

5 REMOTE ACCESS MANUAL

To facilitate remote access and file transfer, a VNC software and SFTP client are configured.

5.1 REMOTE ACCESS DESKTOP MODE; REALVNC

1. Enable SSH and VNC interfaces via Menu → Preferences → Raspberry Pi Configuration → Interfaces, selecting Enabled for both SSH and VNC .

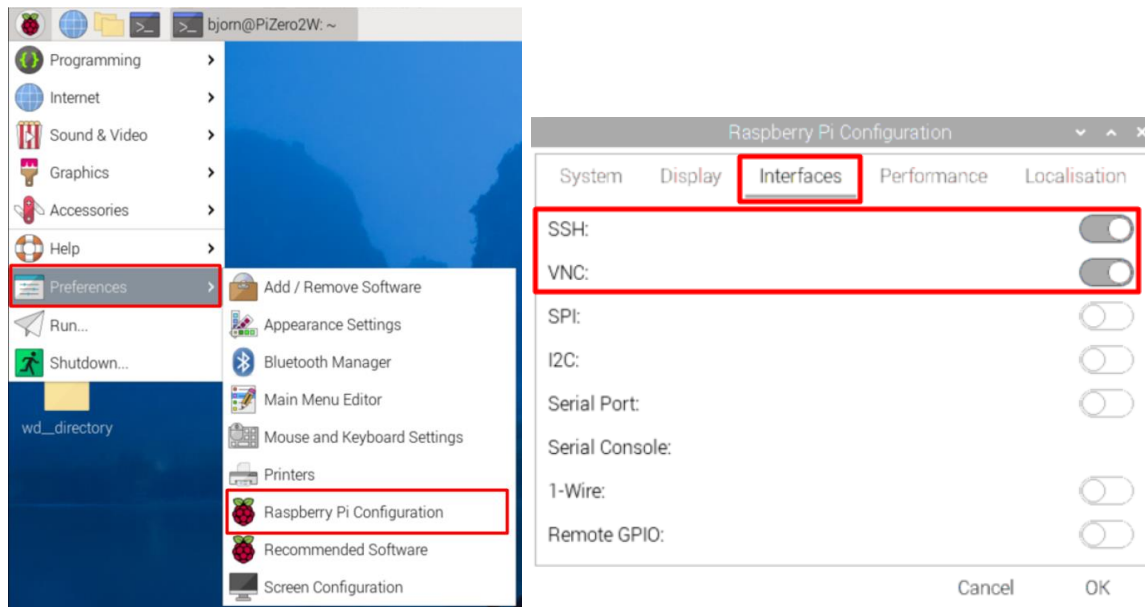


Figure 5.34: : DESCRIPTION

2. From a workstation, download and install RealVNC Viewer (<https://www.realvnc.com/download/>) .
3. In VNC Viewer, create a new connection using the Pi's IP address (visible by hovering over the network icon on the RPi desktop) as the VNC Server address.
4. Authenticate with the Pi user credentials configured during OS imaging; upon success, the Pi desktop is displayed for remote control.

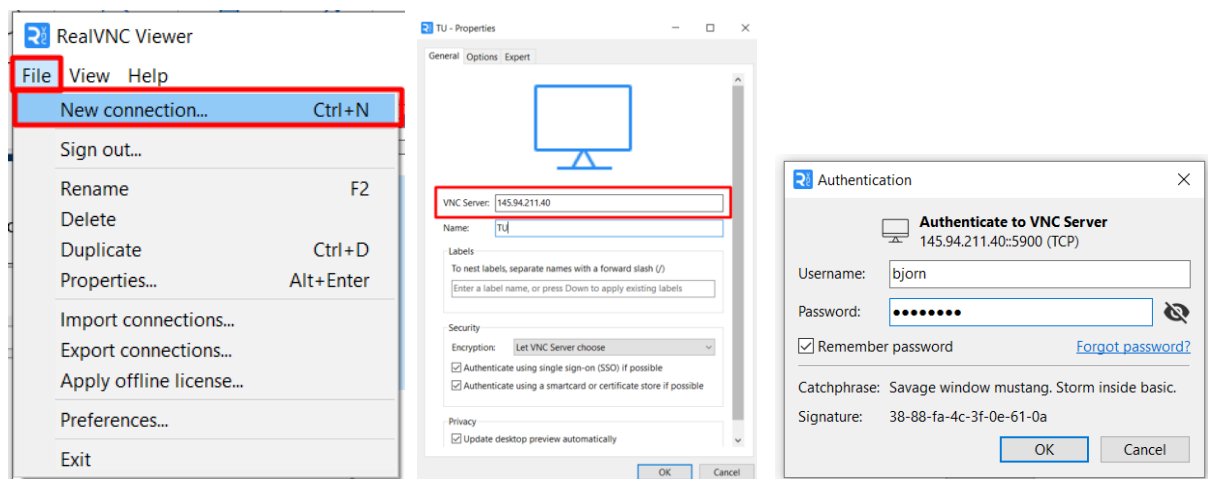


Figure 5.35: DESCRIPTION

Now the system can be controlled from a pc assuming both systems are using the same internet connection.

