**********Default**********

Raspberry Pi 64 bit OS
TensorFlow 2.8
TensorFlow Lite 2.10
Lazarus IDE (Ultibo Edition)
2.5.123-082722-64bit
Ultibo_Projects Bare Metal

Openocd
QEMU 6.2
Pico-SDK 1.4
Pico WIFI Development Environment
WireShark
nmap
Octave
MQTT
Ultibo_Projects/Pauls-ultibo-mqtt
Ultibo_Projects/Pauls-ultibo-mqtt RPi3 RPi2 QEMU
KiCad picoprobe-pcb
rp2040-freeros-projects
klt-feature-detect
minicom
pico-sdk C/C++
mosquitto mosquitto-clients fritzing doxygen
lwip documentation
doxygen
router dnsmasq &hostapd
01/21/23

**********Default**********

This video provides the information to configure the Raspberry Pi as a router

https://www.youtube.com/watch?v=owxOAZAp00Y

```
## Assumption
You have Raspian installed on your Pi and that its primary LAN (_eth0_) is
configured to use DHCP. It will likely get its address information from your
Internet modem/routers. I assume you can connect to it over _eth0_.

## Install dnsmasq
From the command line, run `sudo apt install dnsmasq` to install dnsmasq. Stop
it, for now, with `sudo systemctl stop dnsmasq`

## Static IP for eth1
Now set a static IP address for the second ethernet connection (_eth1_). Edit
_/etc/dhcpcd.conf_ with `sudo nano /etc/dhcpcd.conf`. Go to the end of the file
and edit it so that it looks like the following:
```
```
```

```
interface eth1
    static ip_address=192.168.7.1/24
```

Configure dnsmasq
Discard the old conf file and create a new configuration:
```
sudo mv /etc/dnsmasq.conf /etc/dnsmasq.conf.orig
sudo nano /etc/dnsmasq.conf
```
Add these lines:
```
interface=eth1
dhcp-range=192.168.7.100,192.168.7.120,255.255.255.0,24h
```
This will define a new DHCP range 192.168.7.x which will be administered by the Pi via _eth1_.

Now start dnsmasq with `sudo systemctl start dnsmasq`

Note
To see clients connected to _eth1_ use `cat /var/lib/misc/dnsmasq.leases`

The output will be something like
```
574256399 00:10:a7:0c:a2:c1 192.168.7.109 rpi3a 01:00:10:a7:0c:a2:c1
```

IP forwarding
Edit _/etc/sysctl.conf_ with `sudo nano /etc/sysctl.conf` and this add line (for persistence)

```
net.ipv4.ip_forward=1
```
Activate forwarding now with `sudo sysctl -w net.ipv4.ip_forward=1`

Add a masquerade for outbound traffic on eth0

```
sudo iptables -t nat -A  POSTROUTING -o eth0 -j MASQUERADE
```

Save the iptables rule.

```
sudo sh -c "iptables-save > /etc/iptables.ipv4.nat"
```
Edit _/etc/rc.local_ with `sudo nano /etc/rc.local` and add this just above "exit 0" to install these rules on boot.

```
iptables-restore < /etc/iptables.ipv4.nat
```

Now the router is working. Connect a wired device to the _eth1_ network. From that device you will have access to the network attached to _eth0_ and _eth1_ and if _eth0_'s network has Internet, you will get Internet access as well.

Now add a third network over Wi-Fi!

Static IP for wlan0

Now set a static IP address for the Wi-Fi (wlan0). Edit _/etc/dhcpcd.conf_ with `sudo nano /etc/dhcpcd.conf`. Go to the end of the file and add these lines:

```
interface wlan0
    static ip_address=192.168.17.1/24
    nohook wpa_supplicant
```

This will give it a static address of _192.168.17.1_

Now restart the DHCP server with `sudo service dhcpcd restart`

Install hostapd

```
sudo apt install hostapd
sudo systemctl stop hostapd
```

Edit the dnsmasq.conf file with `sudo nano /etc/dnsmasq.conf` and add

```
interface=wlan0
dhcp-range=192.168.17.100,192.168.17.120,255.255.255.0,24h
```

Reload the configuration file with `sudo systemctl reload dnsmasq`

Configure hostapd

To use the 5 GHz band, you can change the operations mode from hw_mode=g to hw_mode=a. Possible values for hw_mode are:

* a = IEEE 802.11a (5 GHz)
* b = IEEE 802.11b (2.4 GHz)
* g = IEEE 802.11g (2.4 GHz)

Edit `sudo nano /etc/hostapd/hostapd.conf` and add these line:

```
interface=wlan0
driver=nl80211
ssid=PiNet
hw_mode=g
channel=7
wmm_enabled=0
macaddr_acl=0
auth_algs=1
ignore_broadcast_ssid=0
wpa=2
wpa_passphrase=raspberry
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP
rsn_pairwise=CCMP
```

PiNet will be the network SSID and the password will be _raspberry_. Change accordingly.

We now need to tell the system where to find this configuration file.

Edit this file `sudo nano /etc/default/hostapd` and find the line with #DAEMON_CONF, and replace it with this:

```
DAEMON_CONF="/etc/hostapd/hostapd.conf"
```

Now enable and start hostapd:

```
sudo systemctl unmask hostapd
sudo systemctl enable hostapd
sudo systemctl start hostapd
```

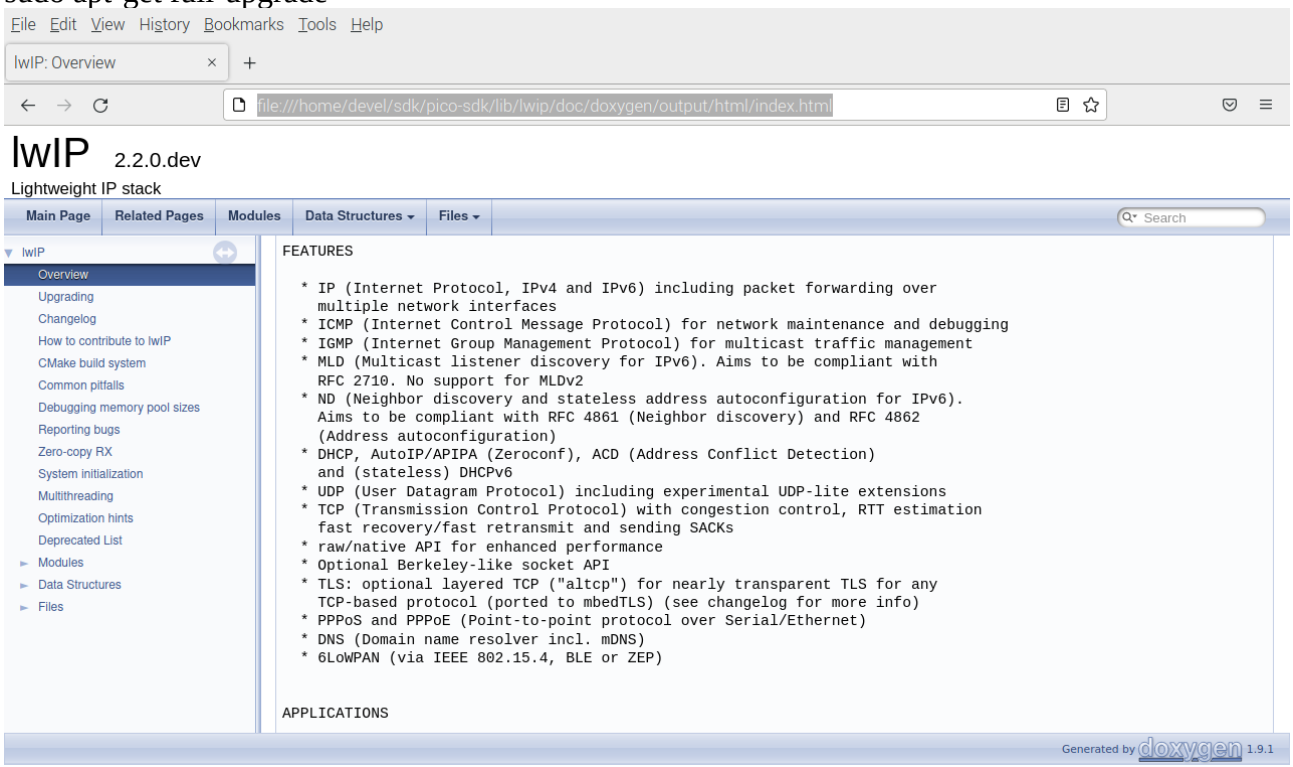
You will now have a PiNet Wi-Fi network which has access to the network on _eth0_

General note
If things aren't working as expected after you configured routing with eth1 or after you added Wi-Fi support, then a good old fashioned reboot will likely fix the problem. Or in the words of the TV show 'IT Crowd', "Have you tried turning it off and on again?"

https://github.com/garyexplains/examples/blob/master/raspberry_pi_router.md

doxygen is now added to my-projects-docs/pkg-install-scripts/mqtt/mosquitto.sh
which installs mosquitto mosquitto-clients mosquitto mosquitto-clients fritzing doxygen doxygen

sudo apt-get install doxygen
cd sdk/pico-sdk/lib/lwip/doc/doxygen/
./generate.sh
file:///home/devel/sdk/pico-sdk/lib/lwip/doc/doxygen/output/html/index.html
sudo apt-get update
sudo apt-get full-upgrade



All the documents and images used to document were done with the software on the Rpi

sudo su

cd /etc

cp hostname hostname.orig
diff hostname hostname.orig
1c1
< pi4-37

> raspberrypi
cp dphys-swapfile dphys-swapfile.orig
diff dphys-swapfile dphys-swapfile.orig
16c16
< CONF_SWAPSIZE=1000

> CONF_SWAPSIZE=100

fetch pkg installers

scp -r pi4-27:~/xx/my-projects-docs/pkg* .

dpkg -l | sort > pkgs.txt

cp pkg-install-scripts/ex* .

adds first set of packages

./extra_pkgs_64bit.sh

dpkg -l | sort > pkgs-a.txt

cp pkg-install-scripts/tensorflow/ex* .

adds 2nd set of packages

./extra-1.sh

dpkg -l | sort > pkgs-b.txt

./extra-2.sh

dpkg -l | sort > pkgs-c.txt

./extra-3.sh

dpkg -l | sort > pkgs-d.txt

./extra-4.sh

dpkg -l | sort > pkgs-e.txt

This is the software to program the picos with SWD

installed-openocd082722-228ede-64bit.img

openocd082722-228ede-64bit.img

Bare Metal for Raspbery Pi

ultibo2.5.123-082722-64bit.img
sudo unsquashfs -d ultibo ultibo2.5.123-082722-64bit.img

qemu-6.2.0-rpios-64bit.img
sudo unsquashfs -d qemu-6.2.0-rpios qemu-6.2.0-rpios-64bit.img
git clone https://github.com/develone/Ultibo_Projects.git
cd Ultibo_Projects/jpeg2000/src/
./compile_ultibo.sh
cd ../QEMU/
./libbuild.sh

vi ~/.local/share/applications/ultibo.desktop
[Desktop Entry]
Name=Lazarus IDE (Ultibo Edition)
Comment=A free pascal platform for bare metal development
Exec=/home/devel/ultibo/core/lazarus.sh
Icon=/home/devel/ultibo/core/images/icons/lazarus.ico
Terminal=false
Type=Application
Categories=Development;IDE;
X-Desktop-File-Install-Version=0.26
scrot -d 3 -s qemujpeg.png
scrot -d 3 -s qemujpeg-1.png
. ~/Ultibo_Projects/picoultibo.sh
/home/devel/ultibo/core:/home/devel/qemu-6.2.0-rpios/bin:/home/devel/local/openocd/bin:/home/devel/picotool/build/:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/local/games:/usr/games

./startqemu.sh

This is what is used to program pico's with SWD.
cd ~/
mkdir local
sudo unsquashfs -d local/openocd/ installed-openocd082722-228ede-64bit.img
Parallel unsquashfs: Using 4 processors
800 inodes (950 blocks) to write

[===|] 950/950 100%

created 800 files
created 33 directories
created 0 symlinks
created 0 devices
created 0 fifos
which openocd
/home/devel/local/openocd/bin/openocd
openocd -V

```
Open On-Chip Debugger 0.11.0-g228ede4-dirty (2022-08-27-19:45)
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
openocd: invalid option -- 'V'

curl https://pyenv.run | bash
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   270  100   270    0     0    704      0 --:--:-- --:--:-- --:--:--   703
Cloning into '/home/devel/.pyenv'...
remote: Enumerating objects: 1007, done.
remote: Counting objects: 100% (1007/1007), done.
remote: Compressing objects: 100% (436/436), done.
remote: Total 1007 (delta 581), reused 707 (delta 442), pack-reused 0
Receiving objects: 100% (1007/1007), 495.52 KiB | 3.02 MiB/s, done.
Resolving deltas: 100% (581/581), done.
Cloning into '/home/devel/.pyenv/plugins/pyenv-doctor'...
remote: Enumerating objects: 11, done.
remote: Counting objects: 100% (11/11), done.
remote: Compressing objects: 100% (9/9), done.
remote: Total 11 (delta 1), reused 5 (delta 0), pack-reused 0
Receiving objects: 100% (11/11), 38.72 KiB | 777.00 KiB/s, done.
Resolving deltas: 100% (1/1), done.
Cloning into '/home/devel/.pyenv/plugins/pyenv-installer'...
remote: Enumerating objects: 16, done.
remote: Counting objects: 100% (16/16), done.
remote: Compressing objects: 100% (13/13), done.
remote: Total 16 (delta 1), reused 7 (delta 0), pack-reused 0
Receiving objects: 100% (16/16), 5.88 KiB | 2.94 MiB/s, done.
Resolving deltas: 100% (1/1), done.
Cloning into '/home/devel/.pyenv/plugins/pyenv-update'...
remote: Enumerating objects: 10, done.
remote: Counting objects: 100% (10/10), done.
remote: Compressing objects: 100% (6/6), done.
remote: Total 10 (delta 1), reused 6 (delta 0), pack-reused 0
Receiving objects: 100% (10/10), done.
Resolving deltas: 100% (1/1), done.
Cloning into '/home/devel/.pyenv/plugins/pyenv-virtualenv'...
remote: Enumerating objects: 63, done.
remote: Counting objects: 100% (63/63), done.
remote: Compressing objects: 100% (55/55), done.
remote: Total 63 (delta 11), reused 28 (delta 1), pack-reused 0
Receiving objects: 100% (63/63), 38.44 KiB | 2.75 MiB/s, done.
Resolving deltas: 100% (11/11), done.
Cloning into '/home/devel/.pyenv/plugins/pyenv-which-ext'...
remote: Enumerating objects: 10, done.
remote: Counting objects: 100% (10/10), done.
remote: Compressing objects: 100% (6/6), done.
remote: Total 10 (delta 1), reused 6 (delta 0), pack-reused 0
Receiving objects: 100% (10/10), done.
Resolving deltas: 100% (1/1), done.
```

WARNING: seems you still have not added 'pyenv' to the load path.

Load pyenv automatically by appending
the following to
~/.bash_profile if it exists, otherwise ~/.profile (for login shells)
and ~/.bashrc (for interactive shells) :

export PYENV_ROOT="$HOME/.pyenv"
command -v pyenv >/dev/null || export PATH="$PYENV_ROOT/bin:$PATH"
eval "$(pyenv init -)"

Restart your shell for the changes to take effect.

