DIY your PVR

The purpose is to build a PVR (personal video recorder) to automatically manage the video while you are working on your cart. The system will record video, replay video, and be transparent automatically. The pictures. quality will be compressed HD and it is definitively dedicated to the monitoring. In/Out video are HDMI but the annex 1 at the end provides a solution to be HD-SDI compatible.

You will need to get:

- Standard hardware parts to buy by yourself (Raspberry pi 4B, raspberry case, SSD …)
-

And on ComboKino.com

- The fully pre-configured operating system for your Raspberry pi 4B (for free)
- An **IoKino** (IO for Input/Output) dedicated electronic board
- A **ShowKino** ONE YEAR software license

Note 1 : The **IoKino** board order includes a ONE YEAR license for the ShowKino

Note 2 : To continue using the system, the license must be renewed every year. If you stop, your Raspberry Pi will remain fully usable for many other applications.

STEP 1 - Do your shopping or check what you already have
The bill of material is around 250 euros / dollars

The main board:
The Raspberry Pi 4B.(the computer board)

The pi 4B is the only compatible version at least **2GB of RAM**.

WARNING: At that time the project is **NOT compatible with the Pi 5** version

Any USB mouse or mouse with a dongle

After installation finished a Bluetooth mouse can be used.

The case

You will need to install an SSD on the raspberry Pi for Read/Write band with speed.

The highly recommended case is
Argon ONE M.2 Case for Raspberry Pi 4

- It is compatible with an SSD
- All connectors are on the same side
- The HDMI regular size connector

This tutorial is based on the use of this case

The power supply

On your cart you may use your cart power distribution. The raspberry Pi 4B input connector is an USB C power supply.

If you buy one for the wall the recommend are:
Argon Type-C Power Supply 18 Watts 5 Volts

OR

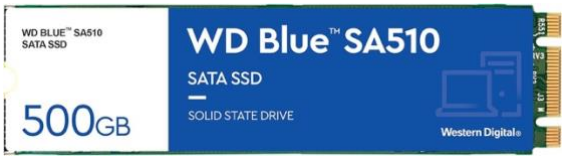
the new official raspberry power supply
Raspberry Pi 27W USB-C Power Supply

One of the best values for money

The micro SD storage
A 32GB is needed for the setup.

SanDisk 32 GB micro SDHC Memory Card. or higher capacity.

The storage:
The SSD will be connected to an USB 3 of the raspberry pi.



If you go for an **Argon ONE M.2case** the SSD will be located in the case and be careful to buy an **M2 SATA SSD** and NOT a NVMe PCI express. WD is an example but another brand can be used (Samsung, Crucial …)

With 250 GB you will have approximatively 30 hours of video, 500 GB is recommended.

the video capture card

It will be an USB video capture card. It will be connected to an USB port of the Raspberry pi

The cheapest one is working great!

The PVR will use 1280x720 MJPEG capture resolution regardless of signal resolution, HDMI input.

And a small extension cable to be more flexible

STEP 2 – Install the software (Operating system) on the micro-SD

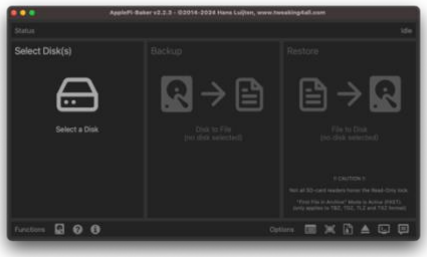
You need a slot on your computer to be able to read/write micro-SD.
You will have to write the provided OS image on the micro-SD

On MAC OS:

- Download **ApplePiBaker** on official website
- https://www.tweaking4all.com/software/macosx-software/applepi-baker-v2/
- Download the image to be written
- https://www.combokino.com/

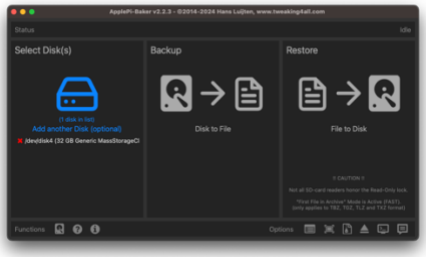
Step 1:
Insert the micro 32 GB SD card in the reader/write on your MAC

Step -2:
Start ApplePiBaker



Step -3:

