

Project: Behavioural Synchrony

Note 02: Raspberry Pi Camera

Date: 2023-06-14

VK (documented from NP)

Load OS onto SD Card

1. Download and install Raspberry Pi imager on your system
2. Connect the required SD card using a SD Card reader
3. Install the Raspberry Pi OS onto the SD card (Sandisk 64 GB - 90 mbps writing speed) using the instructions on this link -
<https://projects.raspberrypi.org/en/projects/raspberry-pi-setting-up/2>

Raspberry Pi Configuration

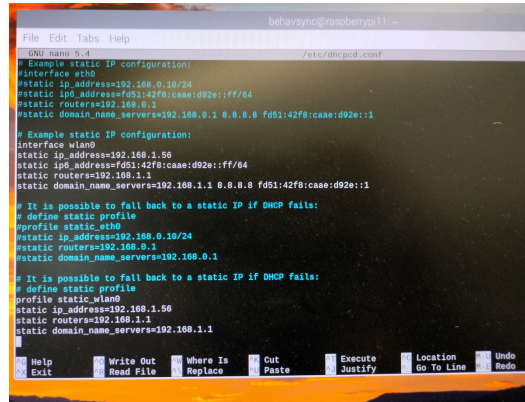
1. Connect the RPi to the monitor, mouse, keyboard and the power connection and insert the SD card, along with connecting the camera
2. Default username: `behavsync`, password: `burkartlab`
3. If a username already exists, to change username
<https://raspberrytips.com/change-raspberry-pi-username/> -
 - a. To enable this, go to the file in `/etc/ssh/` and open the file using `sudo nano sshd_config`. In this file, edit the permission by removing comment and typing “yes” after “*PermitRootLogIn*” and “*PubkeyAuthentication*”. Reboot the system for the settings to be applied
 - b. Create root password using `sudo passwd`
 - c. Disable auto login: `sudo raspi-config -> System settings -> Boot/Auto login -> Select options 1 and 3 (requiring user to login)`. Reboot again.
 - d. Then directly use `ssh root@192.168.1.xxx`
 - e. Change the username using the command `usermod -l behavsync raspberry` and then change the password from `pi` to `burkartlab`
4. Go to Preferences (top left drop-down) -> Raspberry Pi Configuration
 - a. System -> Rename the device hostname to `raspberrypi[xx]` (from 10-18). We'll know the IP address once the system connects to the router - this IP address needs to be added in the code to detect the camera and record from it.
 - b. Interfaces -> Enable all the options
5. Connect it to the internet (via a personal hotspot) to update the date and time
6. Connect the raspberry pis to the router with the following name: `yanik_5` and password: `testtest`
7. Enable camera interfacing
 - a. In the terminal type - `sudo raspi-config`
 - b. Go to Interface options -> Legacy Camera -> Enable

Connecting the camera to the computer

1. Make sure the computer is connected to wired connection 1 and UZH wifi network [worked when connected to the second port on the server!]
2. Copy recording.py file from MarkusCodes folder to the Raspberry Pi using the following command in the terminal – `scp <file path> behavsync@192.168.1.xxx:~/`
3. [Zoom function](#) –
 - a. In line 168 (under “start_streaming”) – change the streaming resolution to “1920x1080”
 - b. After line 142 and 168 (under “start_recording” and “start_streaming”) – add the following line: `camera.zoom = (0.2, 0.2, 0.65, 0.7)`. The parameters range from 0 to 1 and correspond to the x-coordinate, y-coordinate, width and height of the zoomed area of interest respectively in relative values (i.e., ratios)
4. Open Firefox -> 192.168.1.1 -> Network center -> Local network -> DHCP Clients
5. Add it to DHCP Reservation and it should appear in that tab
6. Note down the IP address of the RPi and add it to the code gui_bac.py (line 495)
7. Then follow the instructions in the README file on the desktop to start streaming, inspect cameras and record videos.
8. When a new SD card is inserted into an already configured Raspberry Pi, there is a warning - “*host key has been changed*”. Remove the key using the command suggested in the warning - “*ssh-keygen...*”
9. In case there’s an error with connecting - use `ping <ip address>` to check if the computer is able to establish a connection
10. [Not important anymore] In recording.py file, make sure that –
 - a. the saving file directory has been changed from “/home/raspberry/” to “./”
 - b. Filename should indicate the name of the camera/RPi hostname

