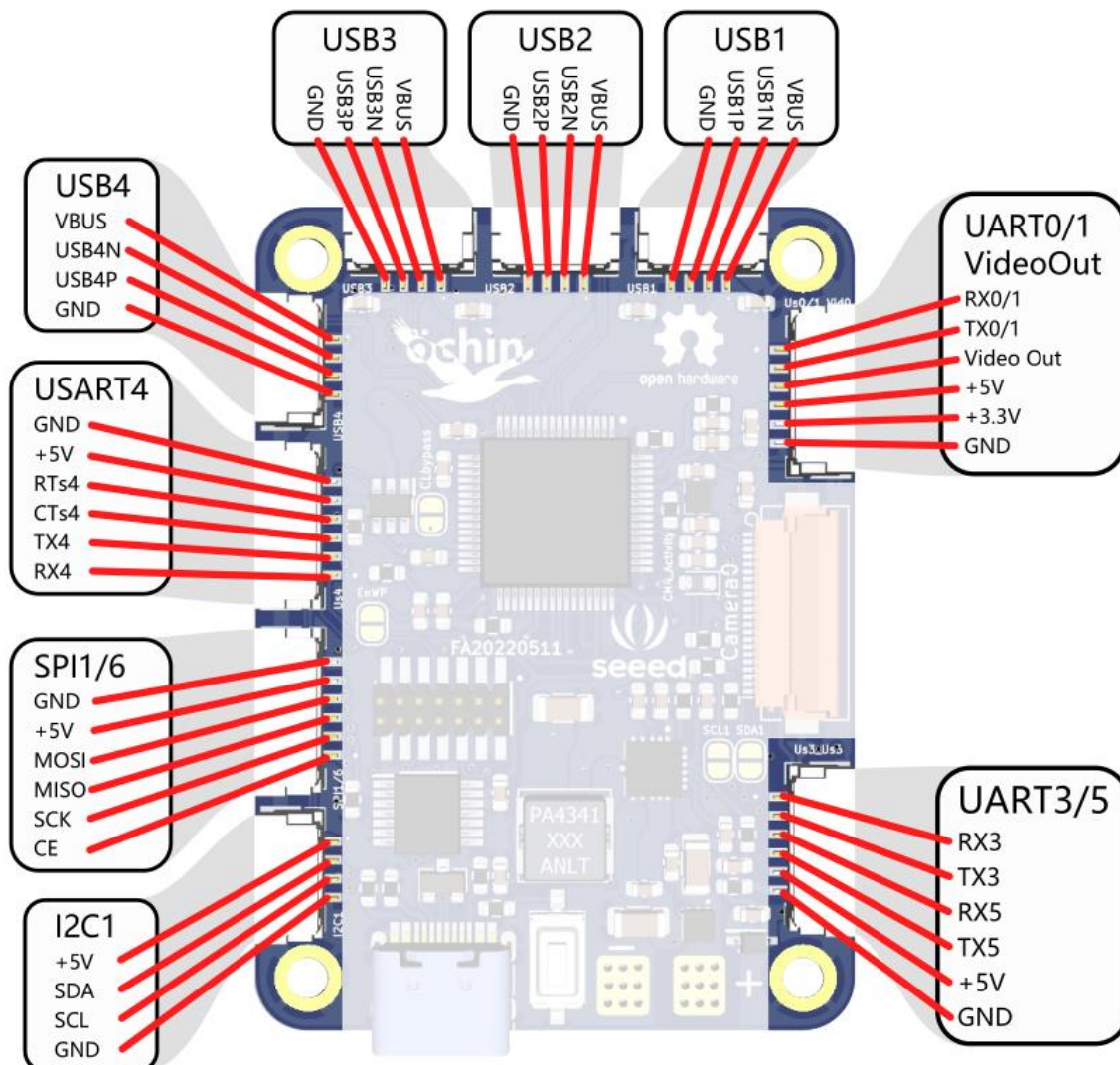
USBs

The connections related to the USB ports are a bit critical, the reason for their criticality is the high frequency at which the USBs work. The maximum speed at which USB2 works is 480Mbps and at this frequency is very important to ensure impedance coupling to avoid reflections and other deleterious phenomena. Understanding these phenomena requires in-depth studies and this document does not purport to explain any of this. This paragraph has the sole purpose of warning the reader that the connection of a USB device is not made by any 4 wires, as it can be for a serial or I2C device. The ochin_CM4 board uses