In ApplePiBaker application click on **Select disk(s)** and choose the sandisk 32GB

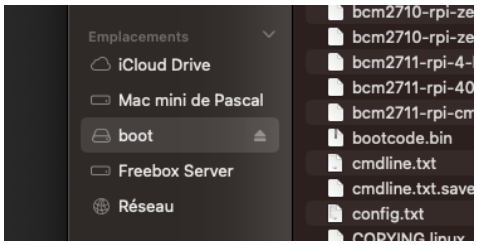


WARNING: Be careful to select the micro SD and not an other drive connected to your MAC

Step 4

Click on **Restore** and browse and select the **ComboKino.img.zip** file you have downloaded

ApplePibaker is now creating your microSD



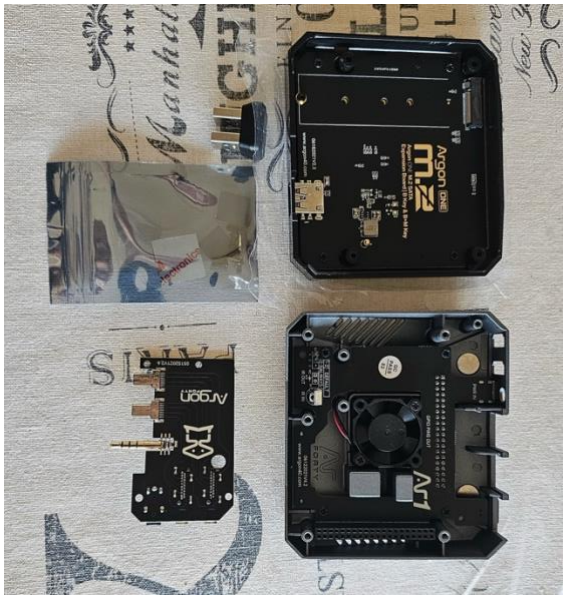
Step 5

Once finished, you can eject it in your MAC finder.

You can now remove the micro-sd from the computer slot.

STEP 3- Build the PVR

Unpack the Argon one M2 case
Follow the instruction to seat your Raspberry Pi 4B in the case



An USB 3 bridge connector

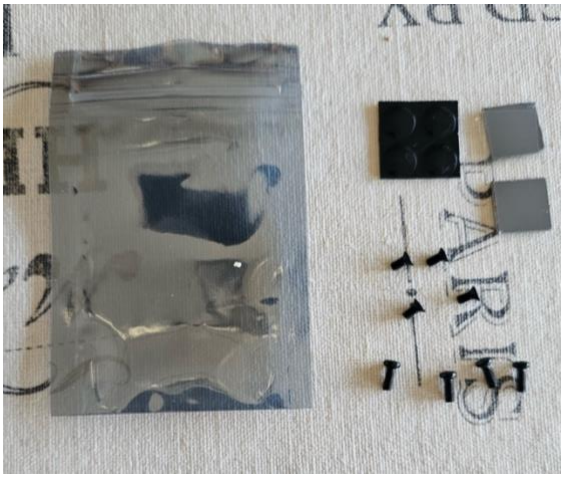
A bottom case with SSD M.2 STAT SSD expansion Board

A top case with power and cooling board

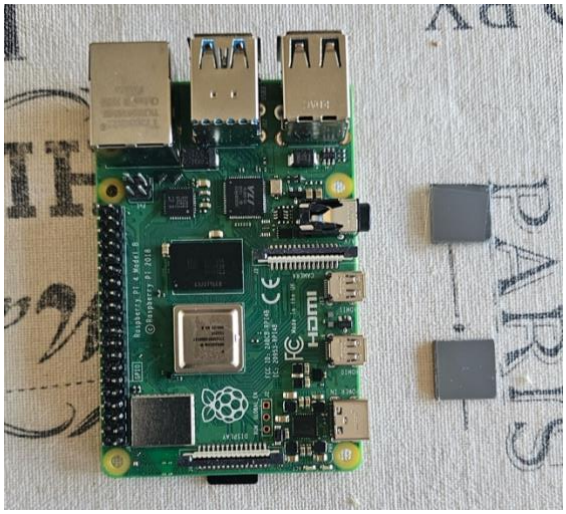
An Argon HDMI board

The Raspberry Pi 4B Board and the micro-SD card you have created at step 2

Your micro-SD card can be seated in your Raspberry pi 4B slot.

