CNT5517/CIS4930 Mobile Computing

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Configuring your Raspberry Pi Remote Connection

The Raspberry Pi 3 comes equipped with a variety of connectivity capabilities. This includes:

- WiFi connectivity for joining a wireless network.
- Display out ports for connecting to a monitor with a keyboard/mouse.
- A wired Ethernet adapter.

The fastest way to get started is to connect to a monitor, however this is not always feasible. SSH over WiFi is also convenient, but if you do not administer your network it may be hard to connect from your development computer (this is the case for the UFL network). Barring these options, a direct connection can be made between your computer and the Raspberry Pi.

This document will describe configuring a new Raspberry Pi, and setting it up for SSH. The document focuses on the Ethernet connection method, although the steps to configure WiFi are also mentioned.

Requirements

Raspberry Pi 3 Model B

An micro SD card flashed with the latest Raspberry Pi OS

An Ethernet-to-USB adapter (if your computer lacks an extra Ethernet port).

Setting up the First Boot

If you are running your RPi headless, that is, without a monitor connected, some steps must be taken first to enable SSH and set up networking.

1. **Enable SSH:** At the top-level of the micro SD card, create an empty file called `ssh`. It is important that this file has no extension.

2. **Configure Networking**
    a. **With WiFi:** Create a new file in the same directory as step 1, called `wpa_supplicant.conf`. Edit the contents of this file as described in the Raspberry Pi Documentation, under "adding the network details".
    b. **With Ethernet:** Locate the file `cmdline.txt` in the SD card root. Inside the file, at the end (after `rootwait`) add `ip=10.254.254.64` on the same line, replacing the IP with your own desired one. This IP should not be within the range of any networks you are currently connected to. Note that this step is not necessary if you are connecting your RPi to a *router*, and not directly to your PC.

Configuring the USB-Ethernet Adapter

If you are not using the adapter, this section may be skipped.

1. **On Mac:**
    a. With the adapter connected, go to System Preferences, under the *Network* tab, and click the "+" button below the list of interfaces.
    b. Select the USB adapter from the interface dropdown (called "USB 10/100 LAN", for example), and give it a descriptive name.

c. Ensure *Configure IPv4:* is set to “Manually”, and enter an IP address within the range of the IP you specified in `cmdline.txt` (but do not use the exact same IP address).
d. The subnet mask should be 255.255.255.0 for most cases, and the *Router:* field can be left blank.
e. Ensure the *Apply* button is clicked before exiting Preferences.

2. **On Windows 10:**
    a. With the adapter connected, in the Control Panel, click *Network and Internet*, followed by *Network and Sharing Center*. Select *Change adapter settings.*
    b. Select *More Options,* and click *Details*. Identify the USB adapter, and double click on it to open Properties.
    c. Double click the *Internet Protocol Version 4 (TCP/IPv4)* property.
    d. Select *Use the following IP address*, and enter an IP address within the range of the IP you specified in `cmdline.txt` (but do not use the exact same IP address).
    e. The subnet mask should be 255.255.255.0 for most cases, and the *Default gateway:* field can be left blank.

Accessing the Raspberry Pi Shell

The RPi should now be configured for SSH access. With everything connected, plug in the power to the board and wait a little for it to boot. You should then be able to use the SSH command as follows (Terminal on Mac, Powershell on Windows 10):

```
ssh pi@10.254.254.64
```

Note that the IP should be the one you set in `cmdline.txt`. The default RPi user is `pi`, and the password is `raspberry` (you should change this immediately).

If you are using the USB-Ethernet adapter, note that your device does not receive an internet connection from your computer. You should use `raspi-config` to set up a WiFi connection (the school UFL network will work in this regard). Follow the steps on page 2 to do this.

First Time Setup

With your RPi connected to the internet and under your control, you should first update the current packages:

```
sudo apt update
sudo apt upgrade
```

Then install some necessary packages for development. Note that this may take a while.

```
sudo apt install gcc-6 g++-6 build-essential
sudo apt install cmake libboost-all-dev
```