



MAR 01, 2024

BTI plant phenotyping system: Raspi computer and image collection

Li'ang Yu¹

¹Boyce Thompson Institute

Stress Architecture and RNA Biology Lab BTI

Tech. support phone: +1 (607) 279-6002 email: mmj55@cornell.edu



Li'ang Yu

Boyce Thompson Institute , University of Illinois at Urbana-...

ABSTRACT

Instructions on how to set up automated syncing between Raspberry Pi operated PhenoRig and the server through WiFi connections

OPEN ACCESS



DOI:

dx.doi.org/10.17504/protocols.io.j8nlkk156l5r/v1

Protocol Citation: Li'ang Yu 2024. BTI plant phenotyping system: Raspi computer and image collection. **protocols.io** <https://dx.doi.org/10.17504/protocols.io.j8nlkk156l5r/v1>

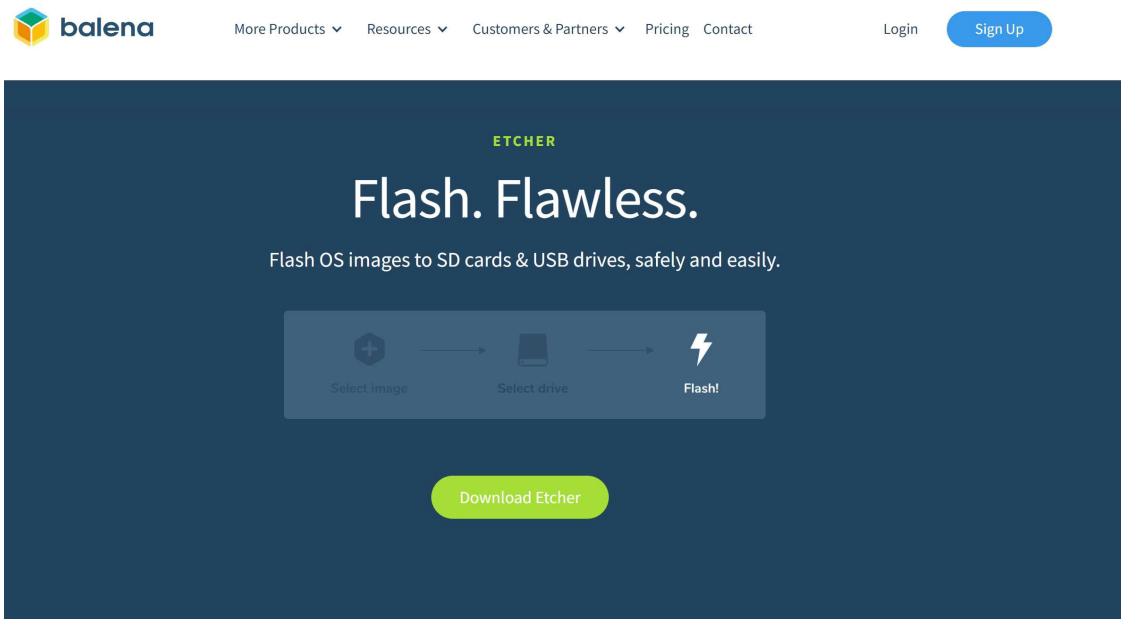
License: This is an open access protocol distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