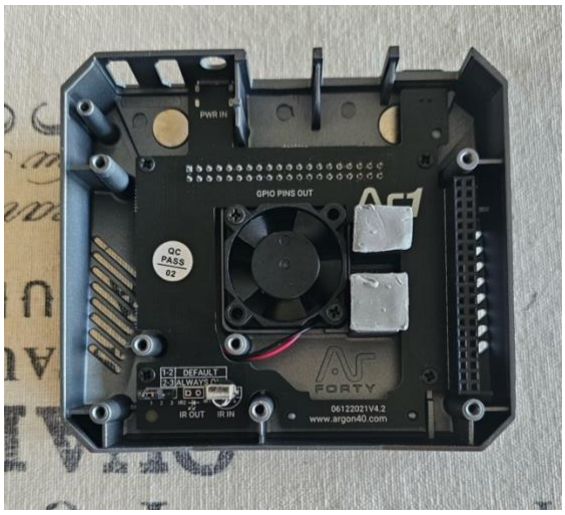


Screws, thermal pad and rubber feet included in Argon M2 case package.



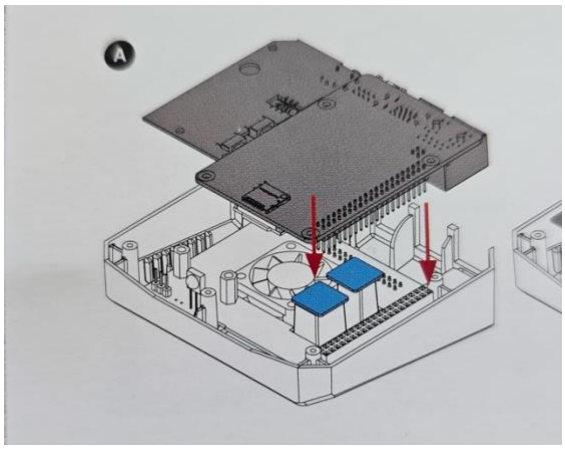
The thermal pads need to be seated on the board chipset.

On both sides of the thermal pad, remove the plastic.

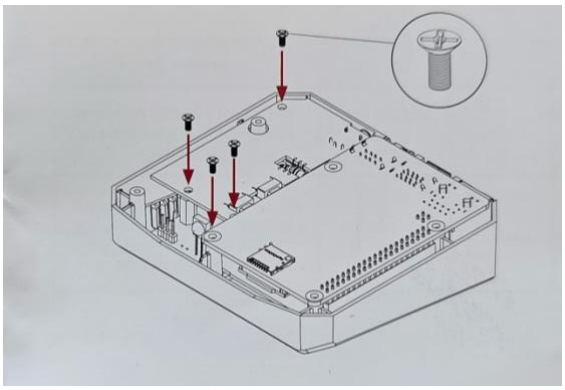


Stick the silicon thermal pad

Connect Raspberry Pi to Argon HDMI board



Connect Raspberry Pi to power and cooling board



Use shorter flat head screws to fasten Raspberry Pi and HDMI board assembly to the top case.

Power management

For the PVR application, always ON mode is recommended

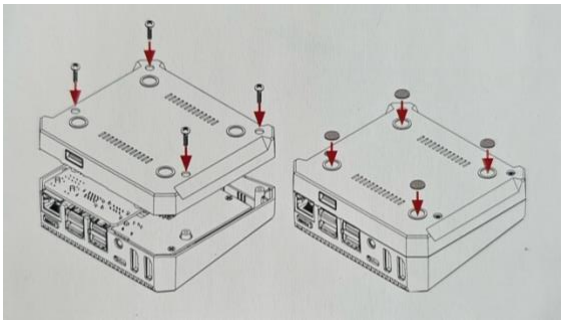
Seat the jumper over PIN 2-3

To connect M.2 STAT SSD to the Expansion Board

Remove the SSD lock screw

Slot the SSD within the connector with an angle (30 degrees)

Push the SSD to the horizontal and lock it with the dedicated lock screw



Assembly of the Argon One M2 bottom plastic cover.

Use longer round head screws to fasten cover and place the rubber footings

Congratulation your PVR is built.

For now, DO NOT CONNECT the USB 3 Bridge.