Load pyenv-virtualenv automatically by adding
the following to ~/.bashrc:

eval "$(pyenv virtualenv-init -)"

These steps save a lot of time installing a lot of python code.
tensorflow
test-1-2.8.img
sudo unsquashfs -d test-1-2.8 test-1-2.8.img
This setup virtual enviornment

cd test-1-28

devel@pi4-37:~/test-1-2.8 $ python3 -m venv env
devel@pi4-37:~/test-1-2.8 $ source env/bin/activate
(env) devel@pi4-37:~/test-1-2.8 $

devel@pi4-37:~/test-1-2.8 $ ipython3 Copy_of_train_hello_world_model.ipynb

```
  0x01, 0x00, 0x00, 0x00, 0x1f, 0x00, 0x00, 0x00, 0x73, 0x65, 0x72, 0x76,
  0x69, 0x6e, 0x67, 0x5f, 0x64, 0x65, 0x66, 0x61, 0x75, 0x6c, 0x74, 0x5f,
  0x64, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x32, 0x5f, 0x69, 0x6e, 0x70, 0x75,
  0x74, 0x3a, 0x30, 0x00, 0x02, 0x00, 0x00, 0x00, 0x01, 0x00, 0x00, 0x00,
  0x01, 0x00, 0x00, 0x00, 0x0c, 0x00, 0x0c, 0x00, 0x00, 0x00, 0x00, 0x00,
  0x04, 0x00, 0x08, 0x00, 0x0c, 0x00, 0x00, 0x00, 0x14, 0x00, 0x00, 0x00,
  0x04, 0x00, 0x00, 0x00, 0x01, 0x00, 0x00, 0x00, 0x80, 0xff, 0xff, 0xff,
  0xff, 0xff, 0xff, 0xff, 0x01, 0x00, 0x00, 0x00, 0x5d, 0x4f, 0xc9, 0x3c,
  0x04, 0x00, 0x04, 0x00, 0x04, 0x00, 0x00, 0x00
};
unsigned int g_model_len = 2408;
```

(env) devel@pi4-37:~/test-1-2.8 $ exec $SHELL

tensorflow lite
sudo unsquashfs -d project-rpi-tflite project-rpi-tflite102222.img

add to the end of ~/.bashrc
This fix is if your using ~/local/openocd/bin/
openocd and

~/qemu-6.2.0-rpios/bin/
qemu-aarch64 qemu-ga qemu-keymap qemu-storage-daemon
qemu-arm qemu-img qemu-nbd qemu-system-aarch64
qemu-edid qemu-io qemu-pr-helper qemu-system-arm

./o-ocd.sh
./o-ocd.sh: line 2: openocd: command not found
export PATH="$HOME/.pyenv/bin:$HOME/local/openocd/bin:$HOME/qemu-6.2.0-rpios/bin:$PATH"
export PICO_SDK_PATH=/home/devel/sdk/pico-sdk
~~export PATH="$HOME/.pyenv/bin:$PATH"~~
eval "$(pyenv init --path)"
eval "$(pyenv virtualenv-init -)"

mkdir sdk

cd sdk

This is when the repo is yours.
git clone git@github.com:develone/pico-sdk.git
With this you can not push changes.
git clone https://github.com/develone/pico-sdk.git

cd pico-sdk/
git submodule update --init
Submodule 'lib/cyw43-driver' (https://github.com/georgerobotics/cyw43-driver.git) registered for path 'lib/cyw43-driver'
Submodule 'lib/lwip' (https://github.com/lwip-tcpip/lwip.git) registered for path 'lib/lwip'
Submodule 'tinyusb' (https://github.com/hathach/tinyusb.git) registered for path 'lib/tinyusb'
Cloning into '/home/devel/sdk/pico-sdk/lib/cyw43-driver'...
Cloning into '/home/devel/sdk/pico-sdk/lib/lwip'...
Cloning into '/home/devel/sdk/pico-sdk/lib/tinyusb'...
Submodule path 'lib/cyw43-driver': checked out '195dfcc10bb6f379e3dea45147590db2203d3c7b'
Submodule path 'lib/lwip': checked out '239918ccc173cb2c2a62f41a40fd893f57faf1d6'
Submodule path 'lib/tinyusb': checked out '4bfab30c02279a0530e1a56f4a7c539f2d35a293'

cd ../../

This is when the repo is yours.
git clone git@github.com:develone/devel-pico-tflmicro.git
git clone https://github.com/develone/devel-pico-tflmicro.git
cd devel-pico-tflmicro
mkdir build
cd build
cmake -DPICO_BOARD=pico .. about 4 hours
Using PICO_SDK_PATH from environment ('/home/devel/sdk/pico-sdk')
PICO_SDK_PATH is /home/devel/sdk/pico-sdk
Defaulting PICO_PLATFORM to rp2040 since not specified.
Defaulting PICO platform compiler to pico_arm_gcc since not specified.
-- Defaulting build type to 'Release' since not specified.
PICO compiler is pico_arm_gcc
-- The C compiler identification is GNU 8.3.1

-- The CXX compiler identification is GNU 8.3.1
-- The ASM compiler identification is GNU
-- Found assembler: /usr/bin/arm-none-eabi-gcc
Build type is Release
PICO target board is pico.
Using board configuration from /home/devel/sdk/pico-sdk/src/boards/include/boards/pico.h
-- Found Python3: /usr/bin/python3.9 (found version "3.9.2") found components: Interpreter
TinyUSB available at /home/devel/sdk/pico-sdk/lib/tinyusb/src/portable/raspberrypi/rp2040; enabling build support for USB.
cyw43-driver available at /home/devel/sdk/pico-sdk/lib/cyw43-driver
lwIP available at /home/devel/sdk/pico-sdk/lib/lwip
-- Configuring done
-- Generating done
-- Build files have been written to: /home/devel/devel-pico-tflmicro/build
make this will take about 4 hours

-rw-r--r-- 1 devel devel 1788264 Oct 25 22:10 libpico-tflmicro.a
-rw-r--r-- 1 devel devel 234456 Oct 25 21:46 libpico-tflmicro_test.a

./pico-sdk/src/rp2_common/boot_stage2/bs2_default.elf
./examples/micro_speech/command_responder_test.elf
./examples/micro_speech/audio_provider_mock_test.elf
./examples/micro_speech/audio_provider_test.elf
./examples/micro_speech/recognize_commands_test.elf
./examples/magic_wand/magic_wand.elf
./examples/magic_wand/gesture_output_handler_test.elf
./examples/magic_wand/magic_wand_test.elf
./examples/magic_wand/gesture_predictor_test.elf
./examples/hello_world/hello_world.elf

This is when the repo is yours.
git clone git@github.com:develone/my-projects-docs.git
git clone https://github.com/develone/my-projects-docs.git

This project uses cmake Important to understand cmake the source code is 1 level above build.

This is when the repo is yours.
git clone https://github.com/develone/pico-examples -b dev
cd pico-examples
mkdir build

This is when the repo is yours. -b dev is branch dev
git clone --recursive git@github.com:develone/rp2040-freertos-project.git -b dev
git clone --recursive https://github.com/develone/rp2040-freertos-project.git -b dev
cd rp2040-freertos-project/
mkdir build
cd build

cmake -DPICO_BOARD=pico ..
Using PICO_SDK_PATH from environment ('/home/devel/sdk/pico-sdk')
PICO_SDK_PATH is /home/devel/sdk/pico-sdk

Defaulting PICO_PLATFORM to rp2040 since not specified.
Defaulting PICO platform compiler to pico_arm_gcc since not specified.
-- Defaulting build type to 'Release' since not specified.
PICO compiler is pico_arm_gcc
-- The C compiler identification is GNU 8.3.1
-- The CXX compiler identification is GNU 8.3.1
-- The ASM compiler identification is GNU
-- Found assembler: /usr/bin/arm-none-eabi-gcc
Build type is Release
PICO target board is pico.
Using board configuration from /home/devel/sdk/pico-sdk/src/boards/include/boards/pico.h
-- Found Python3: /home/devel/test-1-2.8/env/bin/python3.9 (found version "3.9.2") found components: Interpreter
TinyUSB available at /home/devel/sdk/pico-sdk/lib/tinyusb/src/portable/raspberrypi/rp2040; enabling build support for USB.
cyw43-driver available at /home/devel/sdk/pico-sdk/lib/cyw43-driver
lwIP available at /home/devel/sdk/pico-sdk/lib/lwip
-- Configuring done
-- Generating done
-- Build files have been written to: /home/devel/rp2040-freertos-project/build
make

The elf files a loaded with openocd
. ~/Ultibo/picoultibo.sh
this program a file system performs either klt or dwt lifting step,

openocd -f interface/raspberrypi-swd.cfg -f target/rp2040.cfg -c "program test-read-crc16/test-read-crc16.elf verify reset exit"
ls ../doc lots of documentation
ls ../doc/rp2040-logic-analyzer/rp2040-logic-analyzer.pdf
qpdfview ../doc/rp2040-logic-analyzer/rp2040-logic-analyzer.pdf
./first_pwm/50_pwm.elf
./pico-lifting/pico-lifting.elf
./ultibo_blink/ultibo_blink.elf
./rp2040-logic-analyzer/rp2040-logic-analyzer.elf
./Scheduling/Scheduling.elf
./pico-sdk/src/rp2_common/boot_stage2/bs2_default.elf
./pico-littlefs/e-rw-r--r-- 1 devel devel 1788264 Oct 25 22:10 libpico-tflmicro.a
-rw-r--r-- 1 devel devel 234456 Oct 25 21:46 libpico-tflmicro_test.axample0.elf
./pico-littlefs/example2.elf
./pico-littlefs/example1.elf
./pico-ultibo/pico-ultibo.elf
./test-read/test-read.elf
./ProjectFiles/blink.elf
./kltdwt-ultibo/kltdwt-ultibo.elf
./2tasks/2tasks.elf
./2cores/multicore.elf
./pico-lifting-sf/hello_usb.elf
./test-read-crc16/test-read-crc16.elf
./Mutex/Mutex.elf
./HCSR04/HCSR04.elf
./Semaphore/Semaphore.elf

./klt-test/klt-test.elf

This needed for octave

.octaverc
graphics_toolkit("gnuplot");

https://github.com/develone/svd_rgb.git
cd svd_rgb/src/
devel@pi4-37:~/svd_rgb/src $ make
gcc -c -o obj/svd.o svd.c -I../include
gcc -c -o obj/disp_mat.o disp_mat.c -I../include
gcc -c -o obj/mul_mat.o mul_mat.c -I../include
gcc -c -o obj/pnmio.o pnmio.c -I../include
gcc -c -o obj/error.o error.c -I../include
gcc -c -o obj/mythread.o mythread.c -I../include
gcc -c -o obj/trans_mat.o trans_mat.c -I../include
gcc -c -o obj/master.o master.c -I../include
gcc -o master obj/svd.o obj/disp_mat.o obj/mul_mat.o obj/pnmio.o obj/error.o obj/mythread.o obj/trans_mat.o obj/master.o -I../include -lm -lpthread

./master

octave
In a 2nd shell
scrot -d 3 -s redpgm.png

scrot -d 3 -s rcblu.png

scrot -d 3 -s rcblu-1.png

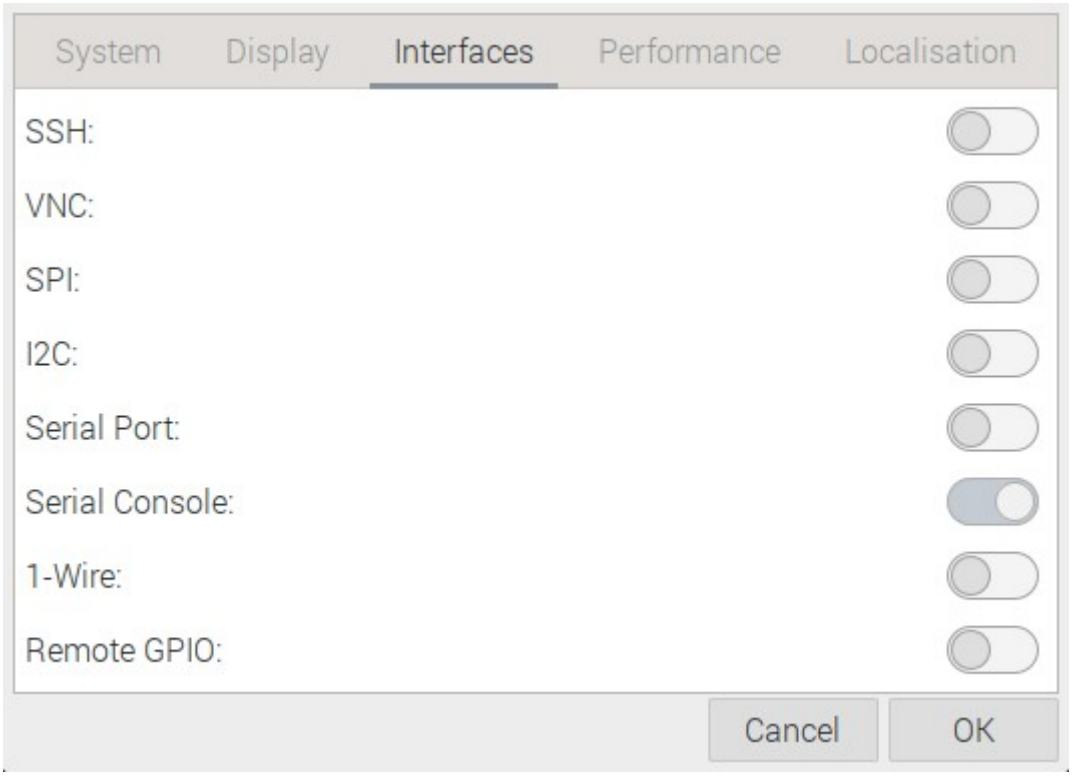
quit

git clone https://github.com/ArduCAM/pico-tflmicro.git
Cloning into 'pico-tflmicro'...
remote: Enumerating objects: 1812, done.
remote: Counting objects: 100% (106/106), done.
remote: Compressing objects: 100% (47/47), done.
remote: Total 1812 (delta 73), reused 59 (delta 59), pack-reused 1706
Receiving objects: 100% (1812/1812), 13.92 MiB | 14.64 MiB/s, done.
Resolving deltas: 100% (950/950), done.

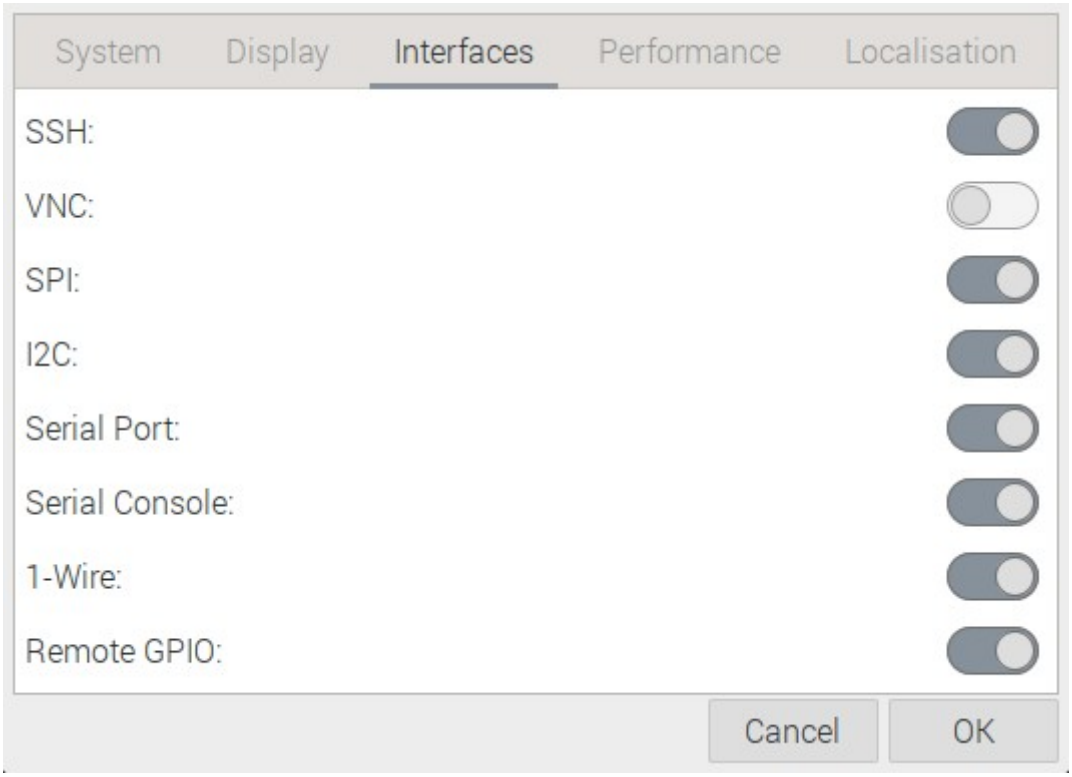
$30.00 at Amazon
devel@pi4-37:~/pico-tflmicro/bin

magic_wand_ble.uf2 person_detection_benchmark.uf2 pico4ml_ble_magic_wand.uf2
micro_speech.uf2   person_detection_int8.uf2   pico4ml_magic_wand.uf2

