RaPiD chamber operational manual

Installation of the chamber

Environment

Temperature

RaPiD chamber is not equipped with any means for autonomous temperature or humidity control. However, due to compact size, RaPiD chamber can be installed directly into the phytotron or, termostat.

Light

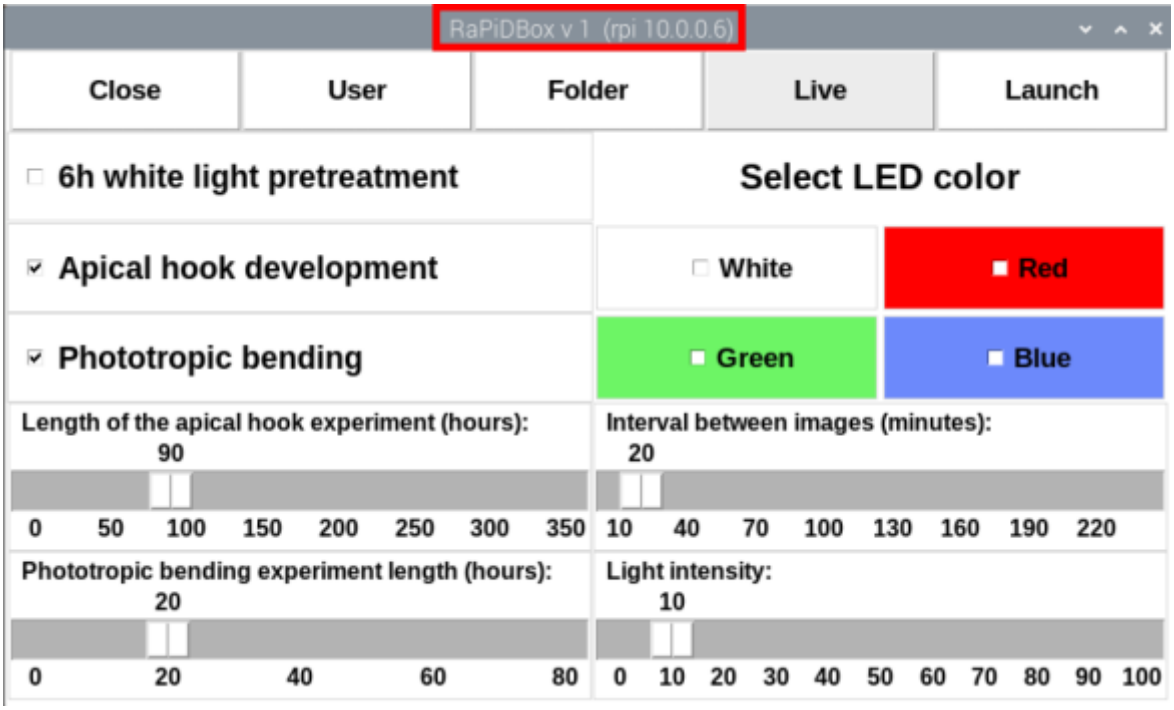
RaPiD chamber is produced from dense matherials, which effectively prevent undesired light contamination from outside the chamber. Thus chamber can be used in any external light conditions.

Position

For proper experimental results, RaPiD chamber should be placed on the smooth horizontal surface.