STEP 4- First PVR Start up and software installation

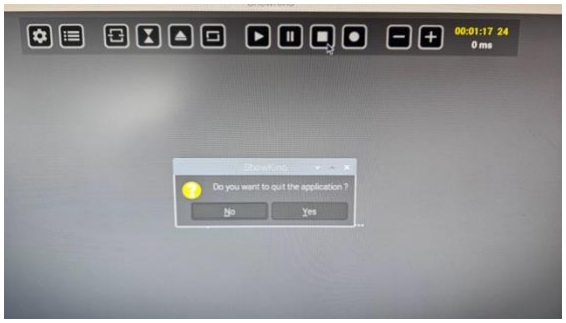
1 - Plug an HDMI display on the left

2 – Plug a mouse on USB 2 socket

3 – Plug the USB C power supply

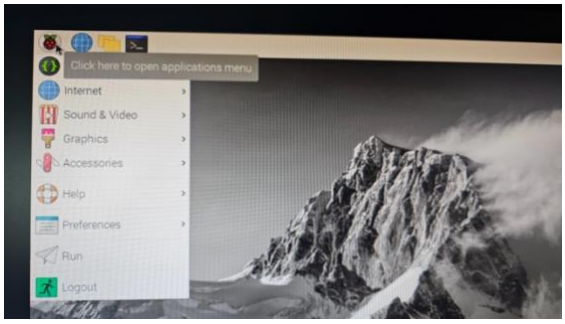
If always ON mode have been chosen the Raspberry Pi starts automatically.

If not, press the Power Button to turn it on

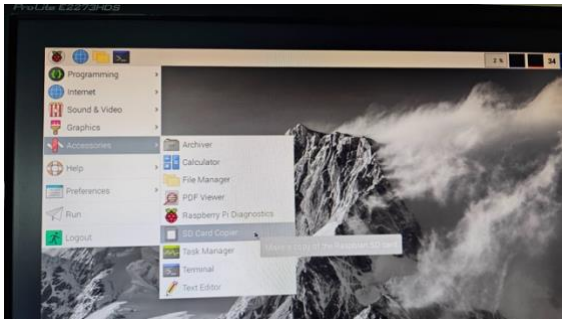


Click 3 times on STOP button and quit the Show Kino application

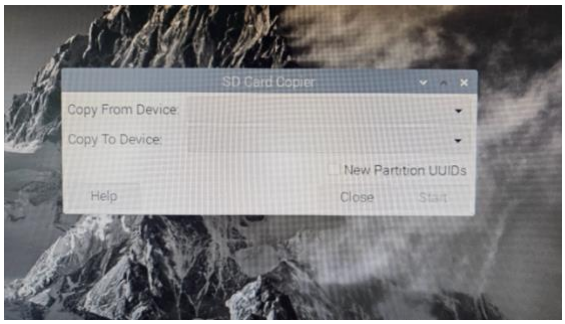
NOW CONNECT the USB 3 bridge



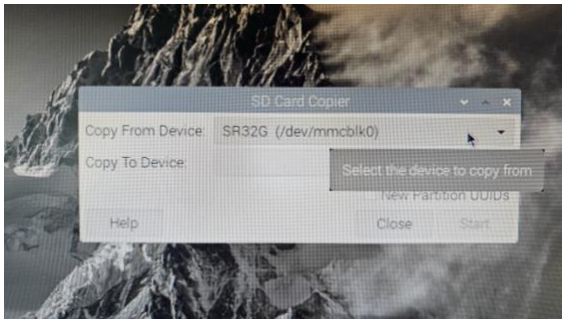
Click to open applications menu



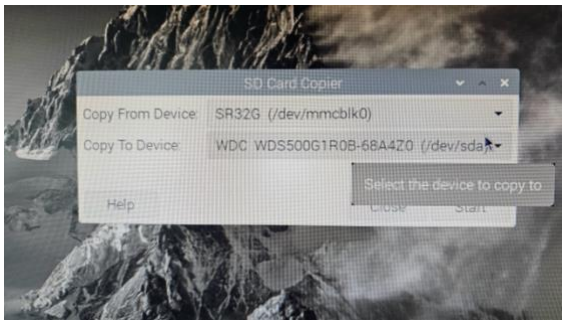
Select Accessories / SD card copier tool