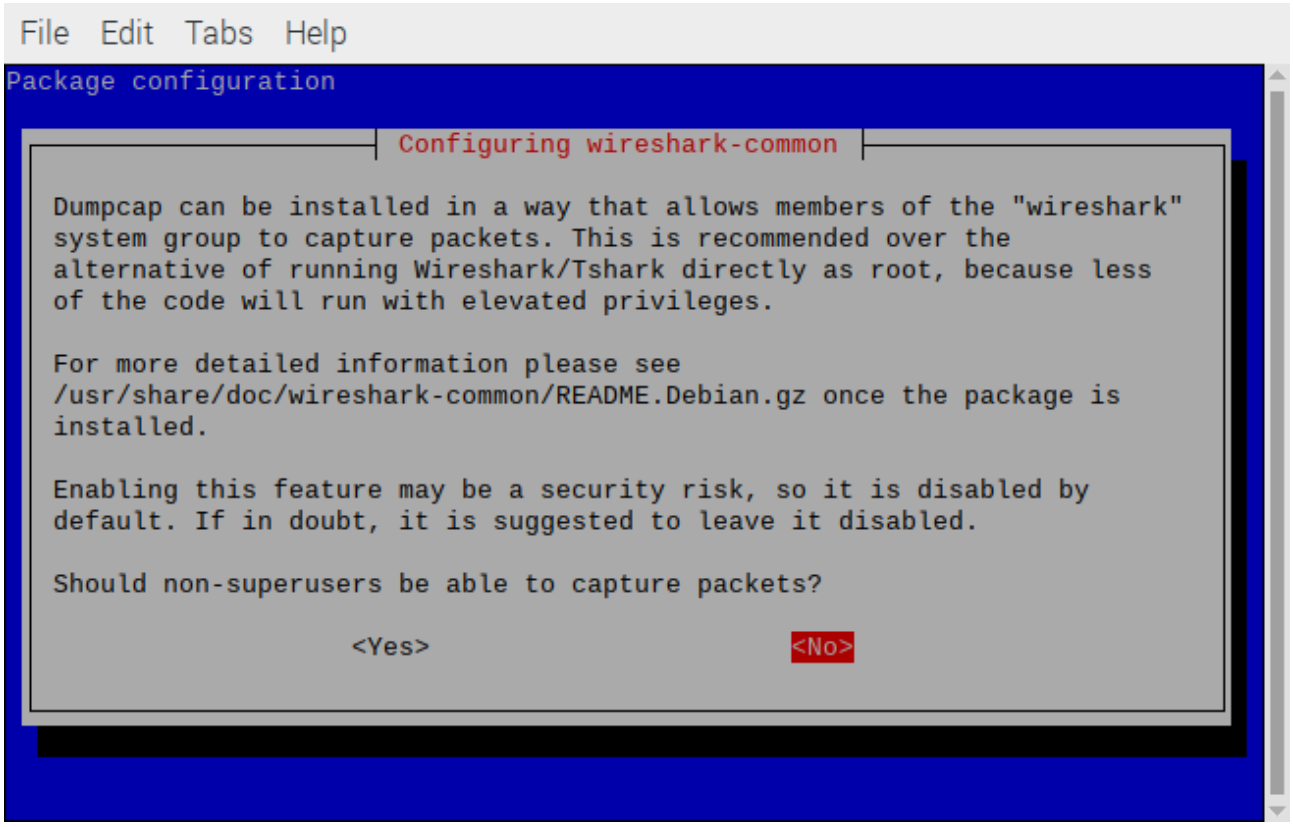
Setting up the interfaces



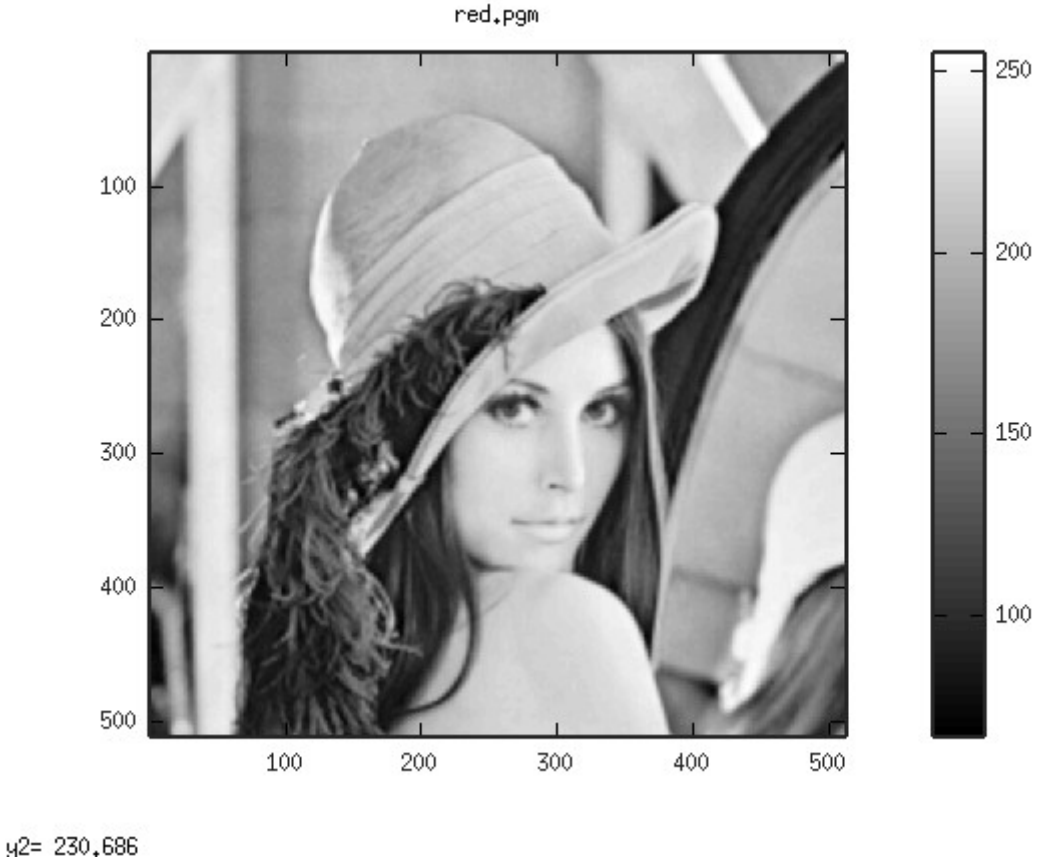
Setting up the interfaces



When installing

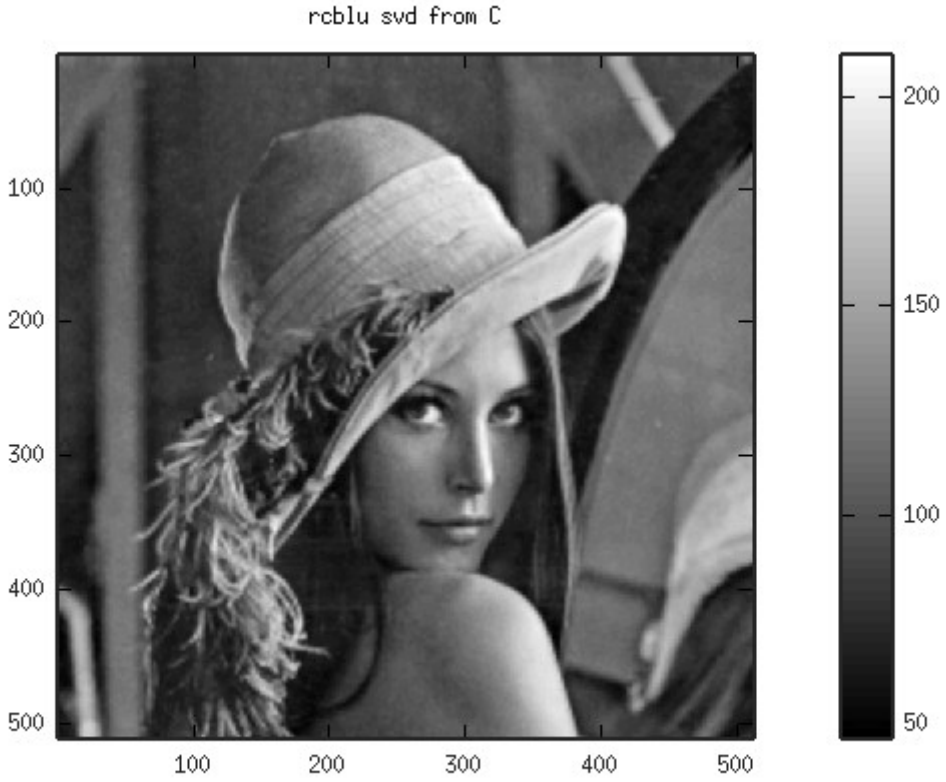


svd_rgb



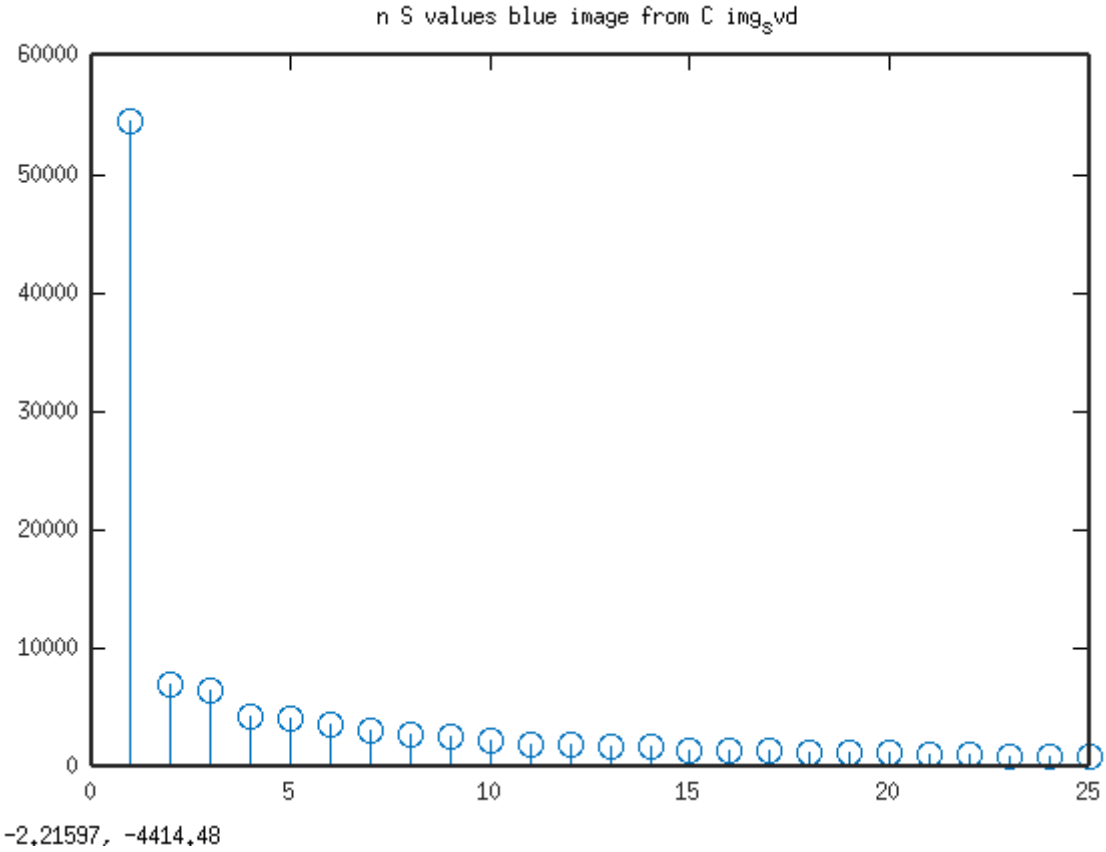
y2= 230.686

reconstruted



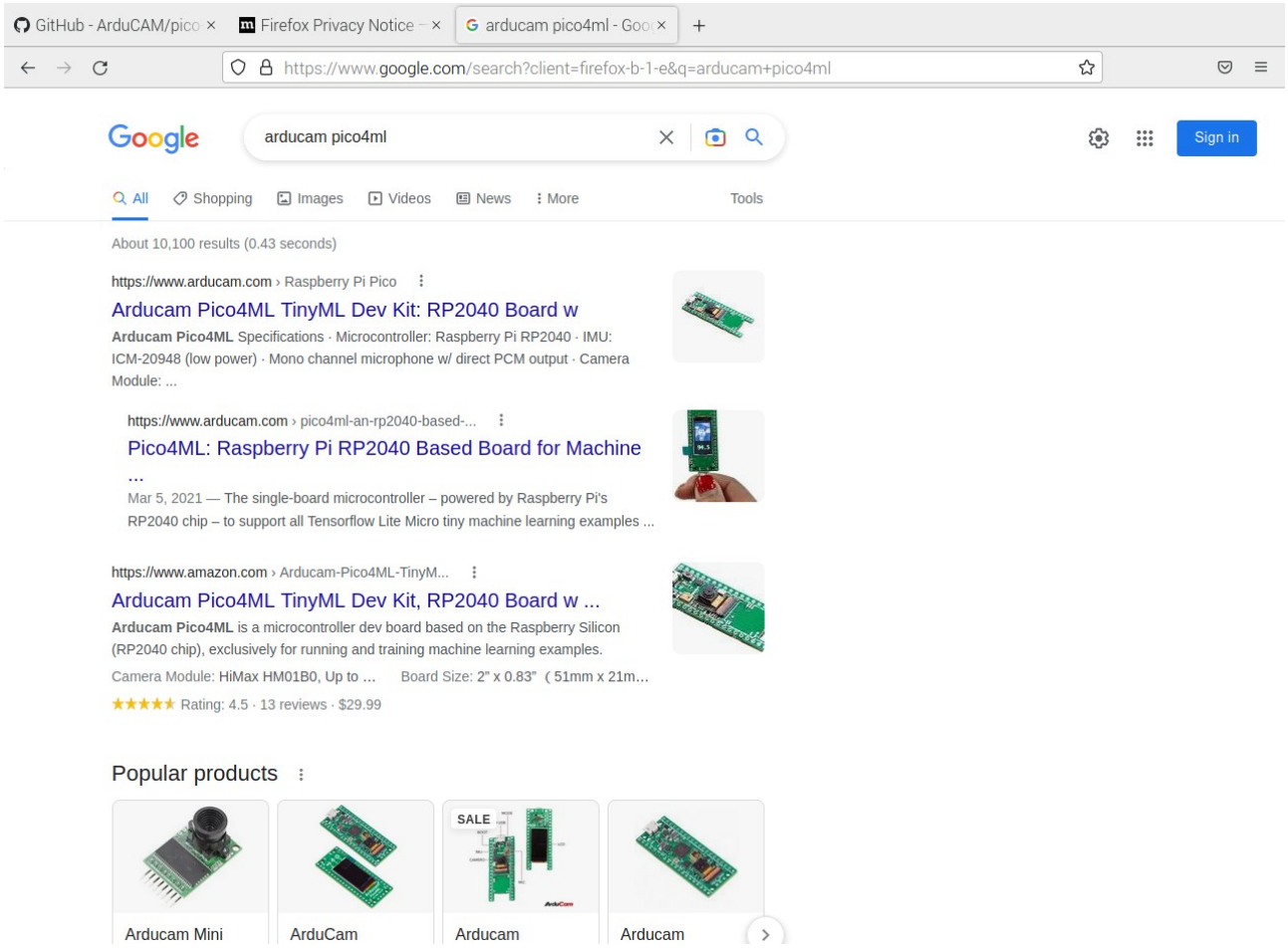
y2= 23.8538

svd

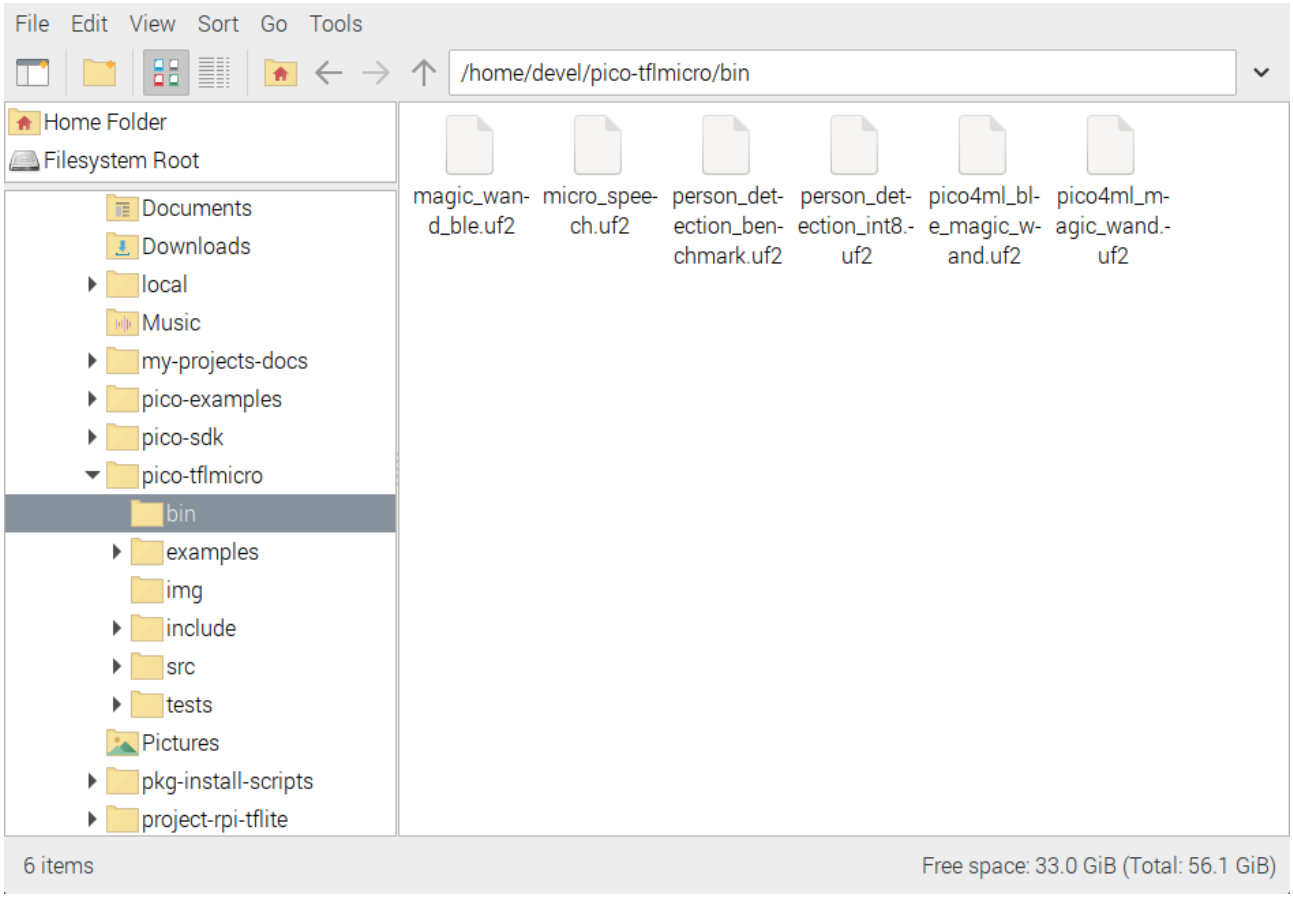


-2.21597, -4414.48

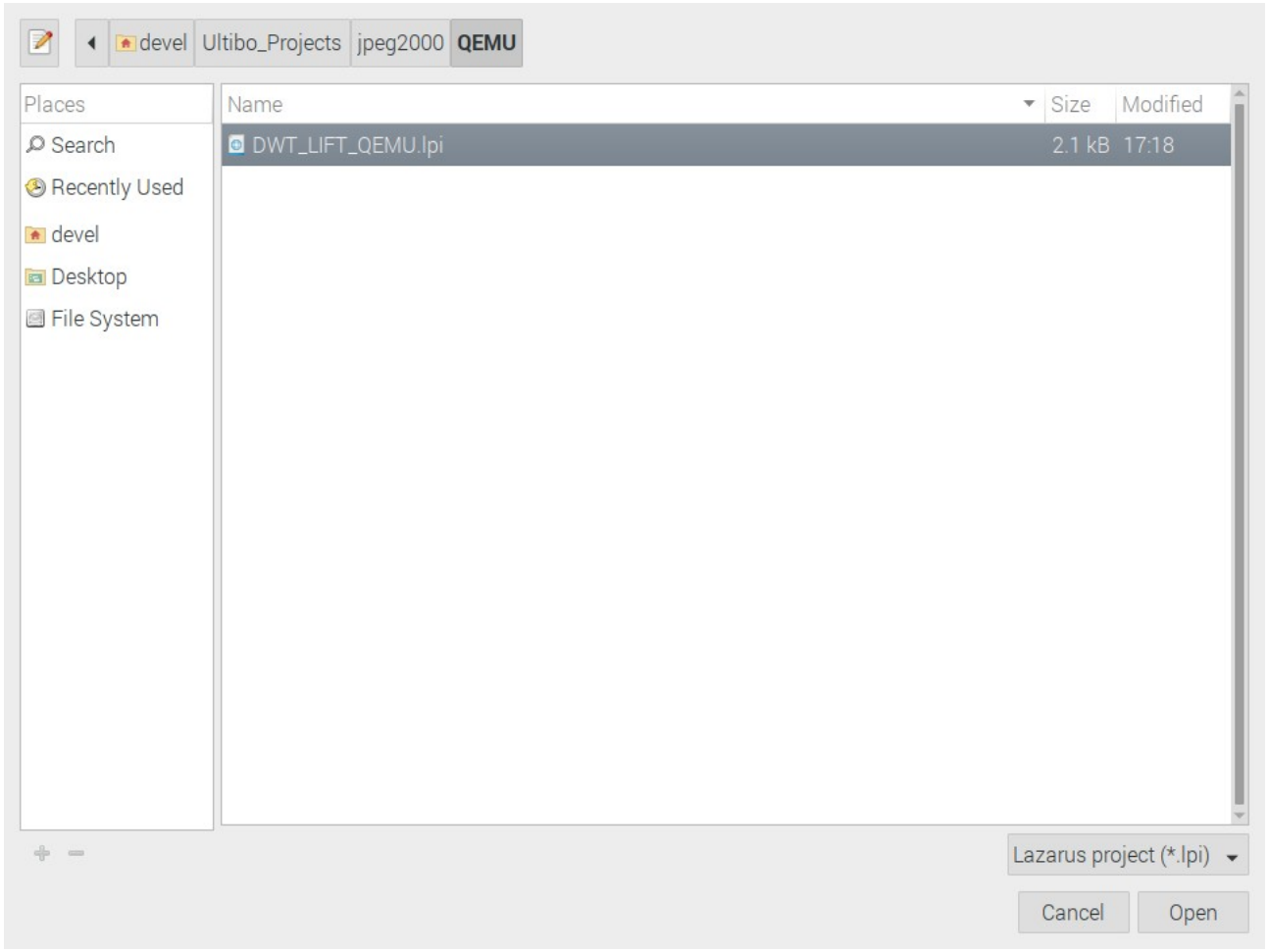
Arducam PicoML


GitHub - ArduCAM/pico
Firefox Privacy Notice
arducam pico4ml - Goo
https://www.google.com/search?client=firefox-b-1-e&q=arducam+pico4ml
Google
arducam pico4ml
Sign in
All
Shopping
Images
Videos
News
More
Tools
About 10,100 results (0.43 seconds)
https://www.arducam.com › Raspberry Pi Pico
Arducam Pico4ML TinyML Dev Kit: RP2040 Board w
Arducam Pico4ML Specifications · Microcontroller: Raspberry Pi RP2040 · IMU: ICM-20948 (low power) · Mono channel microphone w/ direct PCM output · Camera Module: ...
https://www.arducam.com › pico4ml-an-rp2040-based-...
Pico4ML: Raspberry Pi RP2040 Based Board for Machine ...
Mar 5, 2021 — The single-board microcontroller – powered by Raspberry Pi's RP2040 chip – to support all Tensorflow Lite Micro tiny machine learning examples ...