Protocol status: Working
We use this protocol and it's working

Created: Jun 22, 2022

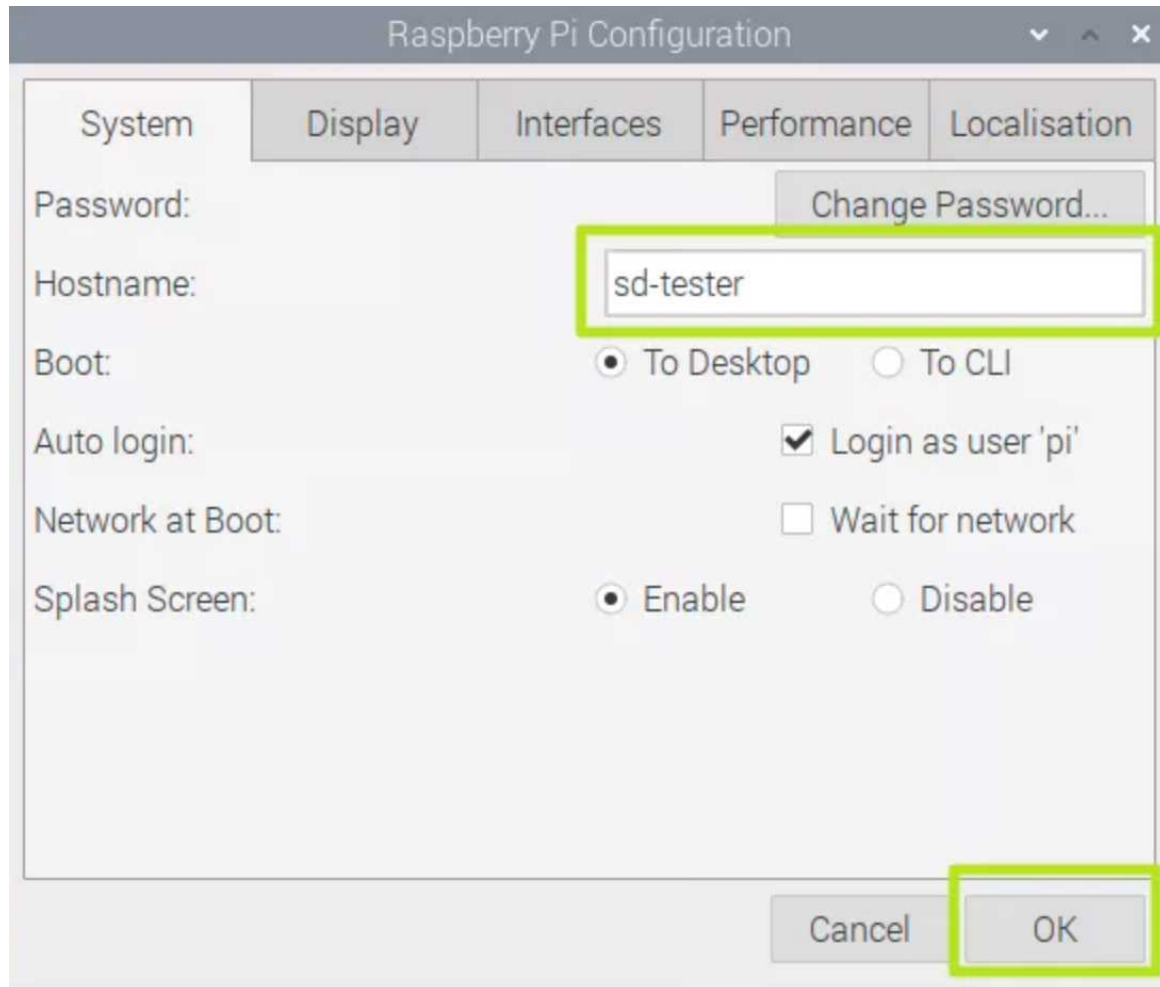
Installation RaspiOS on Raspi Computer

- 1 Here, we download the archived [RaspiOS](#) to support the camera mode of Raspi camera. Then we used an image installer (eg: [Etcher](#)) to install the system into a micro-SD card.