SM04B-GHS connectors for USB which are not the standard connectors with the aim of saving space, therefore it is not possible to use normal USB cables to connect devices to the board. However, it is advisable to connect a shielded USB cable to the GHS connector, cutting the wires as short as possible, because in the USB cable the cross-section of the wires, the material and thickness of the insulation and the way in which D + and D- are twisted make ensure that the cable has the right impedance. To do this, you can cut a USB extension cable and replace one of the connectors with the GHS.
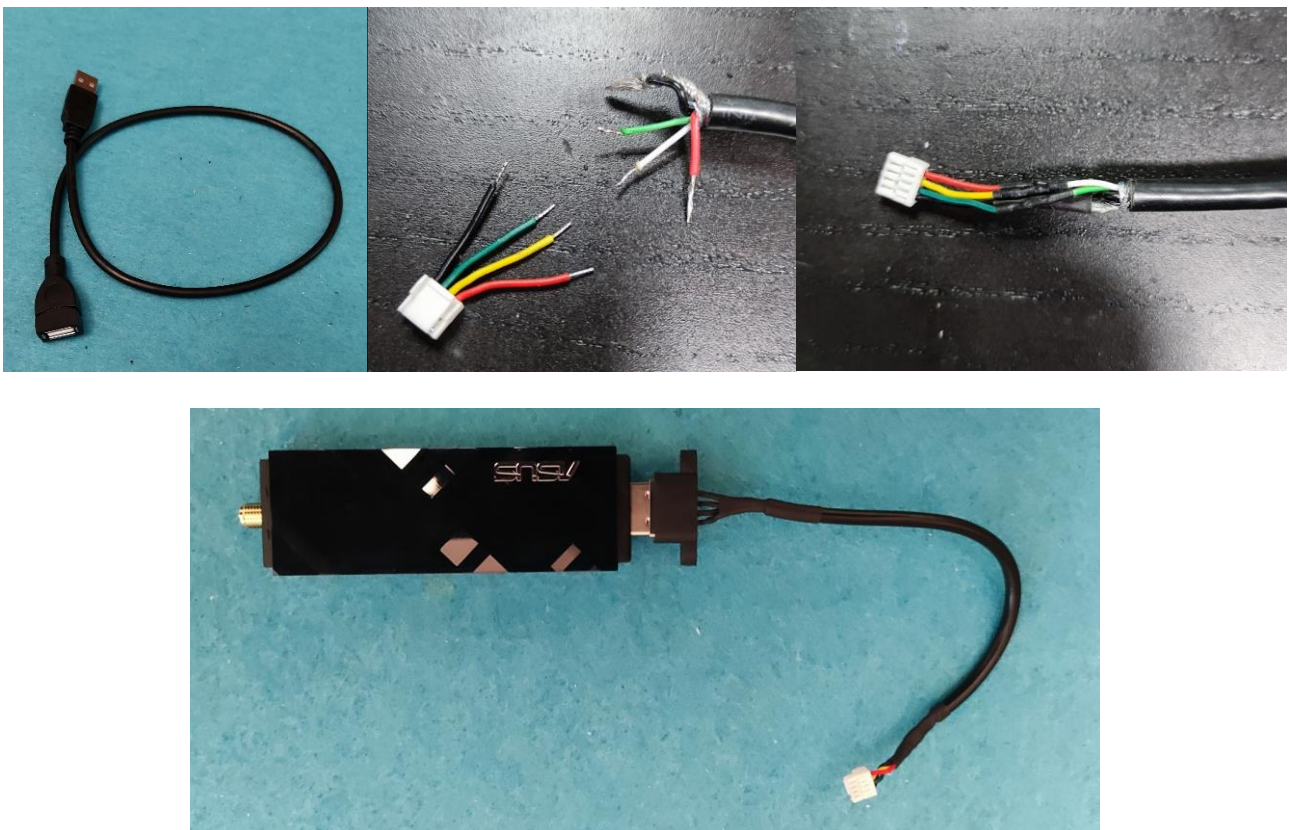
FCC/FPC camera connectors