https://www.amazon.com › Arducam-Pico4ML-TinyM...
Arducam Pico4ML TinyML Dev Kit, RP2040 Board w ...
Arducam Pico4ML is a microcontroller dev board based on the Raspberry Silicon (RP2040 chip), exclusively for running and training machine learning examples.
Camera Module: HiMax HM01B0, Up to ...
Board Size: 2" x 0.83" (51mm x 21m...
Rating: 4.5 · 13 reviews · $29.99
Popular products
SALE
Arducam Mini
ArduCam
Arducam
Arducam

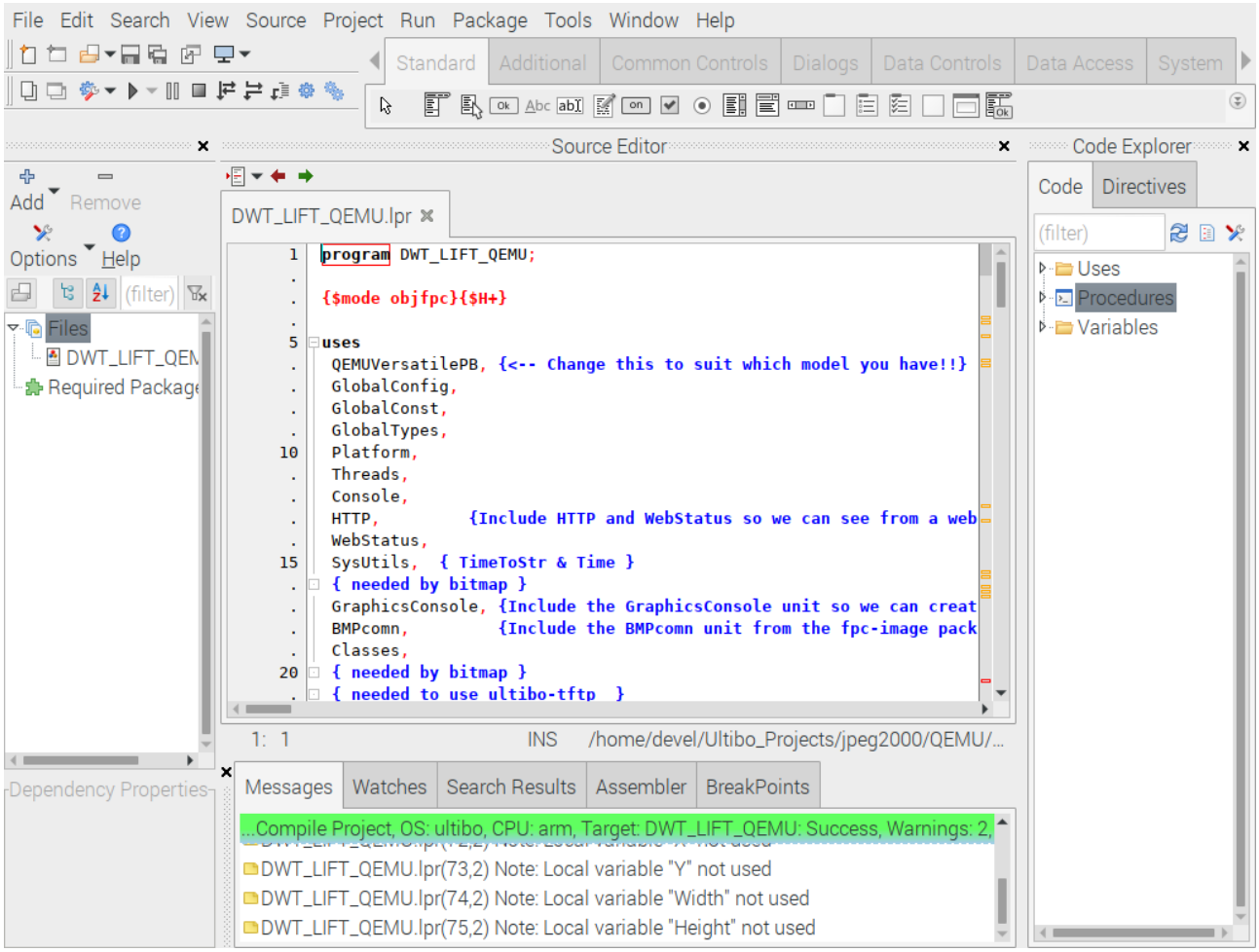
UF2


File Edit View Sort Go Tools
/home/devel/pico-tflmicro/bin
Home Folder
Filesystem Root
Documents
Downloads
local
Music
my-projects-docs
pico-examples
pico-sdk
pico-tflmicro
bin
examples
img
include
src
tests
Pictures
pkg-install-scripts
project-rpi-tflite
magic_wand_ble.uf2
micro_speech.uf2
person_detection_benchmark.uf2
person_detection_int8.uf2
pico4ml_ble_magic_wand.uf2
pico4ml_magic_wand.uf2
6 items
Free space: 33.0 GiB (Total: 56.1 GiB)

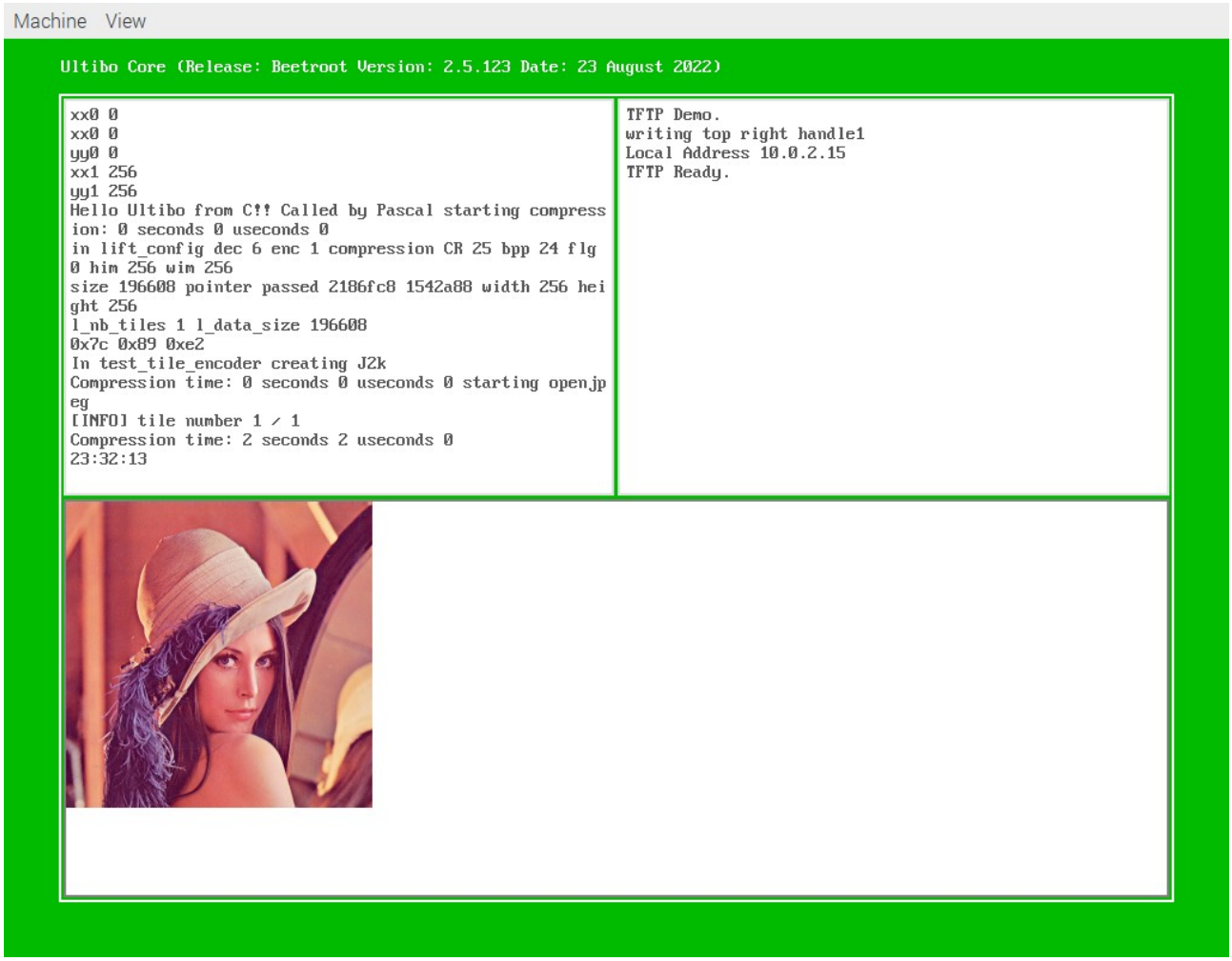
QEMU


devel
Ultibo_Projects
jpeg2000
QEMU
Places
Search
Recently Used
devel
Desktop
File System
Name
Size
Modified
DWT_LIFT_QEMU.lpi
2.1 kB
17:18
Lazarus project (*.lpi)
Cancel
Open