Network connection

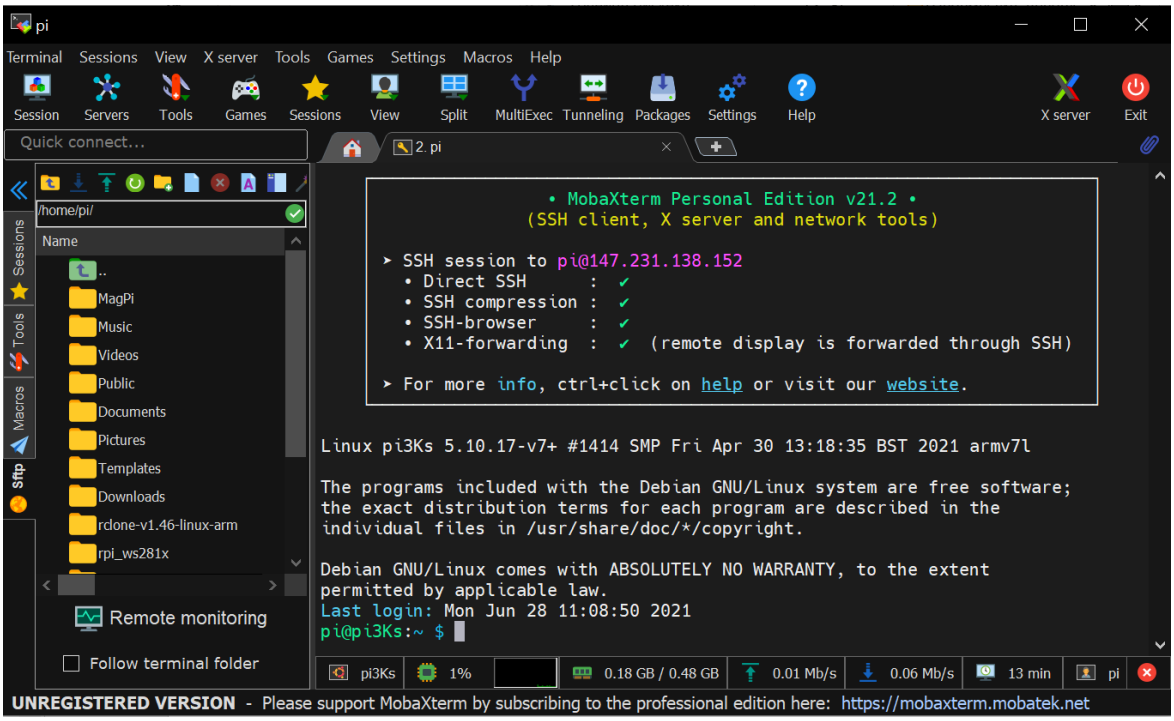
RaPiD chamber can be controlled remotely (headlessly). For headless control connect chamber to the local network, preferably by wired connection.
PC should be connected to the same local network as RaPiD chamber.
Upon the connection, restart the chamber.
IP adress of the chamber should be now shown in the status bar of the configuration window.



Remote control and results download

Moba Xterm (windows)

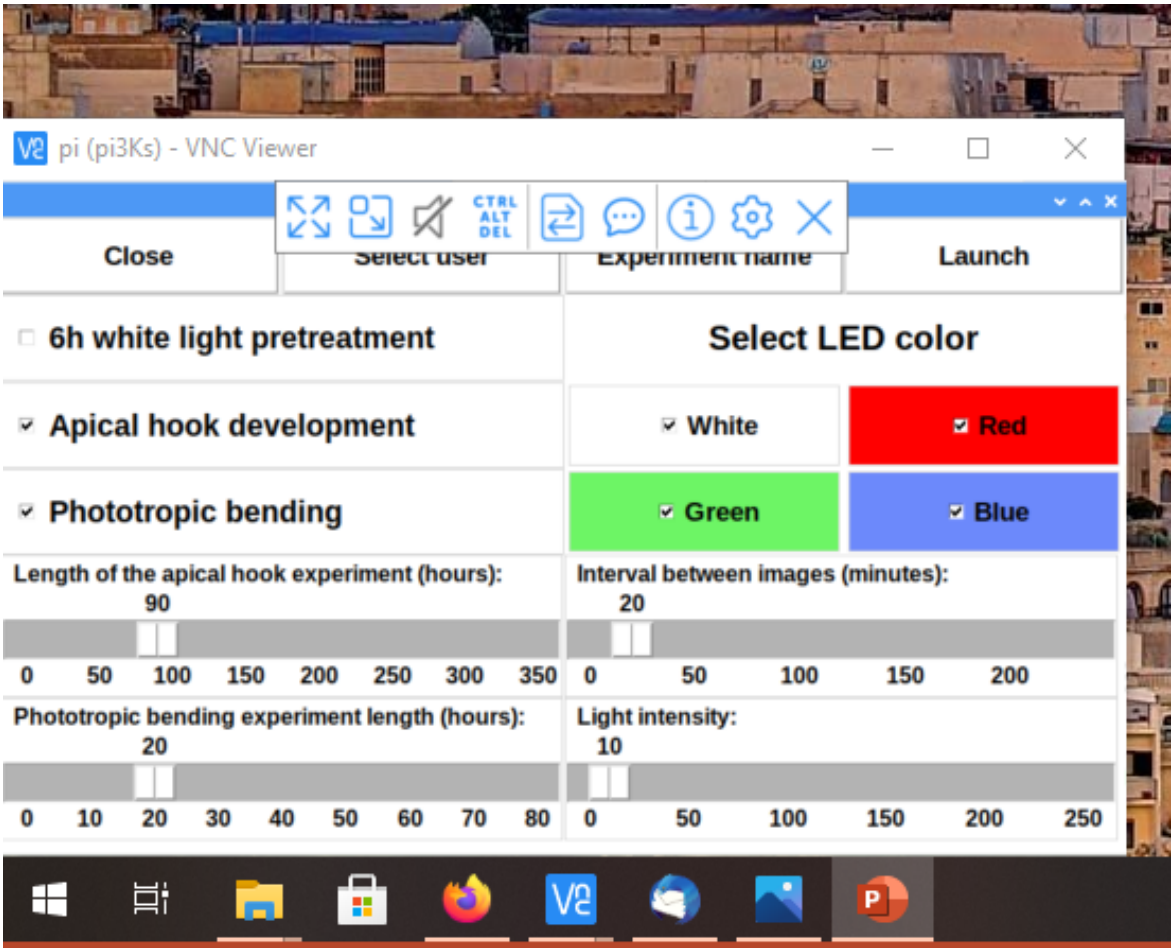
(*can be also applied to Remmina (Linux) or manual ssh/sshfs connections*).
Moba Xterm is free application, which allows headless control of RaPiD chamber via SSH and file access trough SSHFS.