Issues with Raspberry Pi's and potential solutions

1. Unstable connection – sometimes the power cable and camera cable can be connected unstably, so fiddle with the cables and make sure they're connected properly
2. Static IP address lost (changed from 192.168.1.xxx to 169.254.x.x) – modify some code in `/etc/dhcpd.conf` file to manually change the IP address, make sure to change the option to wlan0 from eth0 ([link](#))



```
behavsync@raspberrypi1
GNU nano 2.4 /etc/dhcpd.conf
# Example static IP configuration:
interface eth0
#static ip_address=192.168.0.10/24
#static ip6_address=fd51:42f8:caae:d92e::ff/64
#static routers=192.168.0.1
#static domain_name_servers=192.168.0.1 0.0.0.0 fd51:42f8:caae:d92e::1

# Example static IP configuration:
interface wlan0
static ip_address=192.168.1.56
static ip6_address=fd51:42f8:caae:d92e::ff/64
static routers=192.168.1.1
static domain_name_servers=192.168.1.1 0.0.0.0 fd51:42f8:caae:d92e::1

# It is possible to fall back to a static IP if DHCP fails:
# define static profile
profile static_eth0
#profile static_eth0
static ip_address=192.168.0.10/24
#static routers=192.168.0.1
#static domain_name_servers=192.168.0.1

# It is possible to fall back to a static IP if DHCP fails:
# define static profile
profile static_wlan0
static ip_address=192.168.1.56
static routers=192.168.1.1
static domain_name_servers=192.168.1.1

Help Write Out Where Is Cut Execute Location Undo
Exit Read File Replace Paste Justify Go To Line Redo
```

3. `scp.SCPException: Error receiving, socket.timeout` – most likely connection interrupted while the files were being copied. The power connection in raspberrypi0 is very unstable. But you can still manually copy the videos through the terminal –
 - a. `cd /home/student/Desktop/MarkusCodes/~/Recordings/<session_folder>`
 - b. `scp behavsync@192.168.1.xx:*.*h264 .`
 - c. You'll have to enter the password (burkartlab) at the prompt. The command copies all `.h264` files from the required raspberry pi to your current directory (indicated by `.`)
 - d. The files don't have the initial ID of raspberry pi in the beginning of the name (e.g., `15_side...`). This renaming has to be done manually.
4. `Paramiko: Error reading SSH protocol banner` – usually rebooting the raspberry pi fixes the issue (i.e., unplug and plug the power connection again)
5. Original repeater stopped working, later repeaters were not reliable. The data for the repeaters: Make sure to connect the wifi to the signal from the Y++ repeater, which connects to `yanik_plus` repeater (with same password) which in turn connects to the computer -
 - a. New name: `yanik_plus_plus` (192.168.1.181), Password: `yaniklab`
 - b. Doesn't work anymore – Old name: `yanik_5_RPT5G`, Password: `testtest`
6. In case the RPi doesn't connect to the repeater on its own -
 - a. Move the `wpa_supplicant.config` file from `/etc/wpa_supplicant/` to `/boot` using `mv` command
 - b. Other option - In the terminal type - `sudo raspi-config`. Go to System Options ->Wireless LAN -> Enter the network name and password

- c. **Other option (which didn't work) - create a file in /boot using the command**
`sudo touch wpa_supplicant.config` **and in that file write –**
`country=ch \ network = { scan_ssid=1 \ ssid =`
`"Yanik_5_RPT5G" \ psk="testtest"}`