QEMU


File Edit Search View Source Project Run Package Tools Window Help
Standard Additional Common Controls Dialogs Data Controls Data Access System
Source Editor
Code Explorer
Add Remove
Options Help
(filter)
Files
DWT_LIFT_QEM
Required Package
Dependency Properties
DWT_LIFT_QEMU.lpr
1 program DWT_LIFT_QEMU;
{$mode objfpc}{$H+}
uses
QEMUVersatilePB, {<-- Change this to suit which model you have!!}
GlobalConfig,
GlobalConst,
GlobalTypes,
Platform,
Threads,
Console,
HTTP, {Include HTTP and WebStatus so we can see from a web
WebStatus,
SysUtils, { TimeToStr & Time }
{ needed by bitmap }
GraphicsConsole, {Include the GraphicsConsole unit so we can creat
BMPcomn, {Include the BMPcomn unit from the fpc-image pack
Classes,
{ needed by bitmap }
{ needed to use ultibo-tftp }
1: 1 INS /home/devel/Ultibo_Projects/jpeg2000/QEMU/...
Messages Watches Search Results Assembler BreakPoints
...Compile Project, OS: ultibo, CPU: arm, Target: DWT_LIFT_QEMU: Success, Warnings: 2,
DWT_LIFT_QEMU.lpr(73,2) Note: Local variable "Y" not used
DWT_LIFT_QEMU.lpr(74,2) Note: Local variable "Width" not used
DWT_LIFT_QEMU.lpr(75,2) Note: Local variable "Height" not used
Code Directives
(filter)
Uses
Procedures
Variables

QEMU



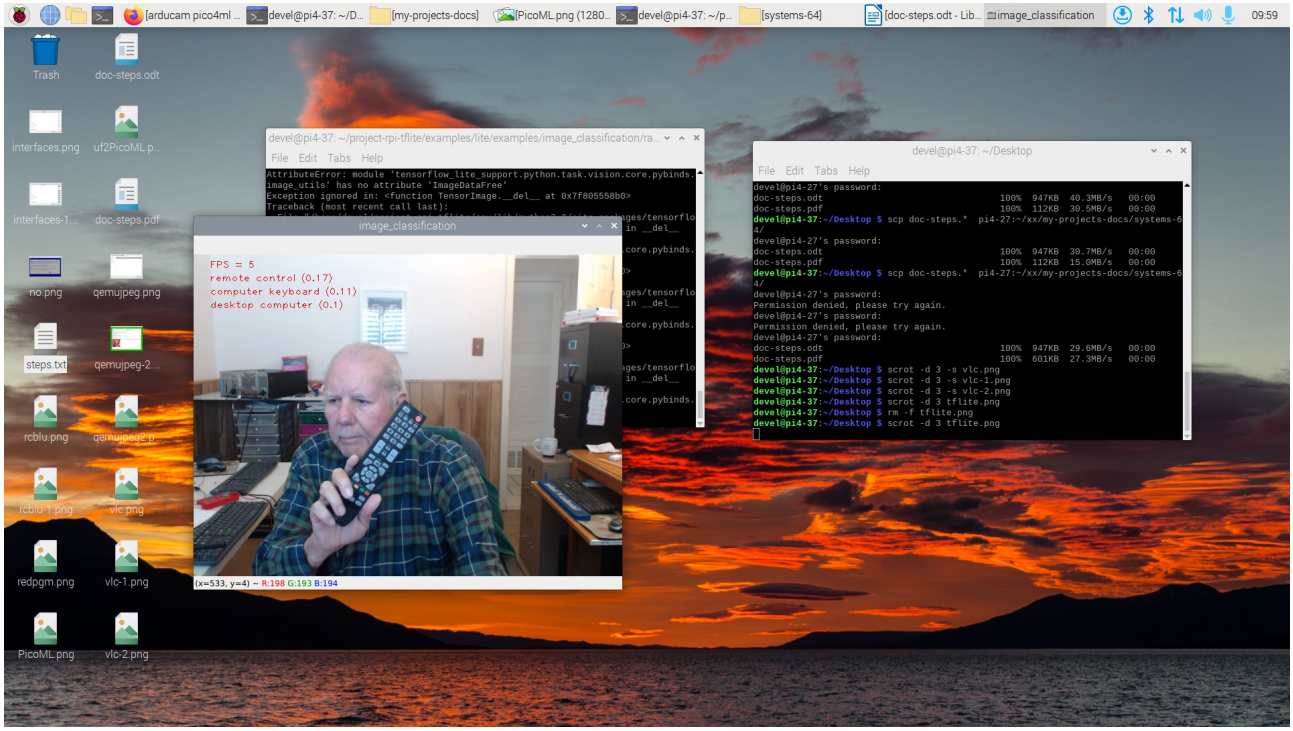
Starting here will be in an update.

cd ~/project-rpi-tflite/
python3 -m venv env
source env/bin/activate
(env) devel@pi4-37:~/project-rpi-tflite $

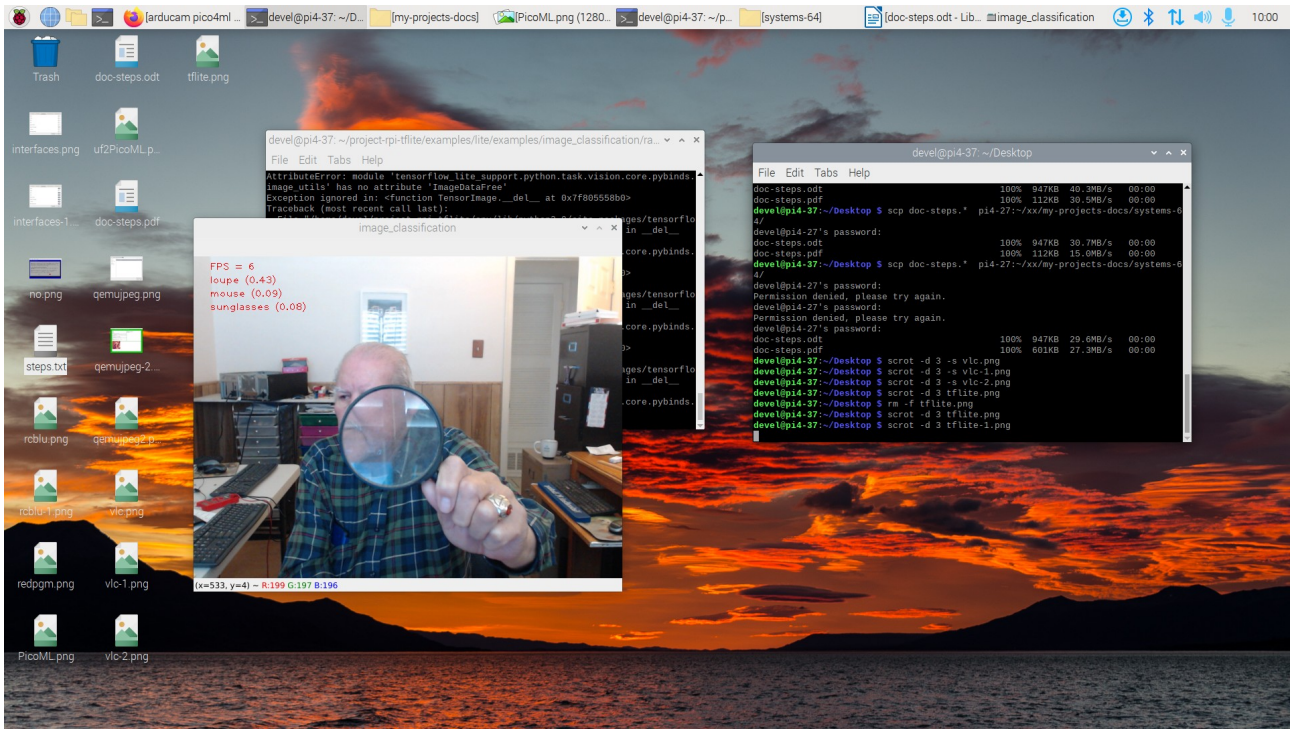
cd examples/lite/examples/image_classification/raspberry_pi/