Create new ssh session with following parameters:
`Host adress: IP adress of your chamber`
`Host name: pi`
`Password: 98685173`
Save the session.
To launch the script for headless control, type command to the terminal window :
`cd /home/pi/Camera/RaPiD-boxes-software/terminal_interface/ && ./launcher3.sh`
Answer to questions and configure your experiment.
If you want to reset experiment parameters and close script window, press `Ctrl + C`.

VNC (windows/linux)

VNC viewer is a free application, which allows remote control of RaPiD chamber using its graphic interface.



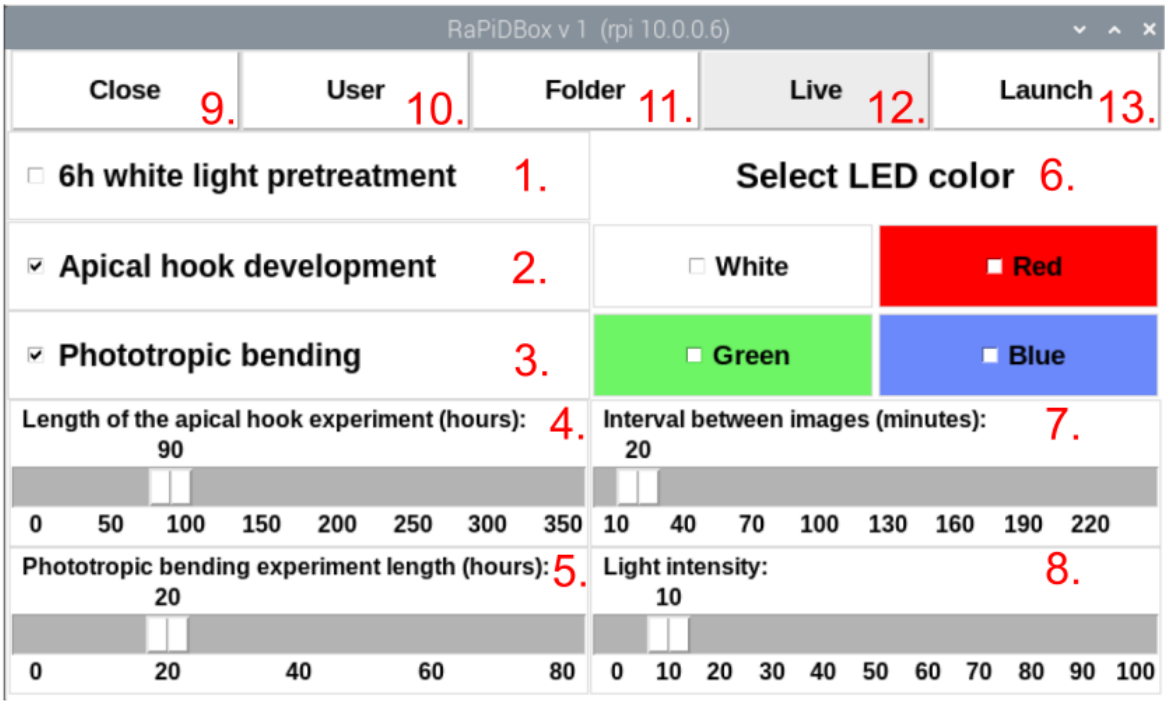
To connect to the RaPiD box, create new session with parameters same as for Moba Xterm in the previous point.

Results downloading

Experiment results can be dowloaded from the folder `/home/pi/camera/Experiments/<Your user name>/<Your experiment name>` using **Moba Xterm** / **Remmina** / **SSHFS** connection.
Results should be downloaded no later than 1 month after experiment. After 1 month, the experiment will be deleted automatically (*not implemented yet*).

Starting the experiment

In the configuration window user can set up parameters of the experiment.



