Setting up Raspberry Pi-4 Hardware and Software in Preparation for Running a Thomas Jacquin Allsky camera

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This document explains the hardware and software setup of a Raspberry Pi (RPI) in preparation for running a Thomas Jacquin-style allsky camera

This setup procedure assumes that:

• You have acquired the CanaKit with RPI-4 (with 4GB or 8GB RAM and 32GB “disk” chip)
• You have a camera; this writeup assumes the ZWO ASI178MC
• You have a right-angle USB cable to connect RPI and the camera
• You have available a USB mouse and keyboard for the RPI setup.
• You have available an ethernet cable which is connected to your local network or an available local wireless network
• Your local network has access to the internet
• You have some familiarity with Linux commands because Linux is the operating system on the RPI

For background, here are links to the Thomas Jacquin allsky camera:

Description of Allsky camera:
https://www.instructables.com/id/Wireless-All-Sky-Camera/

Github site with the software for the raspberry Pi which runs the all sky camera.
https://github.com/thomasjacquin/allsky

Here’s a link to an operating all-sky camera in Bend, Oregon
http://www.cbstarrynights.com/allsky1/
Raspberry Pi and accessories in the CanaKit RPI-4 with 4GB RAM

How to setup

The following document assumes an RPI purchased as shown in Picture

All these items come in The CanaKit box

- Raspberry Pi
- Micro SD Card With OS pre-installed
- Plastic Case
- HDMI to micro HDMI cable
- Cooling Fan
- Power Supply
- Stick-on Heat Sinks
- Setup Manual
- Cover of Case
Raspberry Pi setup
Assumes RPI CanaKit purchased

- Remove the empty RPI plastic case from the box
- Take the cover off the case
- Separate the bottom from case
- Remove the RPI from its wrapping

- Install the RPI in the base of case – make sure the micro SD slot opening on the case points toward the micro SD slot on the RPI board; the RPI board needs to be inserted under the two plastic tabs on the base, which are on the same side as the micro SD slot
Raspberry Pi setup
Assumes RPI CanaKit purchased

• Stick the 3 heat sinks to their respective chip locations as described in the CanaKit manual.

Heat sinks attached

• Place the case frame over the base with the openings in the frame positioned for access to the various ports on the RPI board. The case frame will click mildly into place.
Raspberry Pi setup
Assumes RPI CanaKit purchased

- Install the cooling fan wires as described in the CanaKit manual for high speed fan operation – red on 4 pin, black on 6 pin – see the detailed picture of the pins in the CanaKit quick start guide

Fan wires connected

- Insert fan into position on the plastic case cover as shown in the picture, noting where the tabs on the plastic case cover will later attach to the frame of the case; label on fan point outward from the RPI; to avoid stretching the wires, position the fan as shown so there is no stress on the fan wires after installing the plastic cover;

Fan clicked into position with wires as shown
Raspberry Pi setup
Assumes RPI CanaKit purchased

- Click the plastic cover and fan assembly onto the frame of the plastic case

- Insert the micro SD card that came with the CanaKit into the slot on the side of the case – note orientation shown in the pictures – a) initial insert b) inserted all the way in

A) Micro SD card partially inserted  B) Micro SD card fully inserted
Raspberry Pi setup  Continued  
Assumes RPI CanaKit purchased

• Connect a keyboard and mouse to the USB ports on the RPI; this is only needed for the initial setup; after the RPI is setup it will be on the local network and we will access the RPI from a different computer via VNC software

**Keyboard and Mouse USB connection**

• Connect HDMI to micro HDMI cable – plug the large connector into an available monitor; plug the small end into the HDMI Zero port on the RPI. This is the micro HDMI port nearest to the USB-C port on the RPI

**HDMI Zero port connection**

• Set your monitor to read input from the HDMI port into which you plugged the cable from the RPI; the RPI is not running yet – your monitor may say something like “no HDMI cable”
Raspberry Pi setup  Continued
Assumes RPI CanaKit purchased

- Connect the USB-C power adapter to the RPI

  **Power connection**

- Connect ethernet cable to RPI; if you have a wireless network which advertises it’s presence, you don’t need an ethernet cable at this point. Select the wireless connection from the options presented; if your wireless connection is not advertised, use an ethernet cable for the time being.

  **Ethernet Cable – the other end is connected to your network**
Raspberry Pi setup  Continued
Assumes RPI CanaKit purchased

- Plug in the power supply to 110V outlet; You should hear the RPI fan come on. The RPI will display a rainbow splash screen to your monitor and will begin to boot. Your display should resemble this picture.
Raspberry Pi setup  Continued  
Assumes RPI CanaKit purchased

• Select RPI OS Full; Click Install, then Yes to the Warning about all existing data will be overwritten The install will take about 10 minutes you will see this sequence of screens

Error? In one RPI setup an error appeared – Error downloading .../os.json After a short while, I changed the keyboard choice from English UK to English US and after that, clicked Install again, and download began. I suspect that my router had not yet setup the RPI on my network, so that the internet was not yet available to the RPI.