5.2 REMOTE ACCESS HEADLESS MODE; SSH & PuTTY

In deployments where power savings dictate operating without a monitor or GUI, the Raspberry Pi must be accessed remotely via SSH over Wi-Fi or a mobile hotspot. The following steps describe enabling the SSH server, configuring wireless network credentials, and establishing an SSH connection from a Windows workstation using PuTTY([source PuTTY](#)).

Initial SSH enablement (with monitor & keyboard):

1. Connect the Pi to a monitor and USB keyboard.
2. Open a terminal and run:
`sudo raspi-config`
3. Navigate to Interfacing Options → SSH, select Enable, then OK.

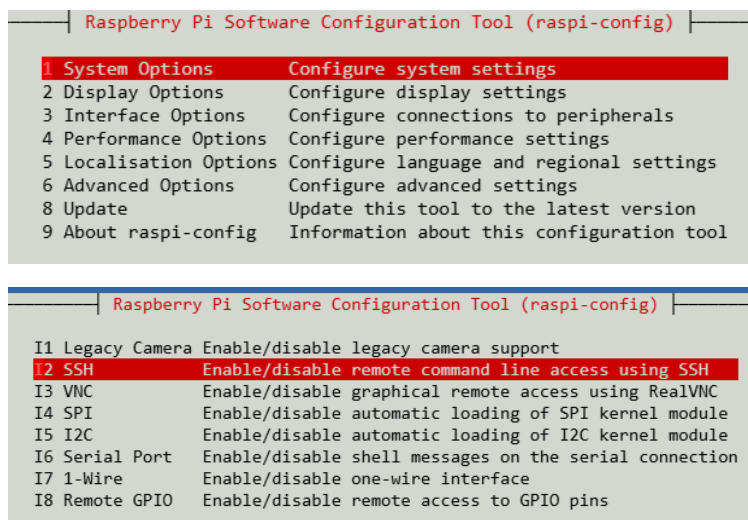


Figure 5.36: DESCRIPTION

Configure Wi-Fi credentials:

4. In the same raspi-config tool, go to System Options → Wireless LAN.

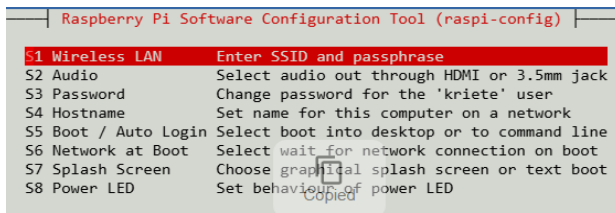


Figure 5.37: DESCRIPTION

5. Enter your hotspot's SSID and passphrase when prompted.
6. Exit and allow the Pi to reboot (if prompted).

Determine the Pi's IP address on the hotspot:

7. Open a terminal and run:

ip a

8. Note the address listed under the Wi-Fi interface

A screenshot of a terminal window titled "bjorn@PiZero2W: ~". The terminal shows the output of the command "ip a". The output lists network interfaces: "lo" (loopback), "eth0" (Ethernet), and "wlan0" (Wi-Fi). The "wlan0" interface is highlighted with a red box, showing its IP address as "172.20.10.3". The terminal text includes details like MTU, state, and various flags for each interface.

```
permitted by applicable law.
Last login: Fri May  2 14:39:03 2025
bjorn@PiZero2W:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
        valid_lft forever preferred_lft forever
2: eth0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc pfifo_fast state DOWN group default qlen 1000
    link/ether 00:e0:4c:36:1b:27 brd ff:ff:ff:ff:ff:ff
3: wlan0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 2c:cf:67:be:41:03 brd ff:ff:ff:ff:ff:ff
    inet 172.20.10.3/28 brd 172.20.10.15 scope global dynamic noprefixroute wlan0
        valid_lft 3389sec preferred_lft 3389sec
    inet6 2a02:a420:274:bb92:8641:9b3f:a37b:640a/64 scope global noprefixroute
        valid_lft forever preferred_lft forever
    inet6 fe80::4b7d:cc6a:e2a7:1e07/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
```

Figure 5.38: DESCRIPTION

Establish the SSH connection:

9. Download and install PuTTY from <https://www.putty.org/>
10. Launch PuTTY.
11. In Host Name (or IP address) enter the Pi's IP from step 8.
12. Ensure Port is set to 22 and Connection type is SSH.