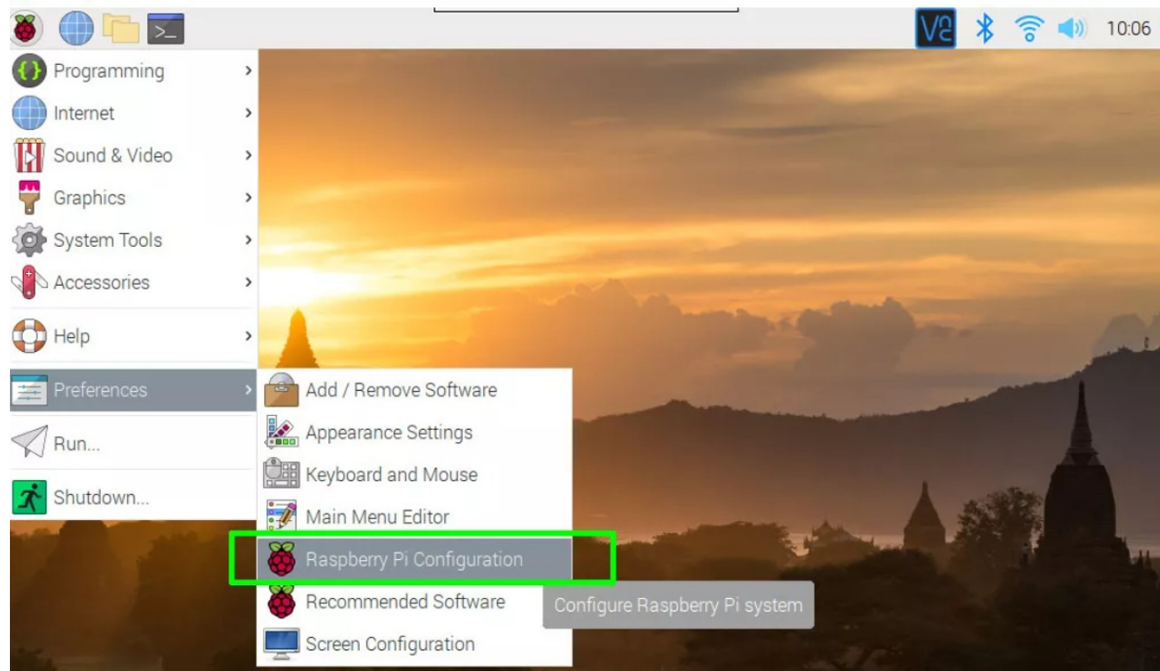


Raspi Computer setup

- 2



If this is a new device, please use a monitor (or screen) to connect the Raspi computer and finish up the initial setup as follows:

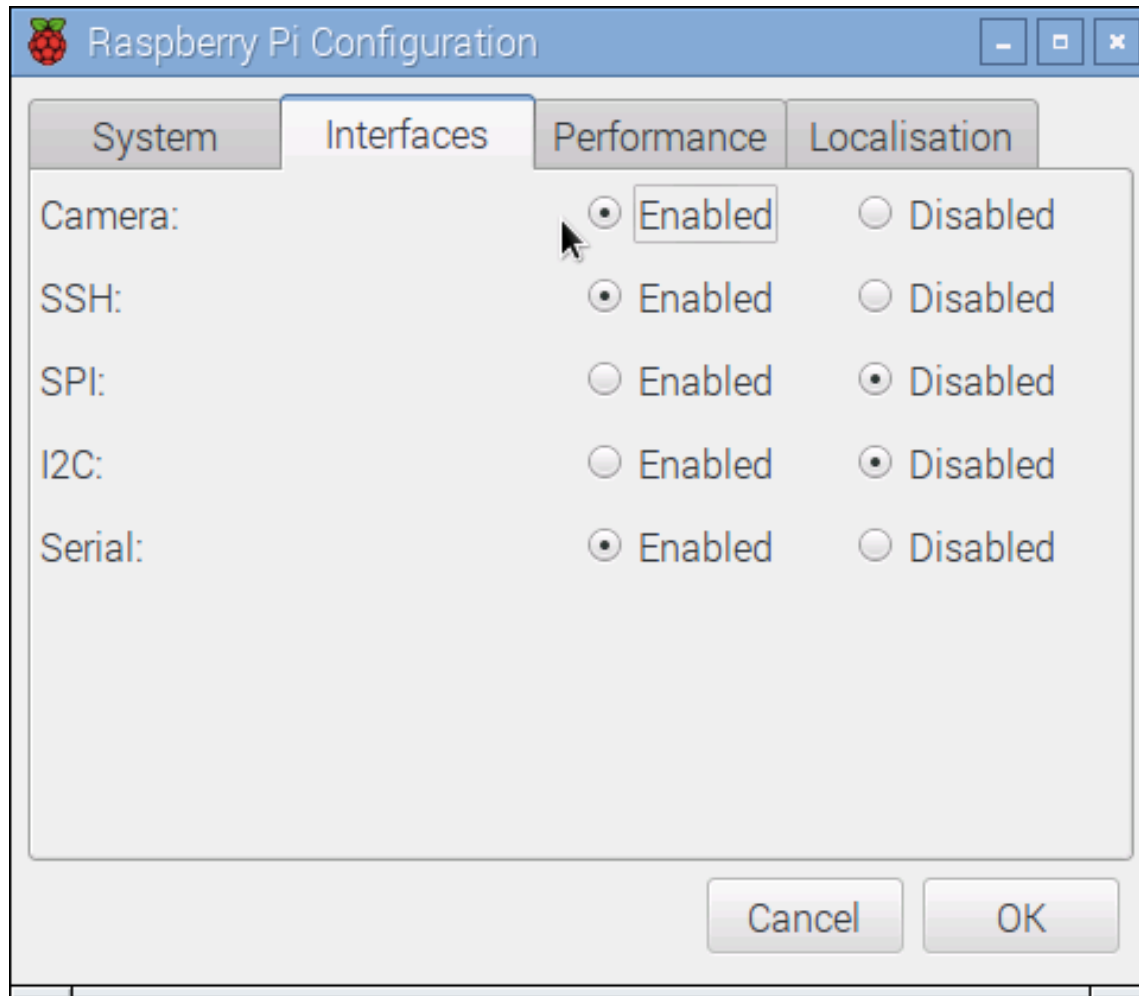


Enter a new name in the hostname field and click Ok. For lab internal use, please set up the "**Hostname**" using the raspi device number and the same password for each device.

For example:

Hostname: RaspiR
Password: *****

Remember to enable the **camera** under the Raspberry Pi Configuration panel, as well as **SSH transfer** and **I2C function**:



Internet connection setup

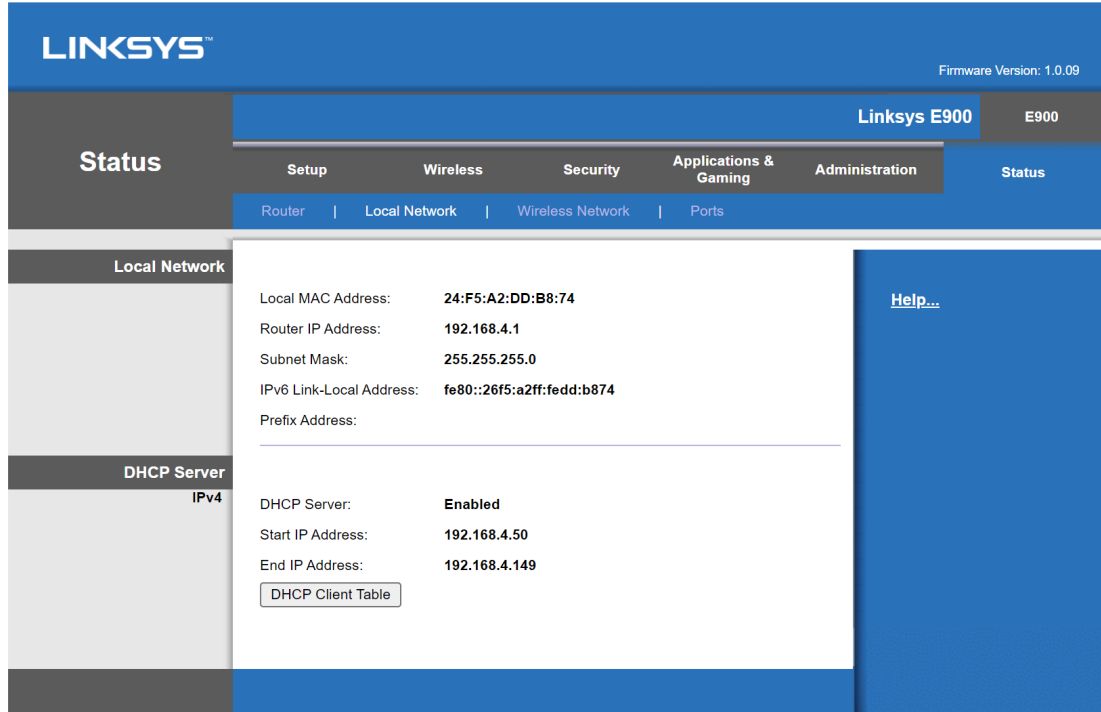
- 3 Please use a router to set up the internet (WIFI). Here we use the LINKSYS app as an example to show the necessary configuration :

For example :

Log in to the system using the following ID and password:



- 4 Check the devices connected to the internet by checking the "Local Network" icon under the "Status" tab. Further, click the "DHCP Client Table" to check each device.