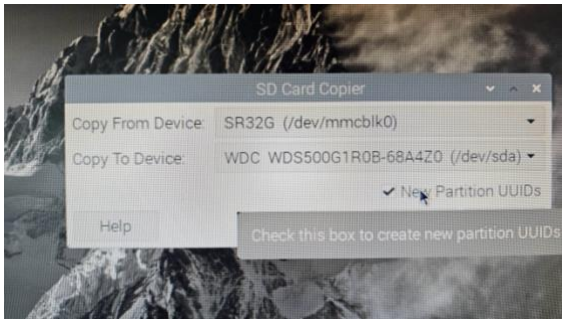
The SD Card Copier application start up



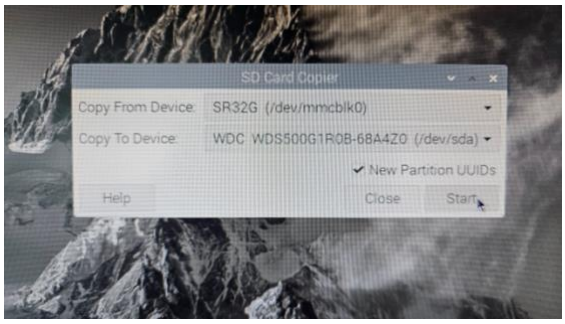
Select the 32 GB Micro SD card as the source (/dev/mmcblk0)



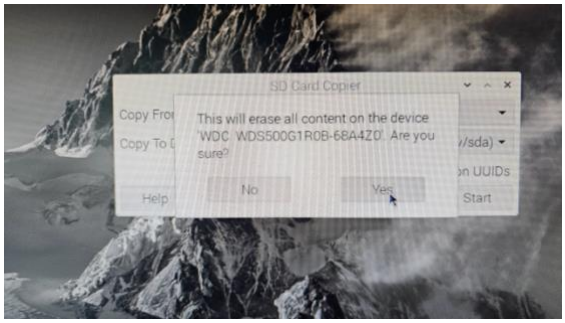
Select the SSD SATA as target (dev/sda)