There are several models of connectors compatible with flat cable manufacturers for Raspberry Pi Zero cameras (MIPI CSI 22 contacts 0.5mm pitch). After several tests of all compatible models, despite the not very small size, it was decided to use Hirose Electric FH12-22S-0.5SH (55). The main reasons are greater mechanical strength and easier positioning of the flat cable. However, it is important to be very careful to position the terminal part of the flat cable correctly and prevent the flat from being removed without having deactivated the mechanical block of the connector. If the flat is pulled out when blocked, it may happen that the pins of the connector scratch the copper surface of the contacts. In this case, seemingly random phenomena often occur in which the camera suddenly stops working or does not work at all. In these cases, it is advisable to check the status of the contacts with a magnifying glass.

It is also important to avoid subjecting the flat cable to too tight bends because they can cause the breakage of the support and the interruption of the connections printed on it.
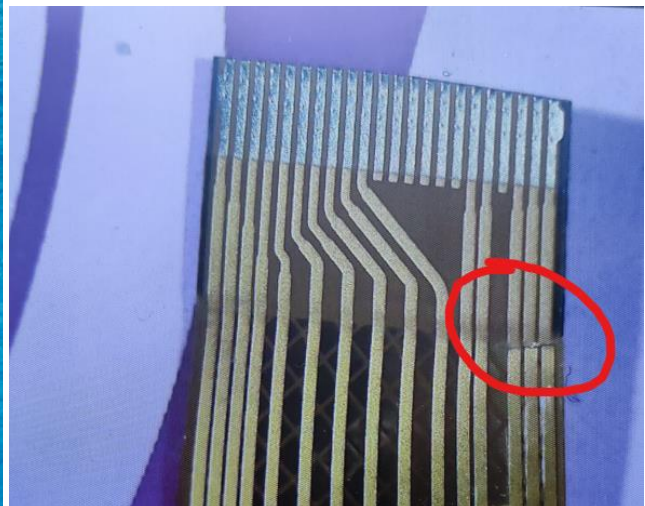
Raspberry CM4 module mezzanine connectors

To mount the raspberry pi CM4 module, there are two 100 pins connectors on the back of the ochin_CM4 board. The two connectors are not vertically centered on the board, so it is quite easy to understand how the module is inserted. If the CM4 module is correctly inserted, the 4 mounting holes coincide with those of the ochin_CM4 board, otherwise the two remain misaligned.

The connectors are quite delicate and very dense, so you need to be careful. Before positioning the CM4 module, it is advisable to check that there are no specks of dust or other things that could prevent contact of the pins, if necessary clean with a soft brush and air. Place the module gently on the connectors until you feel they are seated in each other (there is a first zero force step where they snap into). When you are sure that the two boards are perfectly aligned and the connectors engaged, press the two long edges of the CM4 module until the connectors are fully inserted. It is advisable to limit the disassembly of the CM4 module as much as possible to avoid damaging the connector contacts.
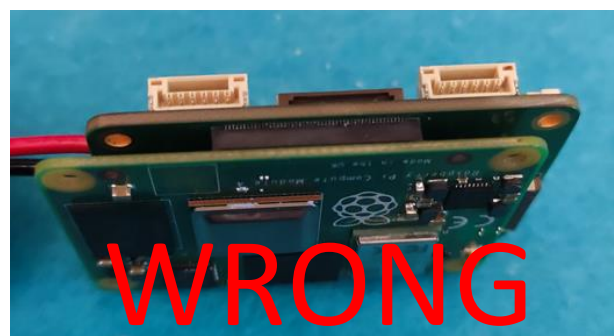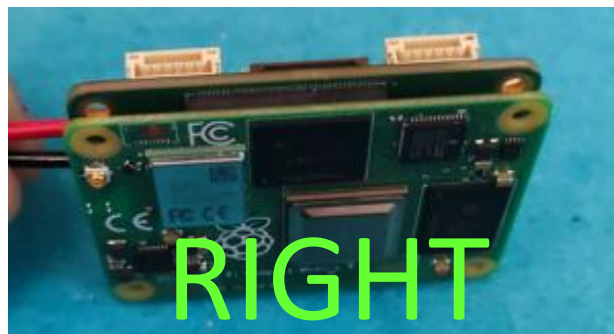
Removing the CM4 module from the ochin_CM4 board is even more critical than mounting. If the module is removed in an inappropriate manner, the two boards will remain misaligned during the release of the mezzanines, and it is very likely that the male connector (CM4 module side) will be damaged.