• After successful install, click OK; wait a minute;  
• The Welcome to Raspberry Pi window will appear, click Next
Raspberry Pi setup  Continued
Assumes RPI CanaKit purchased

• Setup country, language, time zone, “use English”, Use US Keyboard; next

• Choose a new password for the user called pi. This is important. This password is the primary security mechanism that prevents others from logging on to this RPI

• Choose a wireless network (note, if your network does not advertise it’s presence, you will need to enter the name of the hidden network)

• Choose Update software; software will download from the internet and update; this may take 20 minutes; faster if you are plugged directly into an ethernet cable, compared to wireless; when finished a message will say “System is up to date”, click OK; click Restart; screen will flash a few times, then log you onto the RPI as the user “pi”; it will show the display with banner at top;

• Now that the RPI’s operating system and your “pi” user is setup, we will make some changes to the RPI and add some required software, before installing the All Sky Camera software
Make changes to the RPI

- On RPI, select RPI Preferences (click Raspberry icon in upper left, select preferences, then Raspberry Pi Configuration)
- From System Tab, change hostname from the default to something less obvious and more relevant (e.g. SRpi1)
- Select Interfaces Tab
- Enable SSH on the RPI to allow sftp to/from the RPI to another machine on your network; this allows transfer of data over your local network from a PC or Mac to your RPI and vice versa
- Enable VNC to allow connection to the RPI from a different computer via the VNC software; click OK
- Note that VNC requires two pieces of software, a server side which is already by default installed on the RPI and viewer side, which we will later install on your Windows PC or Mac computer on your local network
- You can reboot the RPI if you wish, or wait until after the next step

Enter a new name for the RPI
The new name in this case is “SRpi1”
Make changes to the RPI

• Open up a user terminal on the RPI (click Raspberry icon in upper left, select accessories, then Terminal)

• Figure out the current IP address of the RPI – Type the following command in the terminal– “ifconfig –a” the IP address is listed near the top of the output after “inet”

![Image of ifconfig output]

• Ask your network admin person to add this IP address to a reserved list (i.e. to be saved and unchanging). Note that if your RPI is not assigned a reserved IP address via your router software, this IP address may change from day to day; you will need to have a fixed IP address to successfully send images to the web; if the IP address changes, then various all-sky camera scripts will fail

• Reboot the RPI by typing the following command in the terminal: “sudo reboot”
Add the VNC Viewer software to your Windows or Mac

- Next we will install the free VNC viewer software on your Windows or Mac computer; this will allow you to log into the RPI from the Windows or Mac computer by specifying the IP address of the RPI

- On your Windows or Mac machine, Go to this location, download and install the correct version of the VNC viewer for your machine

- After installation you will find a VNC icon. Launch that and you should see an interface like this:

  ![VNC Viewer interface](image1.png)

  Type the IP Address of your RPI into the box and hit enter – for example:

  ![VNC Viewer interface with IP address](image2.png)

- A VNC login panel to your RPI will appear; enter the password for your user and click OK

  ![VNC Authentication panel](image3.png)
Add the VNC Viewer software to your Windows or Mac

• You should see a VNC viewer window appear, which shows the Graphical User Interface from the RPI; here’s a view of the top of that GUI

![VNC Viewer](image)

• Note – there is a feature of the RPI OS that may prevent the VNC software from displaying the RPI user interface when you try to access the RPI later. You can prevent that possibility by using the “raspi-config” program to manually specify a display size. The feature crops up when a display size is automatically chosen by the interface. So save yourself some trouble and do this in the RPI terminal:
  type “sudo raspi-config” and follow the pictures below; use the down arrow on the keyboard to select Display Options, select Resolution, choose a resolution – like 1280x1024; use right arrow to select OK, hit Enter on keyboard; Enter again; You will be returned to the main raspi-config panel; use right arrow to select “finish”, then “Yes” to reboot now; Enter

![Raspberry Pi Software Configuration Tool](image)

• Note – if the text is too small in the VNC Viewer on your monitor, you can either change the display settings (RPI preferences/screen configuration) or just expand the size of the VNC viewer window on your screen – the text will increase in size upon expansion of the VNC viewer window

• After the RPI successfully reboots, you can now disconnect the mouse and keyboard and HDMI cable from your monitor because we will proceed to interact with the RPI via the VNC software

• Next we will install (or re-install) the all-sky camera software on the RPI – Go to the document called “Install_allsky_software_on RPI.pdf”