NOTE:

Please make sure that the "**Client name**" on LINKSYS matched the "**HostName**" of Raspi computer.

LINKSYS™

DHCP Client Table

To Sort by

IP Address

Client Name	Interface	IPv4 Address	MAC Address	Expires Time	
Jlab-tablet-02	LAN	192.168.4.53	42:BE:D1:32:98:7B	00:26:25	Delete
raspiS	Wireless	192.168.4.64	B8:27:EB:F6:08:1C	18:18:09	Delete
raspiK	Wireless	192.168.4.65	B8:27:EB:C0:DD:CE	18:18:06	Delete
raspiM	Wireless	192.168.4.66	B8:27:EB:E5:A0:94	18:18:08	Delete
RaspiU	Wireless	192.168.4.68	B8:27:EB:78:0E:E5	18:18:07	Delete
RaspiT	Wireless	192.168.4.69	B8:27:EB:BB:46:4B	18:18:11	Delete
RaspiV	Wireless	192.168.4.70	B8:27:EB:48:C2:CE	18:18:07	Delete
raspiL	Wireless	192.168.4.77	B8:27:EB:82:CE:69	18:18:41	Delete
enkidu	Wireless	192.168.4.83	F0:18:98:33:21:AA	00:27:42	Delete
Shamhat	Wireless	192.168.4.86	DA:21:1F:3C:CB:8F	03:03:54	Delete
RaspiR	Wireless	192.168.4.91	B8:27:EB:67:CC:A8	18:18:09	Delete

Refresh

Close

- Match the "**IPv4 address**" of the connected devices to the **port setup page**. For instance, the "**To IP address**" of "raspiN" should be manually updated as same as the **IPv4 address**" listed in step above.

LINKSYS™

Firmware Version: 1.0.09

Applications & Gaming

Linksys E900

E900

Setup

Wireless

Security

Applications & Gaming

Administration

Status

Single Port Forwarding

Port Range Forwarding

Port Range Triggering

DMZ

IPv6 Firewall

QoS

Single Port Forwarding

Application Name

None

None

None

None

None

raspiN

raspiP

raspiS

raspiR

raspiK

raspiM

raspiL

raspiQ

raspiO

raspiT

raspiU

raspiV

Plate_raspiD

External Port	Internal Port	Protocol	To IP Address	Enabled
---	---	---	192 . 168 . 4. 0	<input type="checkbox"/>
---	---	---	192 . 168 . 4. 0	<input type="checkbox"/>
---	---	---	192 . 168 . 4. 0	<input type="checkbox"/>
---	---	---	192 . 168 . 4. 0	<input type="checkbox"/>
---	---	---	192 . 168 . 4. 0	<input type="checkbox"/>
9000	22	Both	192 . 168 . 4. 104	<input checked="" type="checkbox"/>
9001	22	Both	192 . 168 . 4. 102	<input checked="" type="checkbox"/>
9002	22	Both	192 . 168 . 4. 64	<input checked="" type="checkbox"/>
9013	22	Both	192 . 168 . 4. 91	<input checked="" type="checkbox"/>
9004	22	Both	192 . 168 . 4. 65	<input checked="" type="checkbox"/>
9005	22	Both	192 . 168 . 4. 66	<input checked="" type="checkbox"/>
9006	22	Both	192 . 168 . 4. 77	<input checked="" type="checkbox"/>
9007	22	Both	192 . 168 . 4. 100	<input checked="" type="checkbox"/>
9008	22	Both	192 . 168 . 4. 103	<input checked="" type="checkbox"/>
9009	22	Both	192 . 168 . 4. 69	<input checked="" type="checkbox"/>
9010	22	Both	192 . 168 . 4. 68	<input checked="" type="checkbox"/>
9011	22	Both	192 . 168 . 4. 70	<input checked="" type="checkbox"/>
9012	22	Both	192 . 168 . 4. 101	<input type="checkbox"/>
0	0	Both	192 . 168 . 4. 0	<input type="checkbox"/>
0	0	Both	192 . 168 . 4. 0	<input type="checkbox"/>

Help...