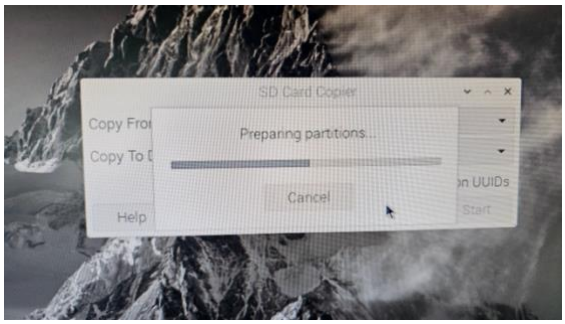
Check the New Partition UUID box



Click on Start button

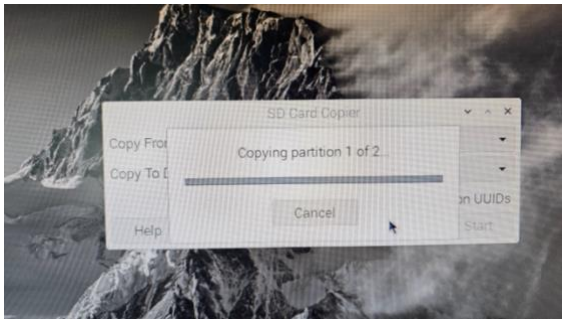


Confirm the transfer

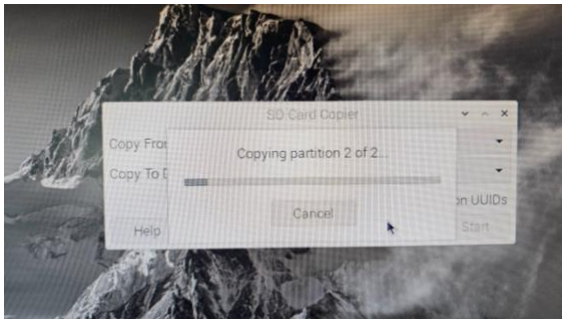


The process will run automatically over 3 steps

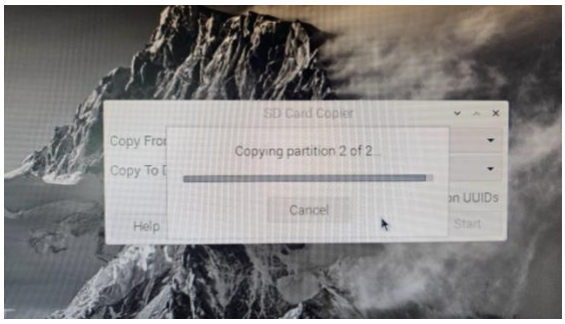
Preparing partitions



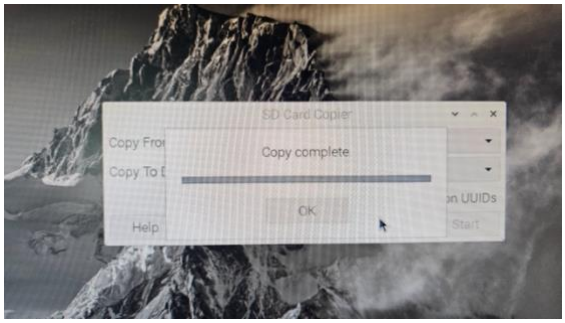
