

Raspberry Pi Setup

OS

1. Download Ubuntu Mate for RPi [<https://ubuntu-mate.org/raspberry-pi/>] and format micro sd card (known to work with both 32 bit and 64 bit versions).
 - a. Can also use flash drive with RPi 3 B+
2. Plug the sd card into the RPi micro sd port and install. (Need screen, mouse, and keyboard)
3. Reboot once OS setup it complete.
4. Open the terminal (ctrl+alt+t)
 - a. `sudo apt-get update`
 - b. `sudo apt-get upgrade`
 - c. `sudo apt-get dist-upgrade`
5. For headless display using xrdp:
 - a. `sudo apt-get install xrdp`
 - b. Then make a file in the home directory called `.xsession`
 - i. `sudo nano .xsession`
 - ii. write the lines:
`unset DBUS_SESSION_BUS_ADDRESS`
`mate-session`
 - iii. `ctrl+x => y =>[Enter]`

Python

1. `sudo apt-get install idle3`
2. `sudo apt-get install python3-pip`
3. `sudo apt-get install cython3`
4. `sudo apt-get install python3-numpy python3-scipy python3-matplotlib python3-astropy`
5. `sudo apt-get install swig libz3-dev libz-dev libcfitsio-dev libnova-dev libindi-dev`
6. `pip3 install --user --install-option="" --prefix="" pyindi-client`

Camera

1. Install INDI and KStars [<http://indilib.org/support/tutorials/169-ekos-on-raspberry-pi-complete-guide.html>].
 - a. `sudo apt-add-repository ppa:mutlaqja/ppa`
 - b. `sudo apt-get update`
 - c. `sudo apt-get install indi-full kstars-bleeding`
2. Reboot.
3. To use the camera with KStars:
 - a. In the terminal: (Do not close this terminal until the camera is no longer being used)
 - i. `indiserver indi_atik_ccd`
 - ii. `indiserver indi_asi_ccd`
 - b. Open KStars then open Ekos (ctrl+k)
 - c. Make a new profile ([+] next to profile) or edit the current one (pencil icon).
 - i. Mode: Remote
 - ii. Host: localhost
 - iii. Port: 7624
 - iv. CCD: Atik CCD or ASI, etc.

- v. Save
- d. Start INDI.
- e. In the INDI Control Panel:
 - i. Wait until the camera has connected and is communicating with the RPi and INDI.
 - ii. Find the tab with the camera properties.
 - Next to the temperature setting is the current temperature of the camera. The number to the right of that is the manual temperature.
 - Change this then click on the “Set” button next to it.
- f. Connect.
- g. Capture Module (third tab) to take an image.
 - i. Set settings for exposure time, file name, delay before image capture, number of images, etc. [<https://indilib.org/about/ekos/capture-module.html>]
 - ii. Note: When taking images with a script, KStars will take that number of images plus any other images to be taken on the sequence even if they have no script. (unknown why)