To help the disassembly of the module I designed a specific tool that allows you to divide the two boards by unhooking the mezzanines vertically.

You can find the stl files to 3d print the tool in the "3d" section of this repository.
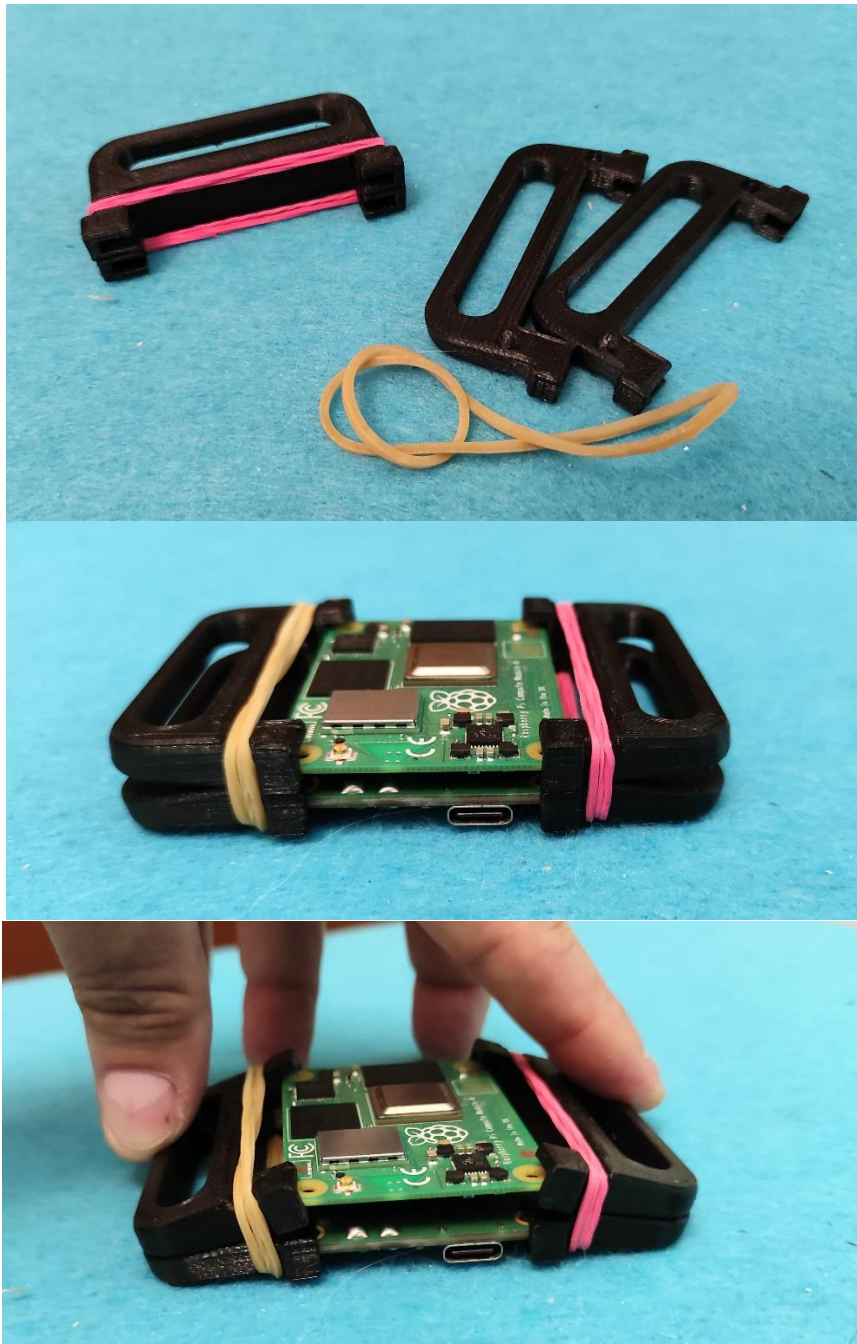
If you don't want to damage your CM4 module I suggest you ALWAYS use this tool.