Copying partition 1 of 2



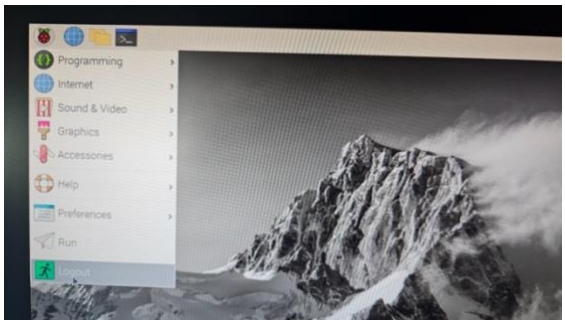
Copying partition 2 of 2



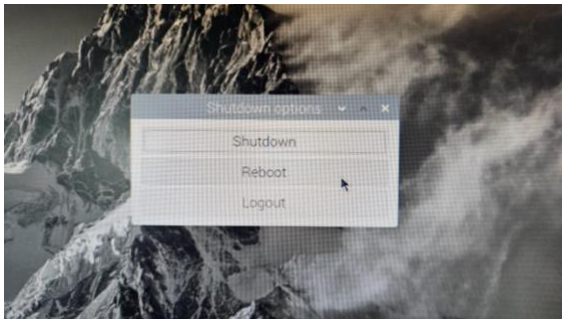
This step take few minutes



The copy process is now completed



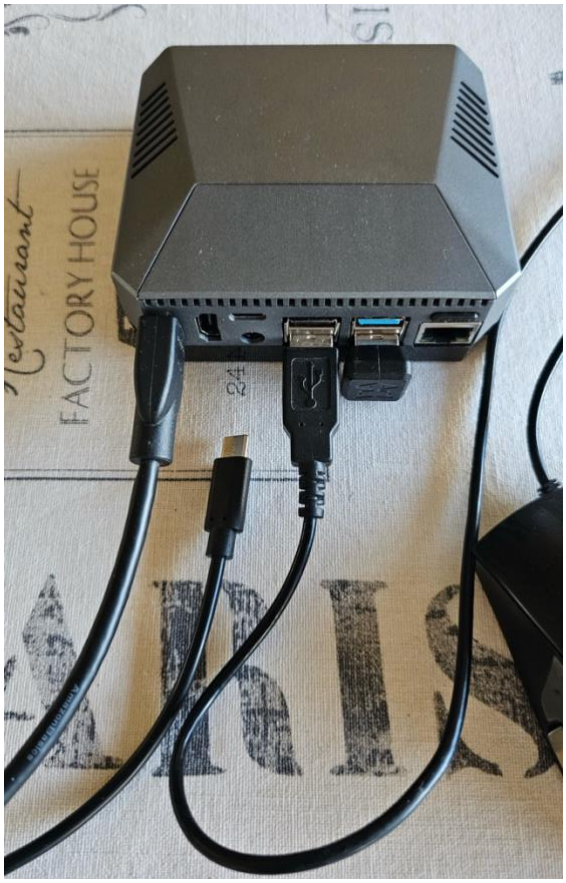
Click to open applications menu



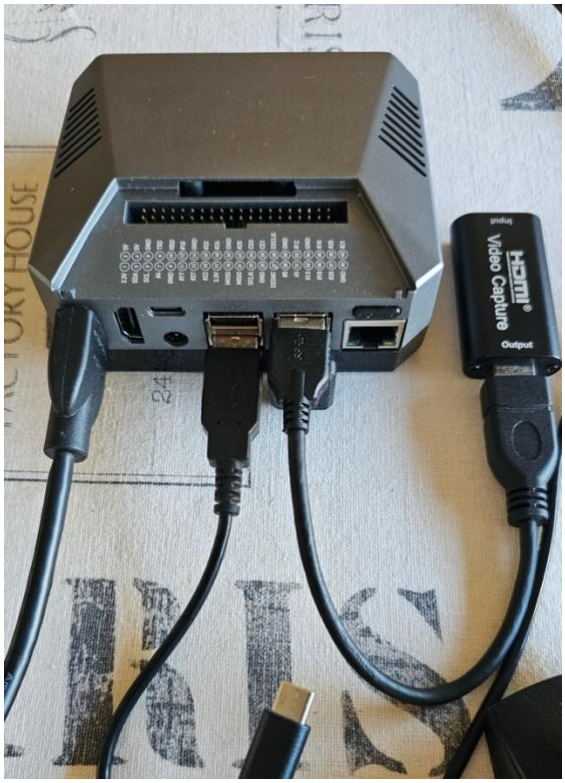
Choose Shutdown

The software setup is now terminated.