1. 6h white light pre-treatment

Initial treatment of seeds with 6h of upright white light. Synchronises germination time and improves germination rate (recommended for each experiment);

2. Apical hook development

- if on, records seedlings development in the dark for given number of hours **(4.)** with given time step (**7.**)
- If off and **4.** is = 0 h, skips dark stage completely;
- If off, but **4.** is > 0 h, introduces unrecorded dark stage of respective length

3. Phototropic bending

- If on, records seedlings development with unilateral illumination for given number of hours **(5.)** with given time step (**7.**);
- If activated simultaneously, **Phototropic bending** always follows **Apical hook development**;

4. Length of the apical hook experiment (hours):/Length of the initial dark period (hours):

Recommended time spans:

- **Apical hook development** ~270 h;
- **Phototropic bending** dark-grown stage to get etiolated seedlings ~90 h (~60h for freshly harvested seeds);
- No dark stage - 0h;

5. Phototropic bending experiment length (hours):

Following time spans of **5.** are recomended for the first experiment with new seedlings:

- Seedlings in WT background without treatments ~ 20 h;

6. Select LED color

Allows to select light spectrum for **Phototropic bending** stage.

- Colors can be selected separatedly or combined.
- White color is represented by separate white LED.

7. Interwal between images (minutes):

Following intervals are recomended for the first experiment with new seedlings:

- **Apical hook development** - 120 - 240 minutes (240 is optimal as it requires less measurements, and insignificant drop in resolution);
- **Phototropic bending** - 20 minutes;
- **Gravitropic bending** - 60 minutes;

8. Light intensity:

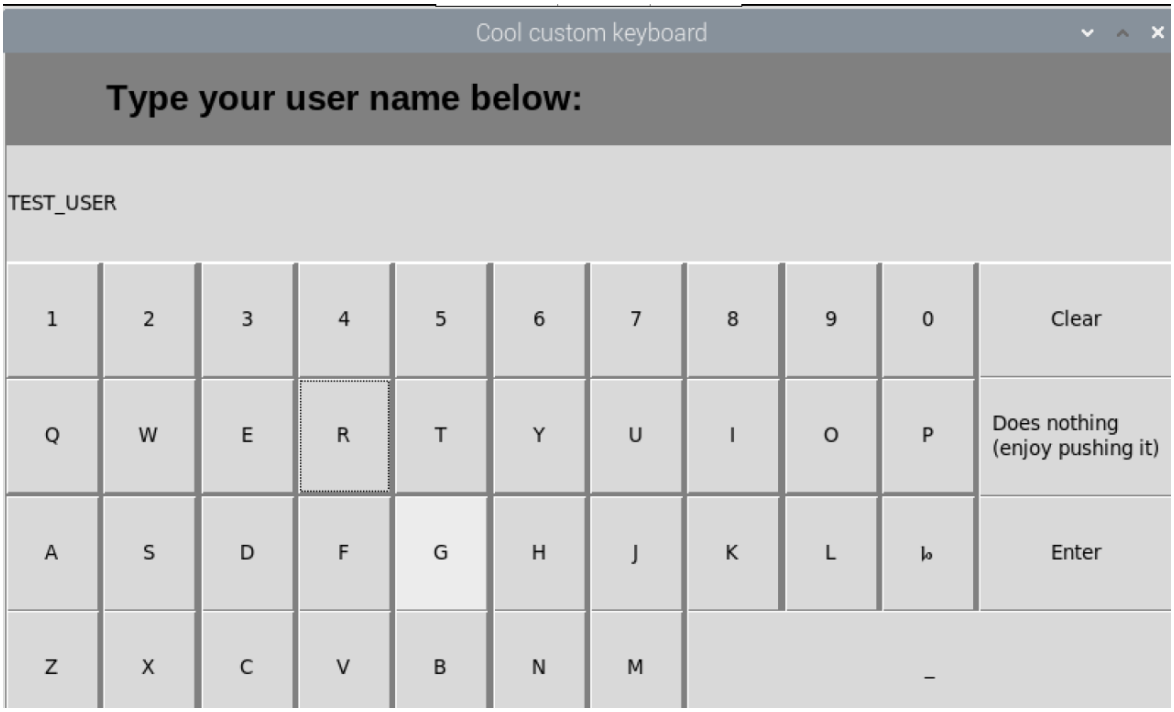
- 10 is enough for phototropc experiments;
- 50 + producing quite some heat.

9. Close

Closes current experiment window.

10. User

Sets the name of the user (obligatory step).



11. Folder

Sets the name of the experiment folder (obligatory step).

12. Live

Turns camera into live mode for adjusting focus or sample position.

13. Launch

Starts experiment and opens experiment progress window.