Raspberry Pi Network

Last updated by Mark Webster on October 1, 2018

The SCC Makerspace has a local network with several Raspberry pi devices in use, mainly running the kiosk TV screens. Students who have IoT (Internet of Things) projects can connect to the Makerspace network with their devices, laptops, or phones.

MAKER-NET

The SCC Makerspace local network has the ssid “MAKER-NET”. For security reasons this network is not connected to the Internet, but is only visible within the Makerspace.

Any device wishing to connect via wifi can select the ssid “MAKER-NET” with a password of “31684903”. This password is on the bottom of the physical tp-link router. To connect to the network with a physical Cat-5 cable, just plug into the back of the physical router.

The physical router is a TP-Link device located on the counter near the main door. It has web based administration software visible to anyone who has connected to MAKER-NET.
Open a browser with the URL “http://tplinkwifi.net” . The user name “admin” and the password is also “admin”. Unfortunately, not many settings in the administration software are of much use in the Makerspace.

If someone accidentally turns off the power to the tp-link router, devices attached to the MAKER-NET by wifi may have to be logged in again to the network.

Raspberry Pi for the Outdoor TV

The raspberry pi on the front counter, next to the Makerspace router, is connected to the outdoor TV by an HDMI cable that runs through the wall from the raspberry pi. The raspberry pi is labeled “kiosktv”. It is connected by a blue cat5 ethernet cable to the router. The power supply for the raspberry pi is beneath the counter. There is no keyboard , mouse, or display for the outdoor TV raspberry pi, so it is controlled remotely. In an emergency an external keyboard and monitor can be connected to the pi, although remote methods are faster.

The outdoor tv raspberry pi has the default user “pi” with a password of “kiosktv”. It defaults to the ip address “192.168.0.110” since it is hardwired to the router.

The outdoor tv raspberry pi is running the standard Raspian desktop version of linux.

Libreoffice software is installed and can open MS PowerPoint files as well as other MS Office file types.

The kiosk tv raspberry pi can play most movie formats encoded with H.264 compression (which is very common). To execute a movie and loop forever, type on the command line:

omxplayer –loop video_file_name_to_show

The omxplayer can be terminated with Control-C , like most unix software.

Usually, the video or PowerPoint file to display is located on a USB flash drive plugged into the raspberry pi. To replace the file:
1) Stop the program displaying the file (Libreoffice or omxplayer)
2) Eject the USB flash drive (the arrow in the upper right corner of the desktop ejects files)
3) Remove the flash drive, plug into another computer with the new file and replace the file
4) Plug the USB flash drive back into the raspberry pi.
5) Run the file which can be found in the folder “/media/pi/usb-drive-name/file_to_run”

Remote Control of Raspberry Pi with a Graphical Interface

The raspberry pi is running the “realVNC” server. Any laptop can download the realVNC viewer software from the company’s website for free. Versions are available for Windows, Mac, and Linux. To remotely control the raspberry pi, just connect the laptop to the MAKER-NET network. Then open the realVNC viewer and connect to the raspberry pi’s ip address, which usually is “192.168.0.110”
Then connect to the user “pi” with the password “kiosktv”. You can then run the raspberry pi computer from your laptop mouse and keyboard. As listed above, eject the USB flash drive and copy a new file to it, then reinsert and execute the file. Movies are run from the command line
“omxplayer –loop video_to_play”

Remote Control of Raspberry Pi with a Command Line Interface

The raspberry pi is also running an ssh server. Any laptop or phone with terminal software can connect to the MAKER-NET network and ssh into the raspberry pi, then issue commands from the terminal window keyboard.

Use terminal software for the laptop operating system. Windows users typically install PuTTY. Macintosh and Linux computers have terminal software built in. Android and iPhones have apps that can be downloaded.

Typically in the terminal window one will type: “ssh pi@192.168.0.110” and then enter the password “kiosktv” to connect.

Once connected one can view running processes with “ps aux”. For example, “ps aux | grep soffice” would show you any processes run by Libreoffice. Record the process ID or name of the proccess.

The software “top” or “htop” is a more visual way to view the processes.

Once the process ID or name is known, one can kill it with

“pkill -n name-of-process”
or “kill process_id”

The software “scp” can be used to new copy files from the laptop to the raspberry pi. Graphical file transfer software is “FileZilla”.

For example, at the command line type:
“scp local_file_to_copy pi@192.168.0.110:/media/pi/585A-EBF9”
then enter the password “kiosktv” and wait for the file to transfer.

To execute graphical software (like omxplayer or libreoffice) remotely, one must use “export DISPLAY=:0” to tell the software where to display the images or video.

To prevent the remote graphical software from terminating when you log out use either “nohup” or “screen” software to detach the process before quitting the terminal software on the laptop.

Raspberry Pi for the Indoor TV

The raspberry pi for the indoor tv is physically attached to the back of the TV itself. It has an HDMI cable running to the tv HDMI 1 input. The power supply for the raspberry pi is connected to an extension cable. There is no keyboard or mouse attached to the raspberry pi. One can connect a keyboard and mouse, then use the TV as a monitor if necessary, but remote access to the raspberry pi is usually faster.

The indoor tv raspberry pi is also running the Raspbian desktop operating system with ssh server and realVNC server operating. It also connects to the MAKER-NET network.

The default user is “pi” and the password is “indoortv”.

The indoor tv raspberry pi is connected by wifi so the ip address will change. Usually it is “192.168.0.112” unless some other device grabbed that ip address first. When unsure of the ip address you can just ping addresses and see what address responds, like “ping 192.168.0.112”.

The same procedures apply for connecting to the indoor tv raspberry pi as for the outdoor tv. This includes: starting and stopping programs, ejecting flash drives, and copying files.