STEP 5-Connect dedicated hardware

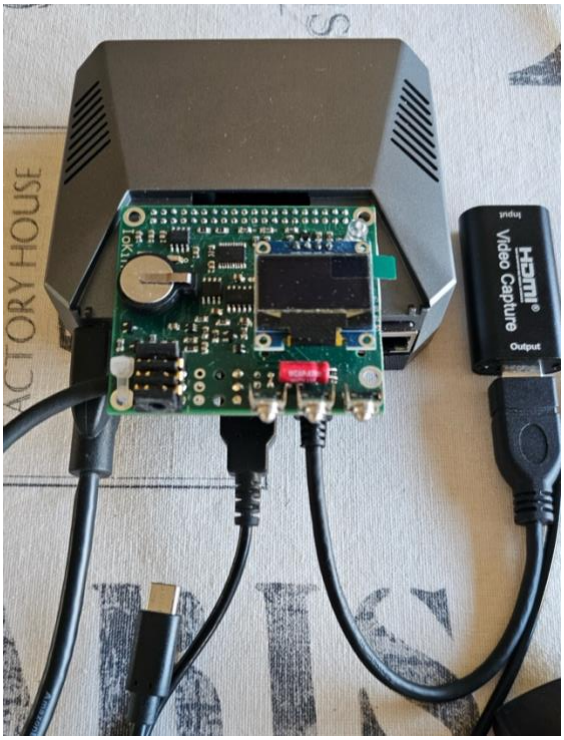


Wait few seconds and remove the USB C power cable



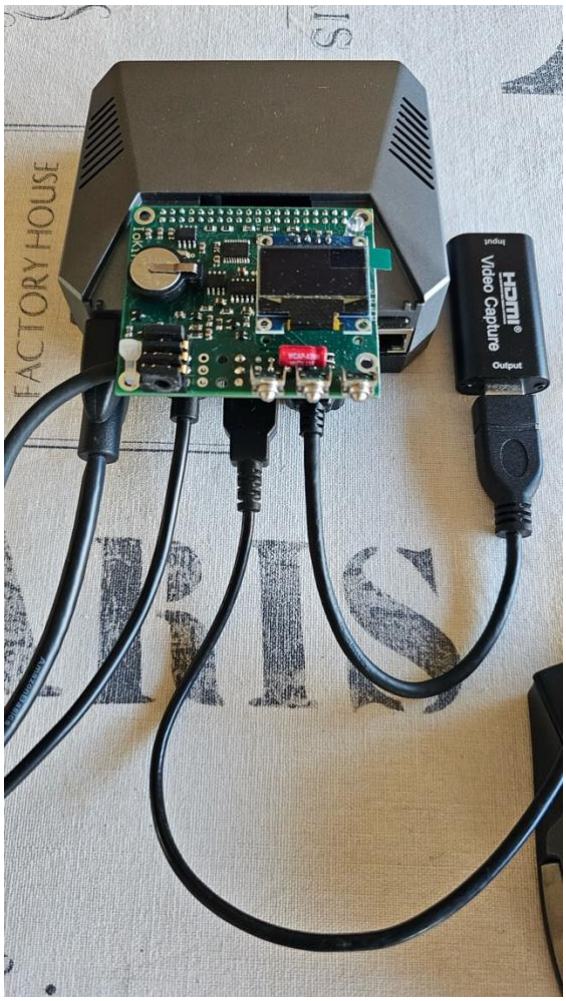
Connect the HDMI video capture board

Remove top cover (held in place by magnets)



Connect the IoKino board

NOTE: About the IoKino board
The picture shows a is a prototype
The definitive one will be smaller
Without screen and button
With a plastic a cover.



Reconnect the USB C power

If always ON mode have been chosen the Raspberry Pi starts automatically.

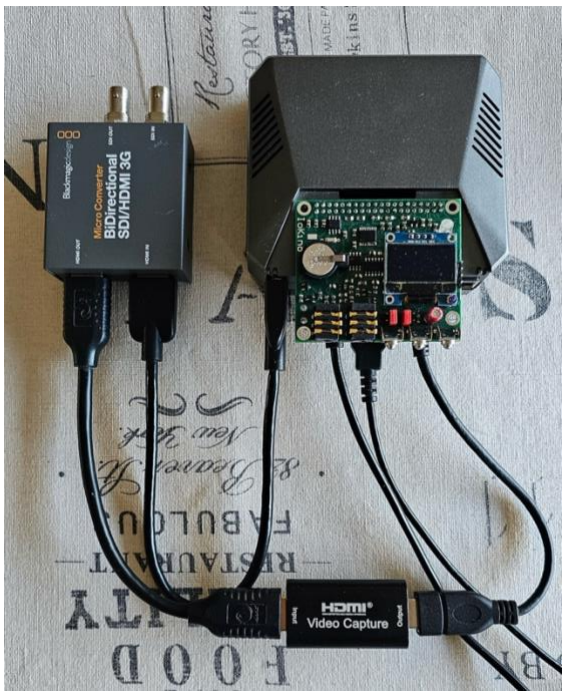
If not, press the Power Button to turn it on

See ShowKino user manual for software details.

ANNEXE-1- How to work with HD-SDI ?

HDMI to HD-SDI converters can be used as add-on to work with HD-SDI signals

Blackmagic - Micro Converter BiDirect SDI/HDMI can bi used for In and Out.



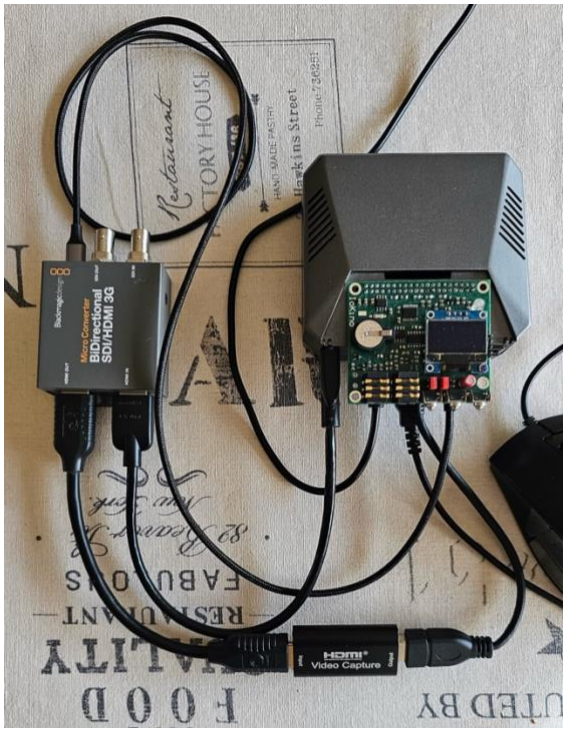
Connect

BlackMagic HDMI OUT to HDMI video capture

Raspberry PI HDMI OUT to BlackMagic HDMI IN

BlackMagic HD-SDI IN to your video source

BlackMagic HD-SDI OUT to your video monitor



Note: The latest Raspberry Pi USB socket can be used to power the Blackmagic converter.