python3 classify.py

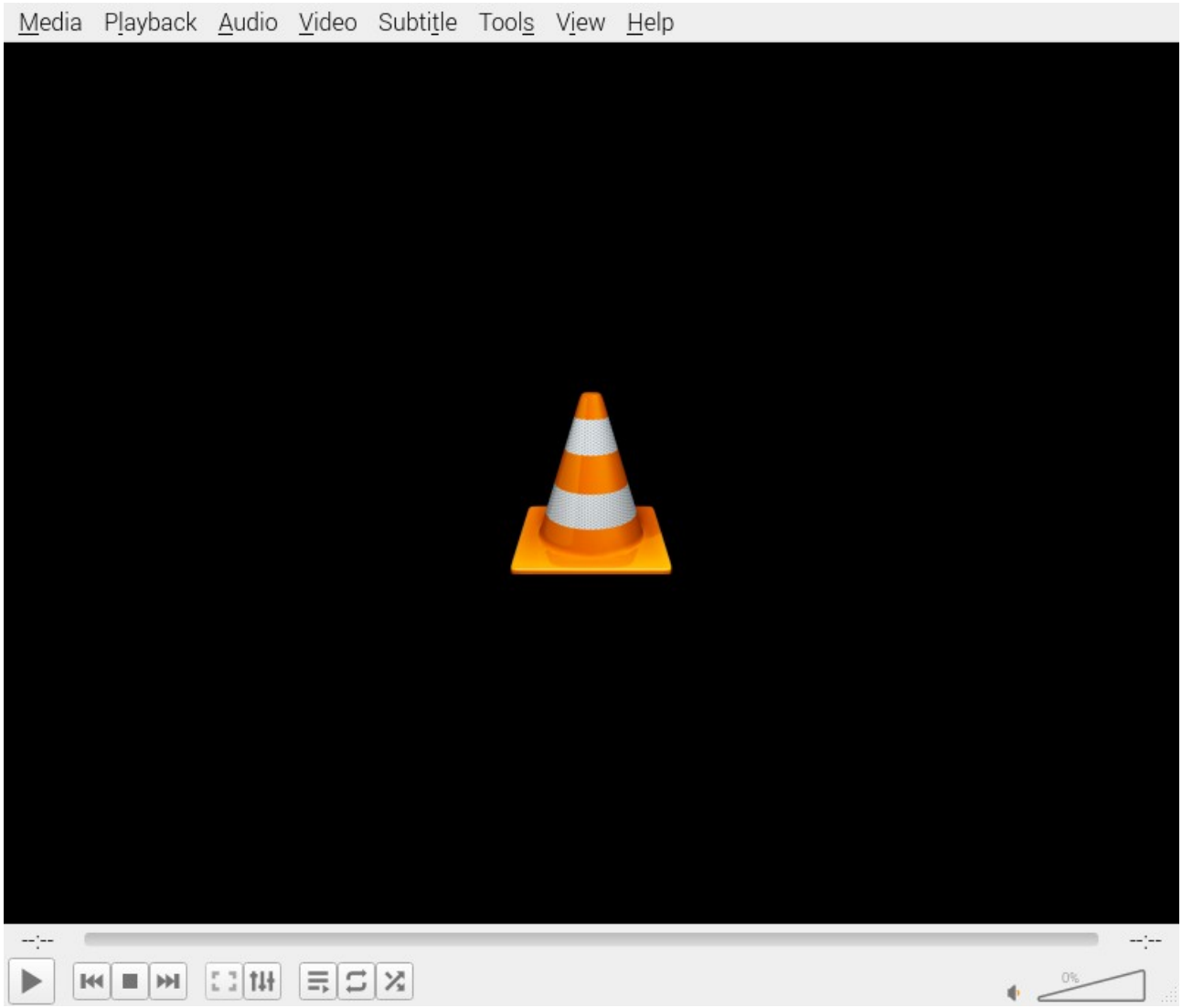
TensorFlow Lite detects remote control



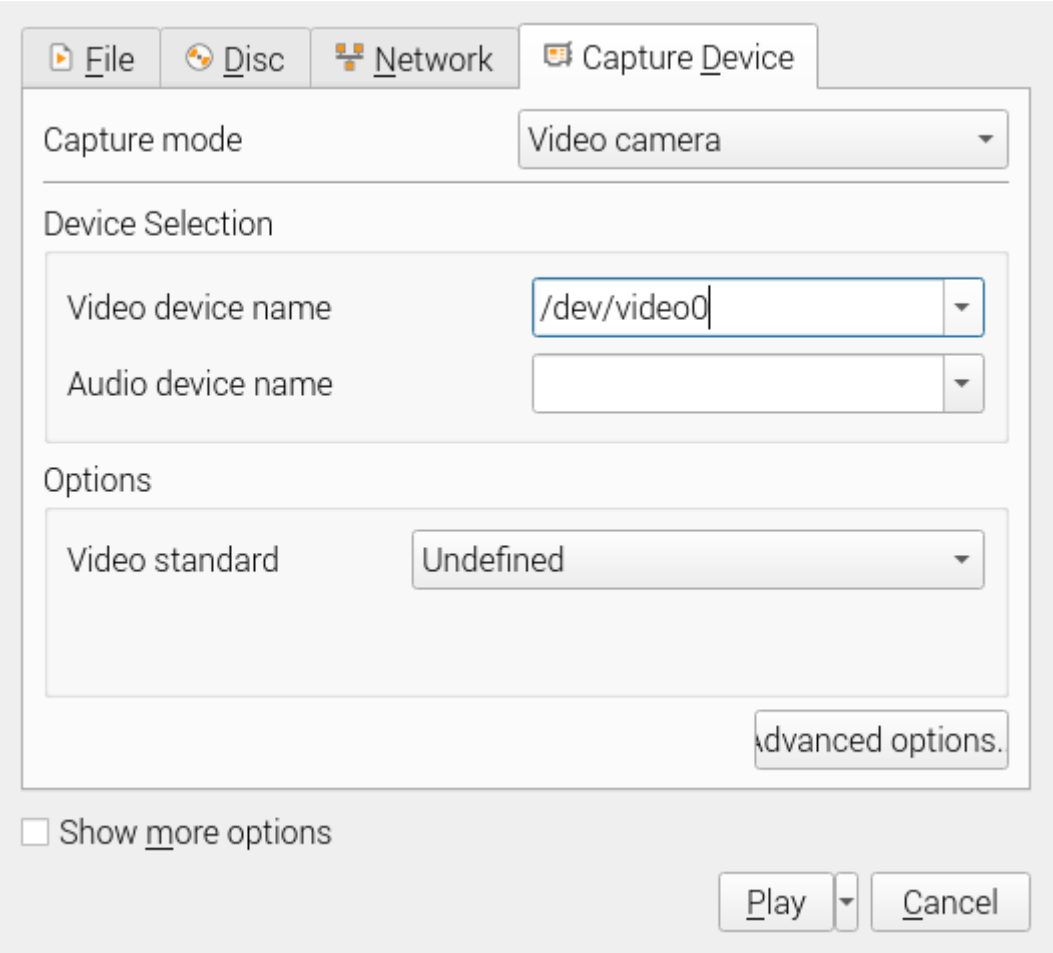
TensorfFlow Lite detects loupe



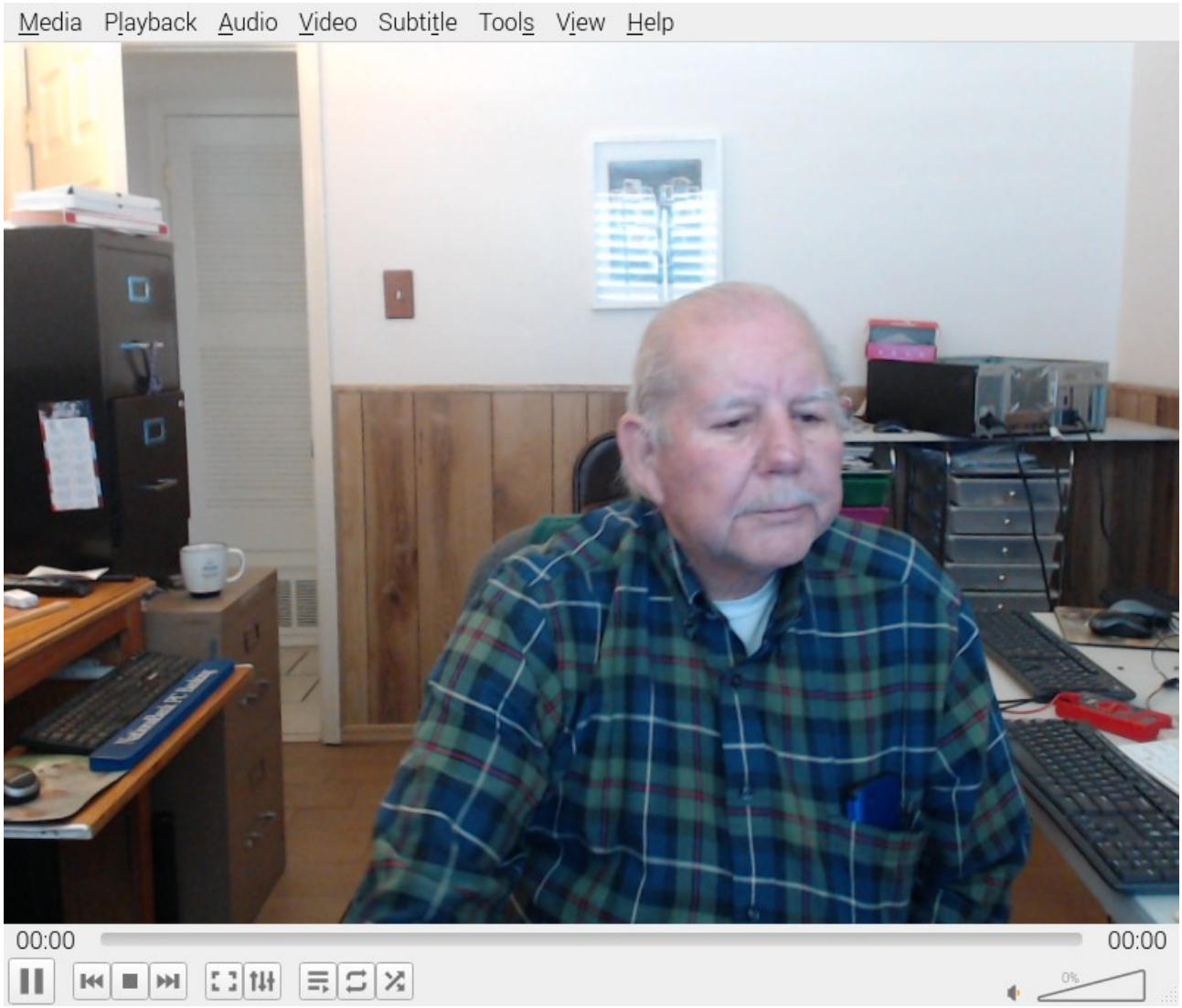
vlc & camera



selecting the video device


File
Disc
Network
Capture Device
Capture mode
Video camera
Device Selection
Video device name
/dev/video0
Audio device name
Options
Video standard
Undefined
dvanced options.
Show more options
Play
Cancel

me in my lab



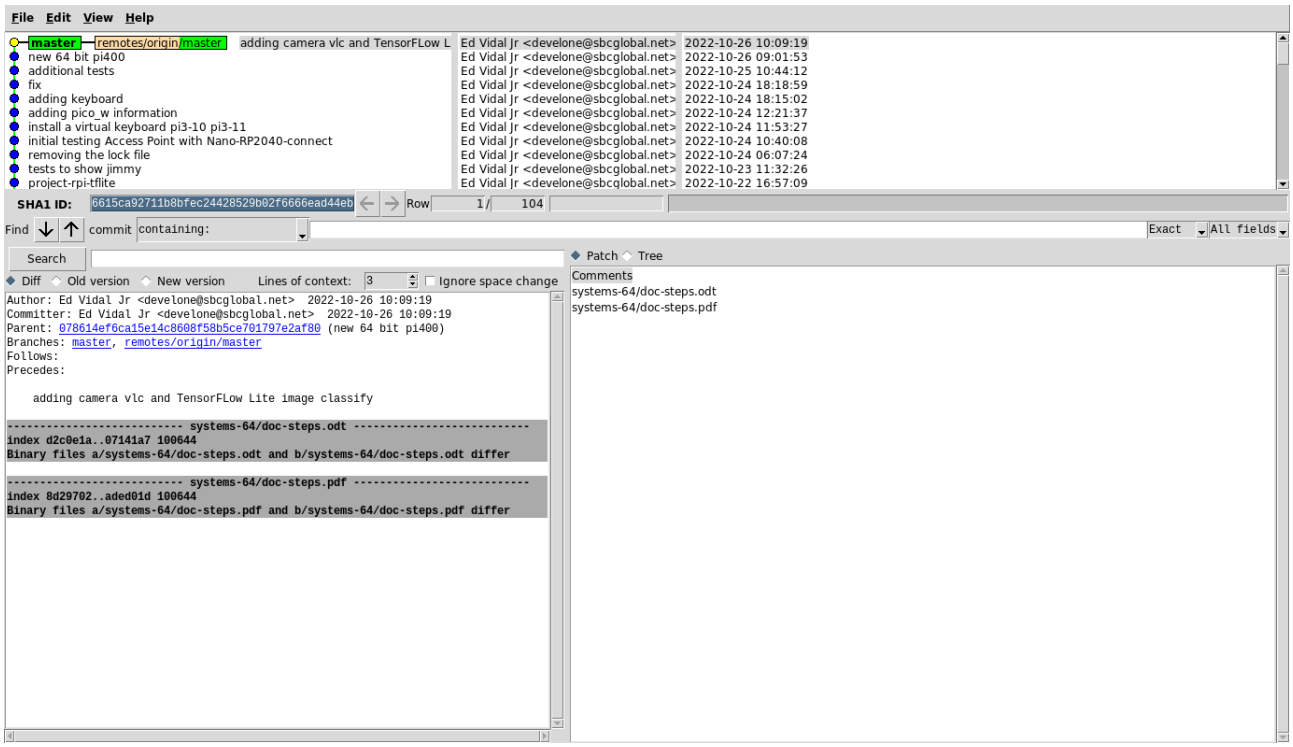
ps -ax | grep python3
xxxx pts/3   Sl+   39:15 python3 classify.py
kill -9 xxxx

version control

cd my-projects-docs/
devel@pi4-37:~/my-projects-docs $ git pull
hint: Pulling without specifying how to reconcile divergent branches is
hint: discouraged. You can squelch this message by running one of the following
hint: commands sometime before your next pull:
hint:
hint: git config pull.rebase false # merge (the default strategy)
hint: git config pull.rebase true   # rebase
hint: git config pull.ff only   # fast-forward only
hint:
hint: You can replace "git config" with "git config --global" to set a default
hint: preference for all repositories. You can also pass --rebase, --no-rebase,

hint: or --ff-only on the command line to override the configured default per
hint: invocation.
remote: Enumerating objects: 9, done.
remote: Counting objects: 100% (9/9), done.
remote: Compressing objects: 100% (3/3), done.
remote: Total 5 (delta 2), reused 5 (delta 2), pack-reused 0
Unpacking objects: 100% (5/5), 7.61 MiB | 4.31 MiB/s, done.
From https://github.com/develone/my-projects-docs
   078614e..6615ca9 master   -> origin/master
Updating 078614e..6615ca9
Fast-forward
 systems-64/doc-steps.odt | Bin 969808 -> 6580211 bytes
 systems-64/doc-steps.pdf | Bin 615076 -> 1634728 bytes
 2 files changed, 0 insertions(+), 0 deletions(-)
devel@pi4-37:~/my-projects-docs $ diff systems-64/doc-steps.odt ~/Desktop/doc-steps.odt
devel@pi4-37:~/my-projects-docs $ diff systems-64/doc-steps.pdf ~/Desktop/doc-steps.pdf
devel@pi4-37:~/my-projects-docs $ gitk &
[1] 8231

gitk &



git log
commit 6615ca92711b8bfec24428529b02f6666ead44eb (HEAD -> master, origin/master, origin/HEAD)
Author: Ed Vidal Jr <develone@sbcglobal.net>
Date: Wed Oct 26 10:09:19 2022 -0600

    adding camera vlc and TensorFLow Lite image classify

commit 078614ef6ca15e14c8608f58b5ce701797e2af80

Author: Ed Vidal Jr <develone@sbcglobal.net>
Date: Wed Oct 26 09:01:53 2022 -0600

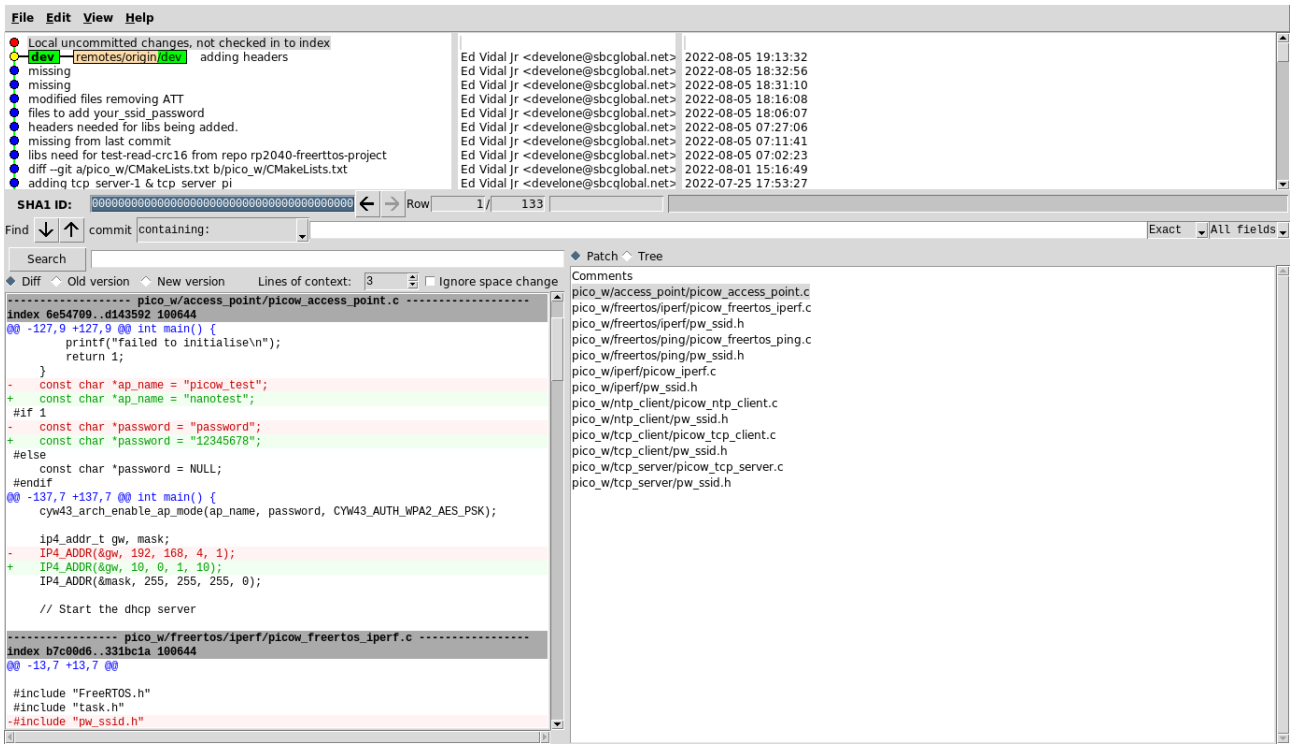
    new 64 bit pi400

commit 35f6add124a7fe0aac9fb65c697459f3b0dce72c
Author: Ed Vidal Jr <develone@sbcglobal.net>
Date: Tue Oct 25 10:44:12 2022 -0600

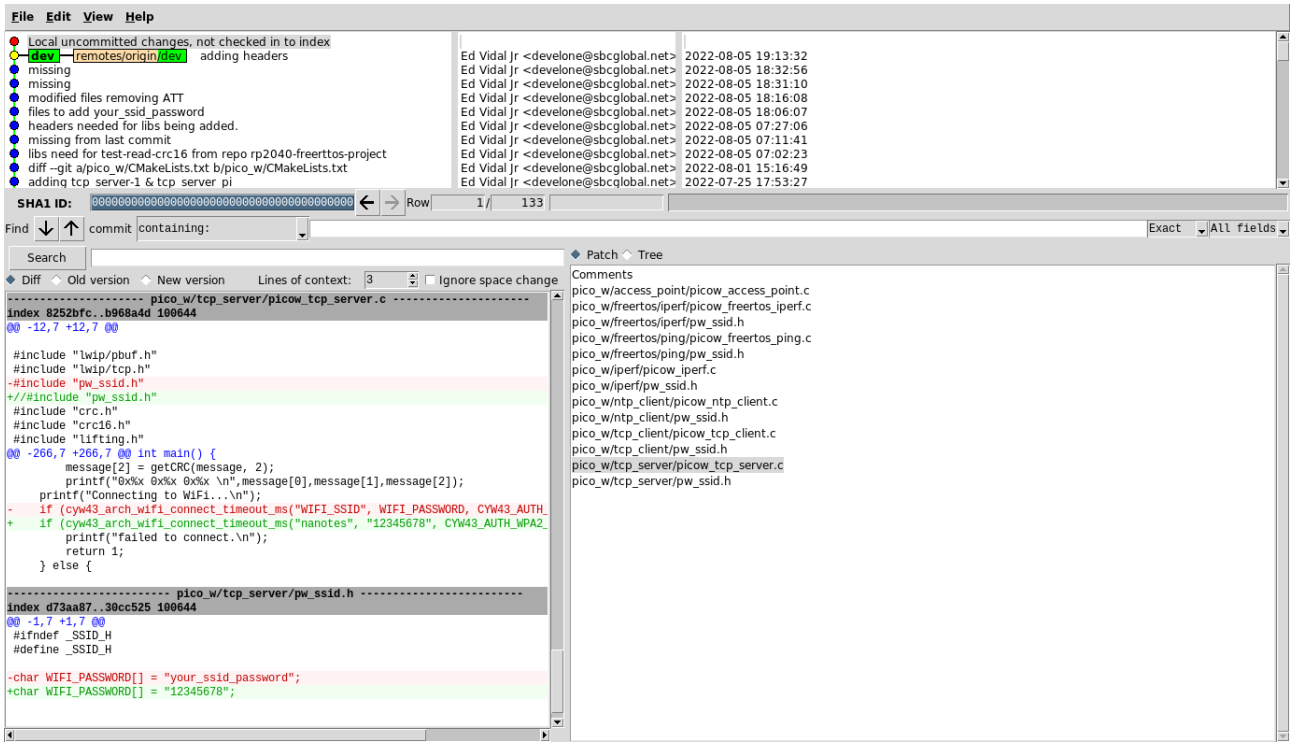
    additional tests

commit f4b4834fb04e78d8cdda68075eb286c9d854c9e4
Author: Ed Vidal Jr <develone@sbcglobal.net>
Date: Mon Oct 24 18:18:59 2022 -0600