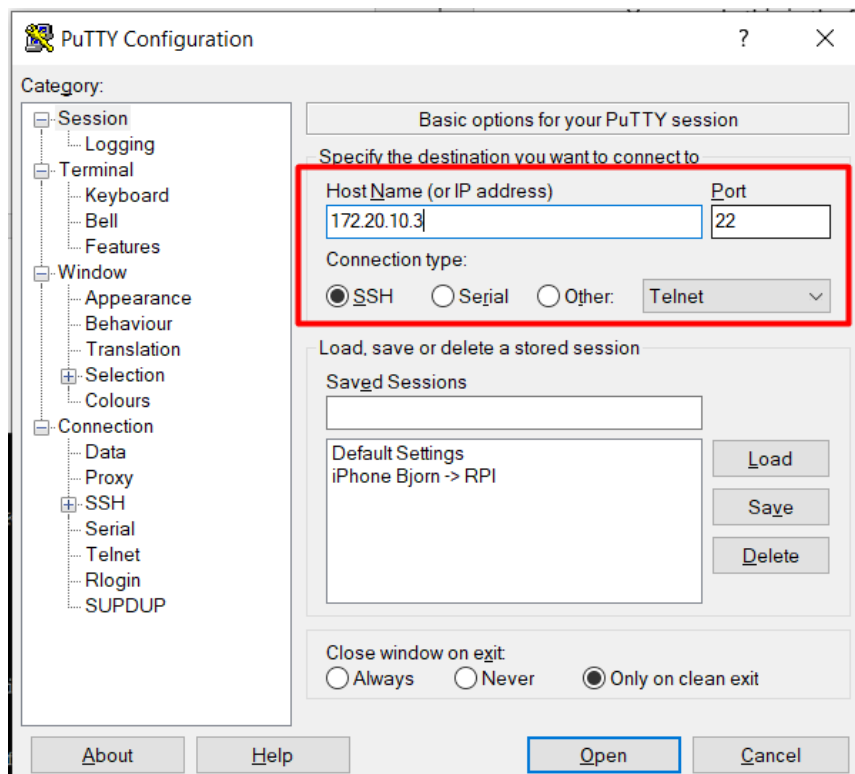


Figure 5.39: DESCRIPTION

13. Click Open, then log in with your Raspberry Pi username and password.



Figure 5.40: DESCRIPTION

Once connected, you can manage the Pi entirely via the terminal in headless mode.

5.3 SFTP FILE TRANSFER VIA WINSCP

To enable reliable file transfer, the SFTP client WinSCP is configured.

1. Install WinSCP on the workstation (<https://winscp.net/>) .
2. Launch WinSCP and configure a New Site with:

File protocol: SFTP

Host name: Pi IP address

Port number: <standard>

User name: <username> (as set in the OS imager)

Password: <password> (as set in the OS imager)

3. Save the site and connect; navigate to the project output directory (e.g. /home/pi/wd_directory/output/) to upload or download images, logs, and CSV files.

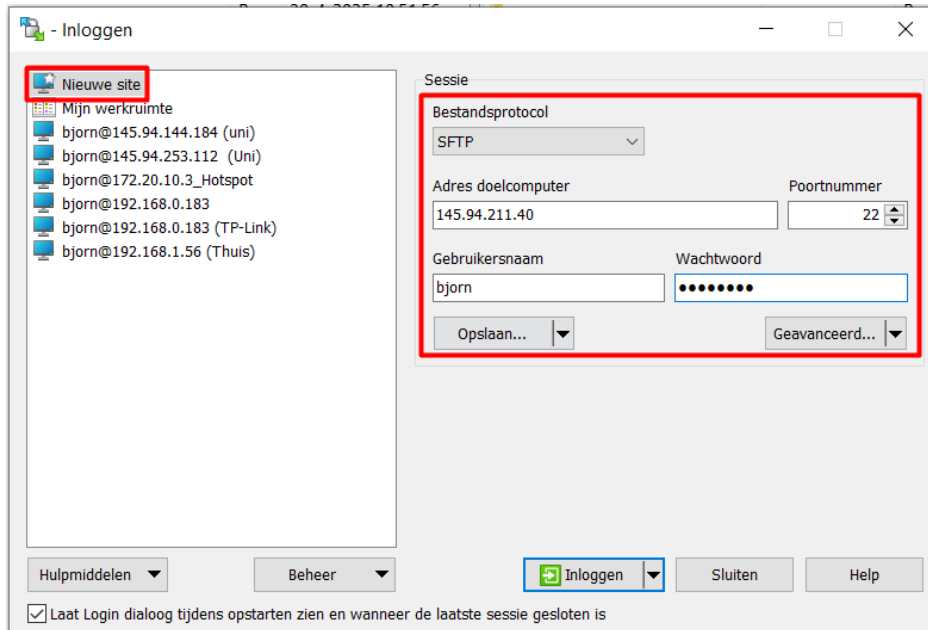


Figure 5.41: Setup file transfer configuration.

Once connected, WinSCP can also be used to upload the entire project directory (cloned from the GitHub repository) to the Pi. Simply clone the wd__directory locally on your workstation (e.g. via git clone <GitHub URL>), then in WinSCP's local pane navigate to that folder and drag it into /home/pi/ on the remote pane. This transfers all scripts, modules, and configuration files in one step, ready for execution.