Save Settings

Cancel Changes

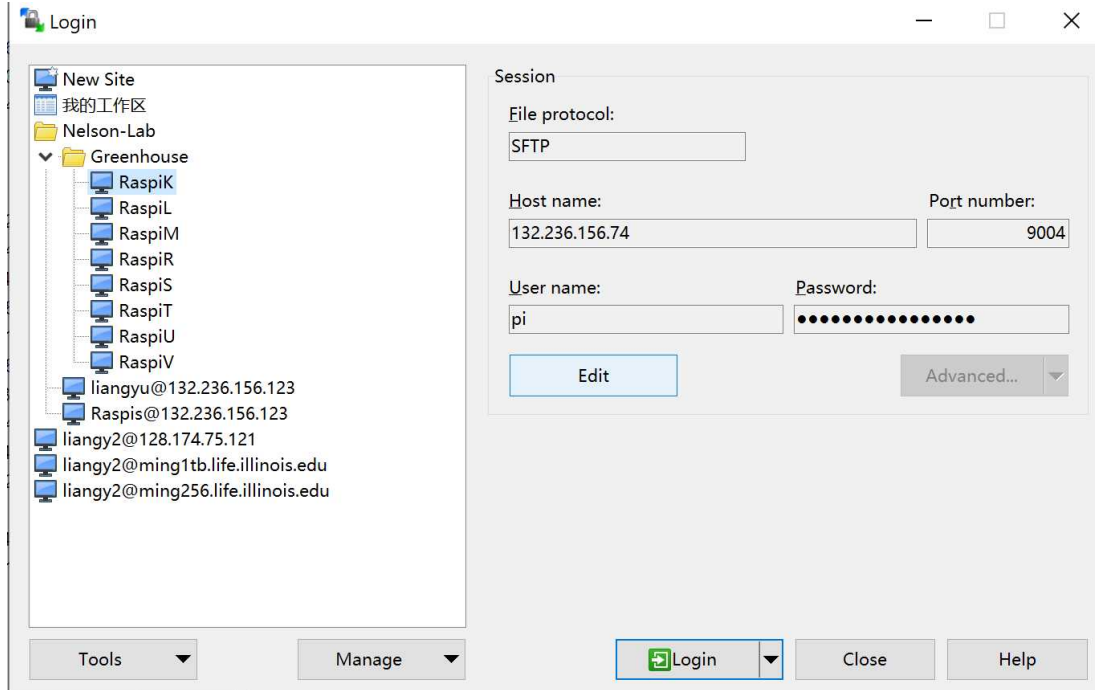
Connect raspi computer by server and PCs

- To provide easy access to check information on each raspi. Please use ssh proxy to connect each raspi computer to your PC and working server. Here, we use the WinSCP to connect the device.

Download the WinSCP: <https://winscp.net/eng/index.php>

7 Connect Raspi to PC

Click "**New Sites**" and manually create the address as follows. Please make sure the **Host Name** and **Port Number** match the record from the step above and click **Login** to reach the connection.



8 Connect Raspi to the SERVER

Using any existing users of **SERVER** in lab to login first. For example, use the Raspis user ID to log in. (If using SSH command: **ssh -p 12345 Raspis@***.***.***.****)

To log in to specific Raspi, use the **ssh command** to log in as same as the IP address and port number above. For instance, to connect RaspiR with **SERVER**

```
ssh -p 9005 pi@***.***.***.**
```

9 Using ssh command to transfer files by crontab

Please install "**sshpass**" first using the following link:

<https://gist.github.com/arunoda/7790979>

IMPORTANT!: Please use the ssh command to connect from host to client, as well as the **client** to host from two sides (As known as a handshake). Otherwise, the "**sshpass**" fails to transfer files. Using RaspiR as an

example:

Login to VAHS first and type in:

```
ssh -p 9005 pi@.***.**.*
```

Login to raspiR then and type in:

```
ssh -p 14817 Raspis@***.***.***.***
```

Using Crontab to initiate the experiment

10

The code is used to launch each new experiment and realize the data transfer from each Raspi Computer to VASH server for storage.

Config the raspi computer file and folder (For example):

Create an image factory for each Raspi (Using R as example)

```
mkdir /home/pi/Documents/raspiR_image_factory
```

Create a text file with raspi password included

```
nano /home/pi/Documents/raspiR_image_factory
```

Log in to vash and launch the setup code:

Reach the setup code:

```
bash /mnt/Knives/image_factory/new_experiment.sh
```