mkdir pi4-28
mkdir pi4-35
cd pi4-28
git clone https://github.com/develone/pico-examples.git -b dev
cd pico-examples/
mkdir build
cd build
gitk &



tcp-server

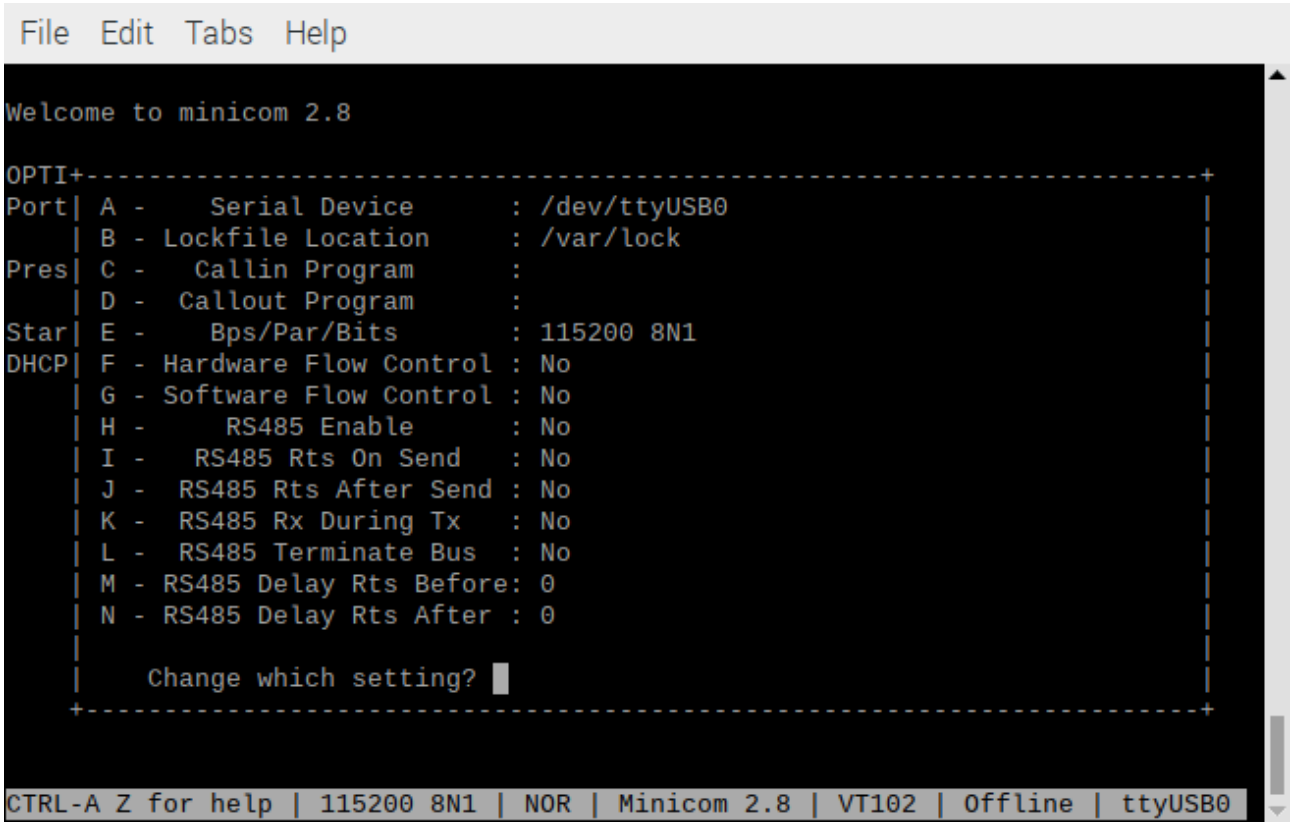


cmake -DPICO_BOARD=pico_w -DTEST_TCP_SERVER_IP="10.0.1.13" -DWIFI_SSID="nanotest" -DWIFI_PASSWORD="12345678" ..
Using PICO_SDK_PATH from environment ('/home/devel/sdk/pico-sdk')
PICO_SDK_PATH is /home/devel/sdk/pico-sdk
Defaulting PICO_PLATFORM to rp2040 since not specified.
Defaulting PICO platform compiler to pico_arm_gcc since not specified.
-- Defaulting build type to 'Release' since not specified.
PICO compiler is pico_arm_gcc
-- The C compiler identification is GNU 8.3.1
-- The CXX compiler identification is GNU 8.3.1
-- The ASM compiler identification is GNU
-- Found assembler: /usr/bin/arm-none-eabi-gcc
Build type is Release
PICO target board is pico_w.
Using CMake board configuration from /home/devel/sdk/pico-sdk/src/boards/pico_w.cmake
Using board configuration from /home/devel/sdk/pico-sdk/src/boards/include/boards/pico_w.h
-- Found Python3: /usr/bin/python3.9 (found version "3.9.2") found components: Interpreter
TinyUSB available at /home/devel/sdk/pico-sdk/lib/tinyusb/src/portable/raspberrypi/rp2040; enabling build support for USB.
cyw43-driver available at /home/devel/sdk/pico-sdk/lib/cyw43-driver
lwIP available at /home/devel/sdk/pico-sdk/lib/lwip
Enabling build support for Pico W wireless.
Skipping Pico W FreeRTOS examples as FREERTOS_KERNEL_PATH not defined
-- Configuring done
-- Generating done
-- Build files have been written to: /home/devel/pi4-28/pico-examples/build

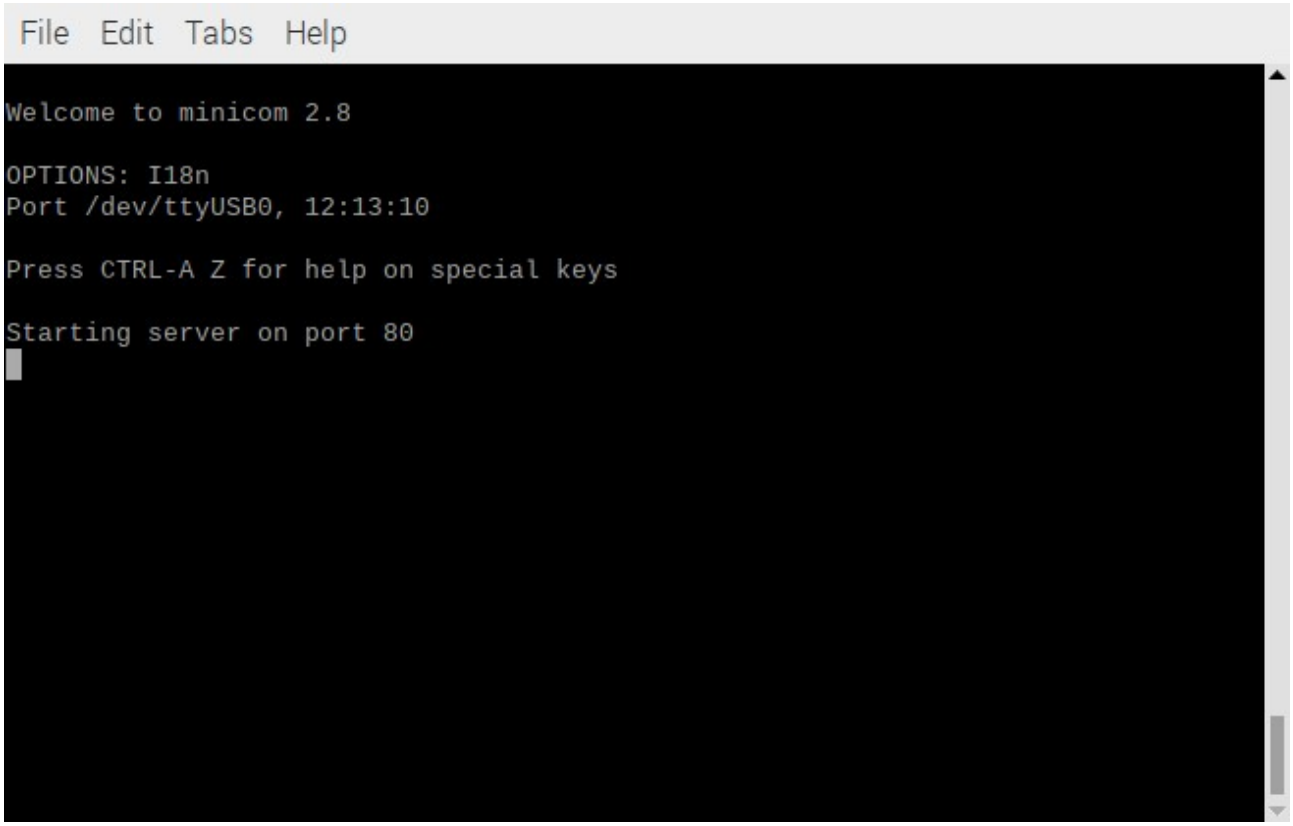
make

programmed a pico_w wtth the file /home/devel/pi4-28/pico-examples/build/pico_w/access_point/picow_access_point_poll.uf2

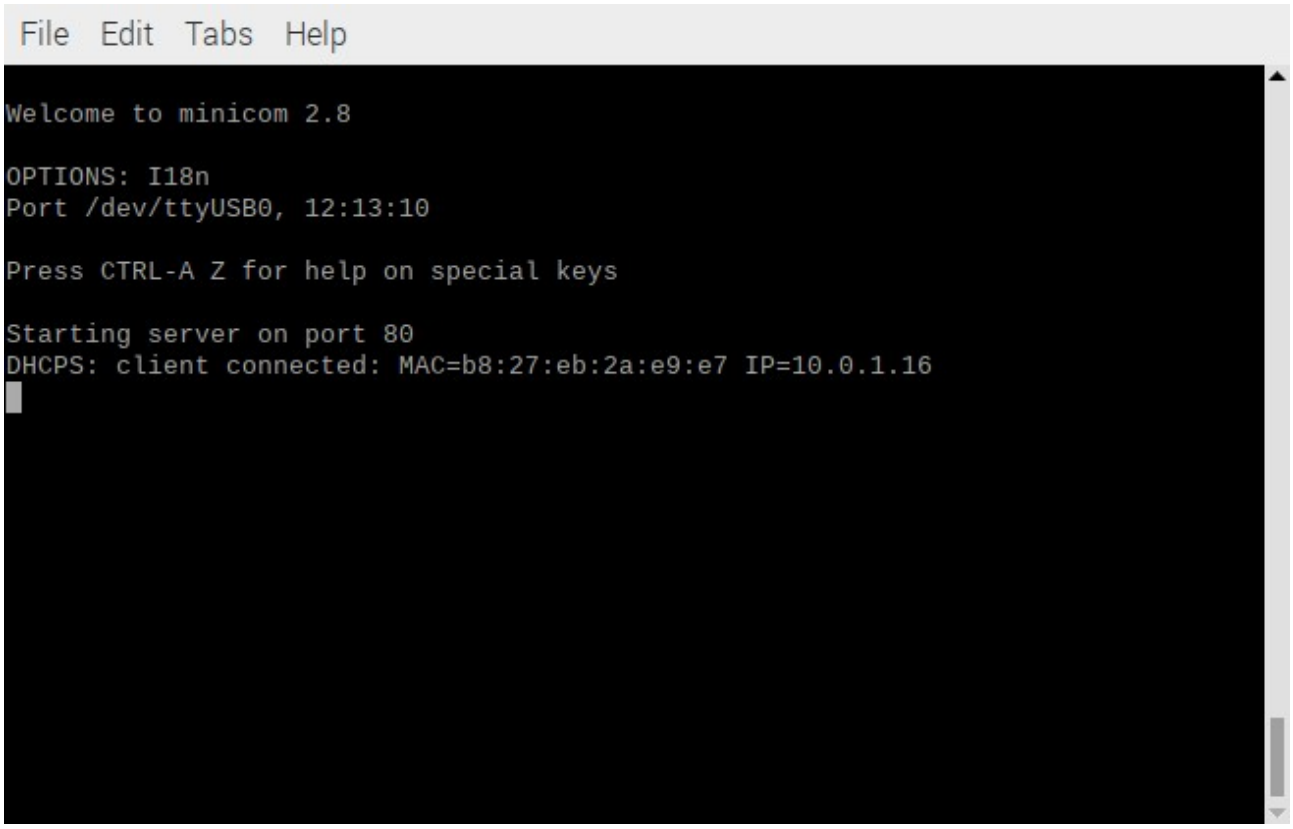
minicom myusb0
This setup on /dev/ttyUSB0



xx



This is when the remote pi3-11 is powered up



cd pi4-35

This is for creating the 2nd pico_w solftware.

rsync -avl ../pi4-28/pico-examples .

cd pico-examples

rm -rf build

mkdir build

cd build

cmake -DPICO_BOARD=pico_w -DTEST_TCP_SERVER_IP="10.0.1.14" -DWIFI_SSID="nanotest" -DWIFI_PASSWORD="12345678" ..

make

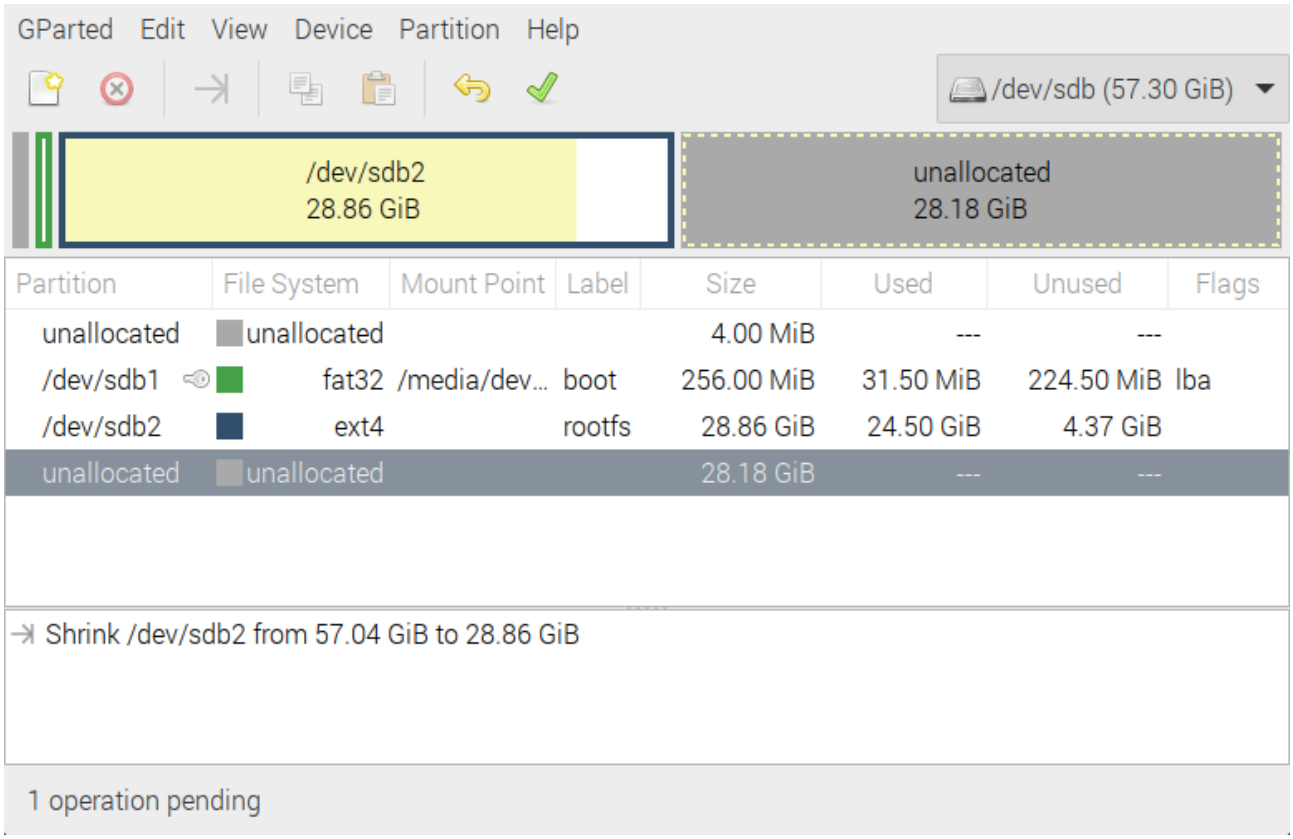
making a backup of the system

Mount the 64 Gb USB on another system.

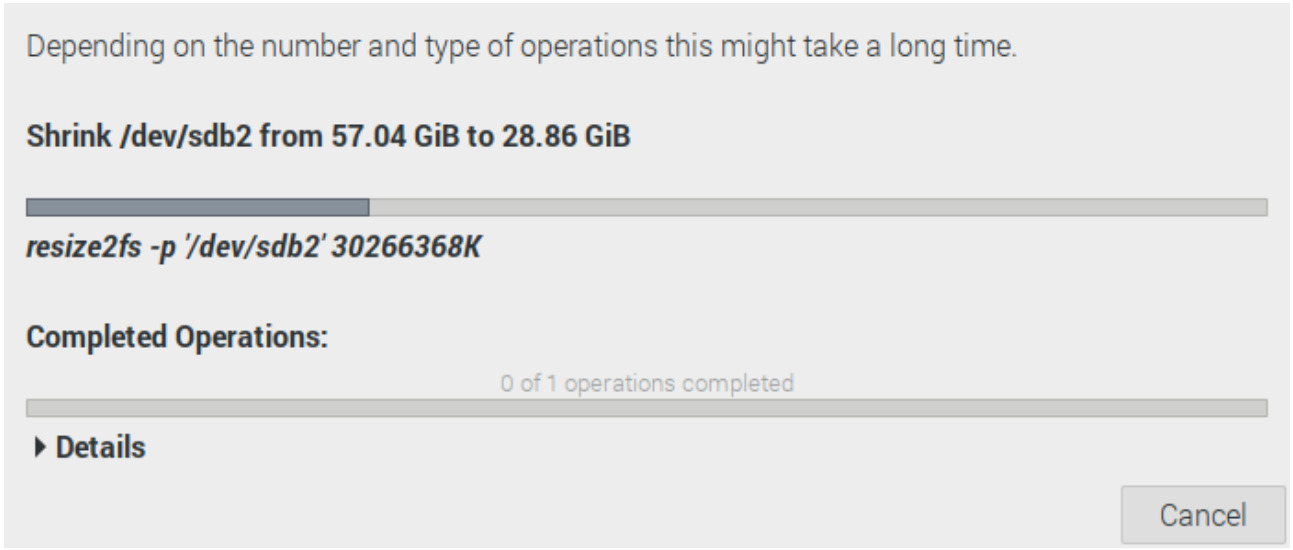
As root use gparted

UN-mount the 2nd partition

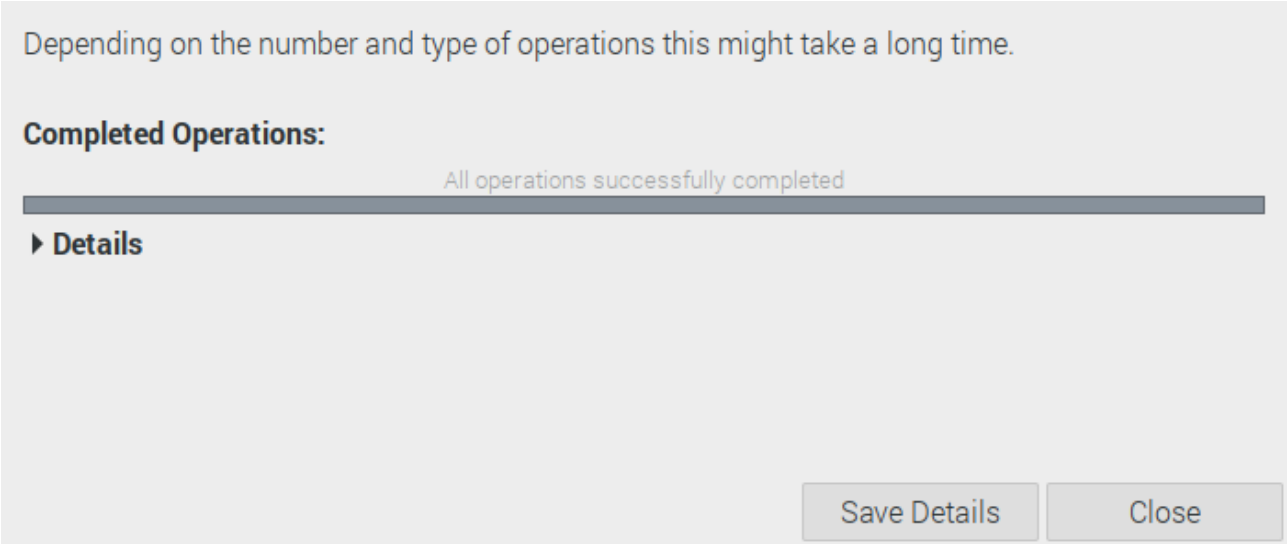
first you shrink the partition



As the partition is being shrieked.



results are successful



root@pi4-27:/media/devel/1b763776-4e1d-499c-9f24-a116a58c161f#

df
Filesystem 1K-blocks Used Available Use% Mounted on
/dev/root 305602156 150970520 141834472 52% /
devtmpfs 3878868 0 3878868 0% /dev
tmpfs 4043732 0 4043732 0% /dev/shm
tmpfs 1617496 2040 1615456 1% /run
tmpfs 5120 4 5116 1% /run/lock
/dev/sda1 258095 50707 207389 20% /boot
tmpfs 808744 24 808720 1% /run/user/1000
/dev/sdb1 306552464 141394184 149513388 49% /media/devel/1b763776-4e1d-499c-9f24-a116a58c161f
/dev/sdc1 261108 31222 229886 12% /media/devel/boot
/dev/sdc2 29719076 22959176 5513828 81% /media/devel/rootfs

dd bs=16M if=/dev/sdc status='progress' of=pi4-37.img

61522051072 bytes (62 GB, 57 GiB) copied, 3427 s, 18.0 MB/s
3667+1 records in
3667+1 records out
61524148224 bytes (62 GB, 57 GiB) copied, 3427.2 s, 18.0 MB/s

dd bs=16M if=pi4-37.img status='progress' of=/dev/sdc
61524148224 bytes (62 GB, 57 GiB) copied, 5401 s, 11.4 MB/s
3667+1 records in
3667+1 records out
61524148224 bytes (62 GB, 57 GiB) copied, 5401.02 s, 11.4 MB/s

MQTT
pi4-38 & pi4-37
https://mosquitto.org/documentation/authentication-methods/

sudo apt-get install mosquitto mosquitto-clients
mosquitto
1667650417: mosquitto version 2.0.11 starting

1667650417: Using default config.
1667650417: Starting in local only mode. Connections will only be possible from clients running on this machine.
1667650417: Create a configuration file which defines a listener to allow remote access.
1667650417: For more details see https://mosquitto.org/documentation/authentication-methods/
1667650417: Opening ipv4 listen socket on port 1883.
1667650417: Opening ipv6 listen socket on port 1883.
1667650417: mosquitto version 2.0.11 running
1667651226: New connection from ::1:45558 on port 1883.
1667651226: New client connected from ::1:45558 as auto-D507A4C8-6C9D-557C-E95B-9C9FA6E9121F (p2, c1, k60).
1667651310: New connection from ::1:47850 on port 1883.
1667651310: New client connected from ::1:47850 as auto-8FD4E2A6-C70D-FBBD-A29E-675081C9DA76 (p2, c1, k60).
1667651334: Client auto-8FD4E2A6-C70D-FBBD-A29E-675081C9DA76 disconnected.
1667651379: New connection from ::1:55678 on port 1883.
1667651379: New client connected from ::1:55678 as auto-C3CC2EA9-8C6A-F7CB-6735-F7757782222D (p2, c1, k60).
1667651379: Client auto-C3CC2EA9-8C6A-F7CB-6735-F7757782222D disconnected.
1667651404: New connection from ::1:51540 on port 1883.
1667651404: New client connected from ::1:51540 as auto-C3C38D98-59AD-C162-1EE8-9AC0CD19F427 (p2, c1, k60).
1667651404: Client auto-C3C38D98-59AD-C162-1EE8-9AC0CD19F427 disconnected.
1667651411: New connection from ::1:51556 on port 1883.
1667651411: New client connected from ::1:51556 as auto-EE2DA2C4-0C40-B57A-2836-1FB8B088D143 (p2, c1, k60).
1667651411: Client auto-EE2DA2C4-0C40-B57A-2836-1FB8B088D143 disconnected.
1667651425: New connection from ::1:47258 on port 1883.
1667651425: New client connected from ::1:47258 as auto-00448448-E30D-465A-DA0B-F162B17D477E (p2, c1, k60).
1667651425: Client auto-00448448-E30D-465A-DA0B-F162B17D477E disconnected.
1667652597: Reloading config.

cp /usr/share/doc/mosquitto/examples/mosquitto.conf .

mosquitto_passwd -c /home/devel/mosquitto-pw testuser

password123

password123

less ~/mosquitto-pw

testuser:$7$101$7OIAauVb8Ow8mP6c$134ZYut+1qEracS7SWlsGXG7pndOKWvr/XeBWplTqgT9eShnEDkPBajQUOqPd1sVyt50RSOV4D85JDaYOlkW7A==

sudo diff mosquitto.conf /home/devel/mosquitto.conf
512d511
< allow_anonymous true

ps -ax | grep mosquitto
kill -HUP 2058

sudo cp mosquitto.conf /etc/mosquitto/

First shell
mosquitto_sub -t 'testtopic' -u 'testuser' -P 'password123'

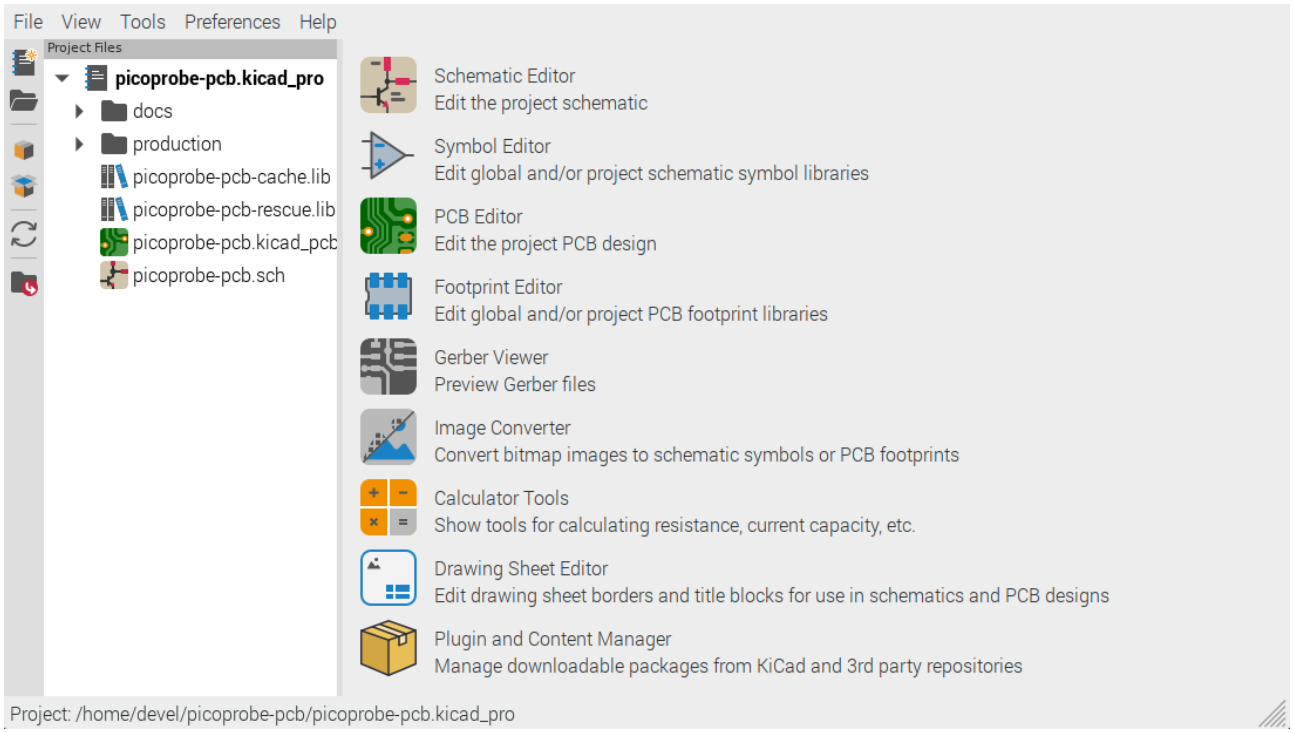
In another shell
mosquitto_pub -t 'testtopic' -m 'Hello World!' -u 'testuser' -P 'password123'

First shell
mosquitto_sub -t 'testtopic' -u 'testuser' -P 'password123'
Hello World!

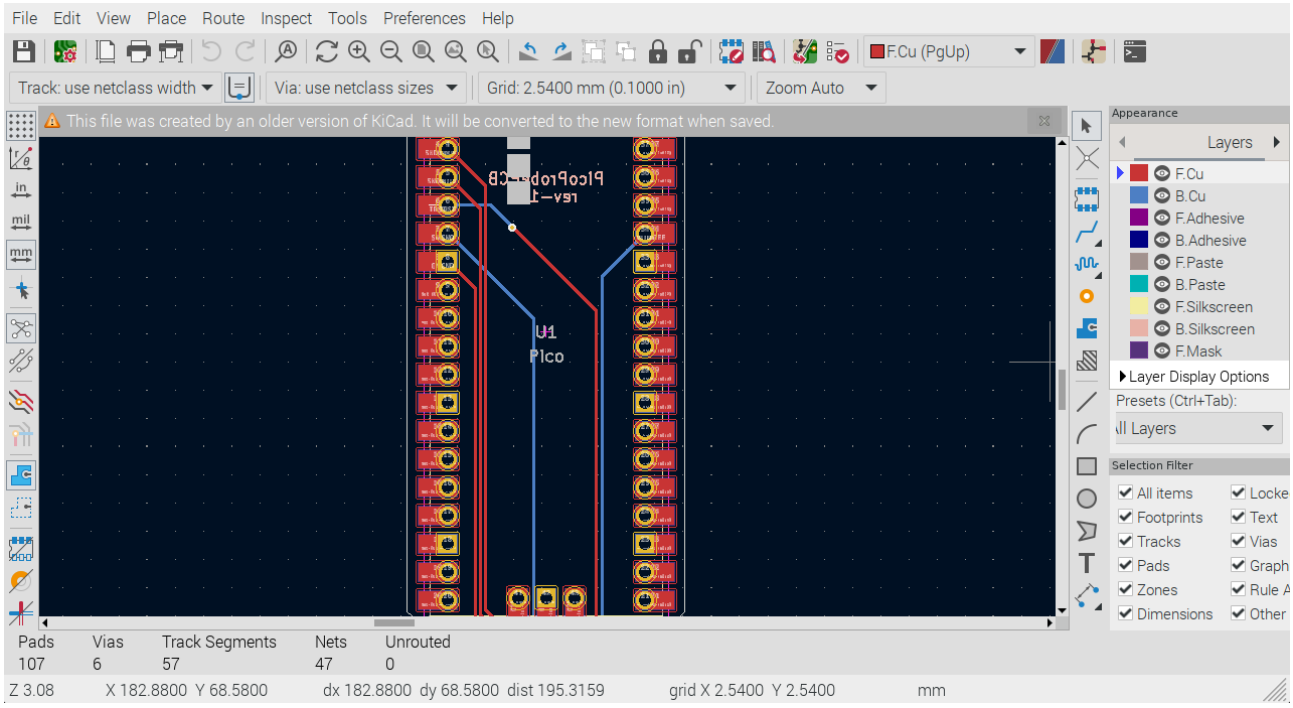
KiCad

cd picoprobe-pcb/

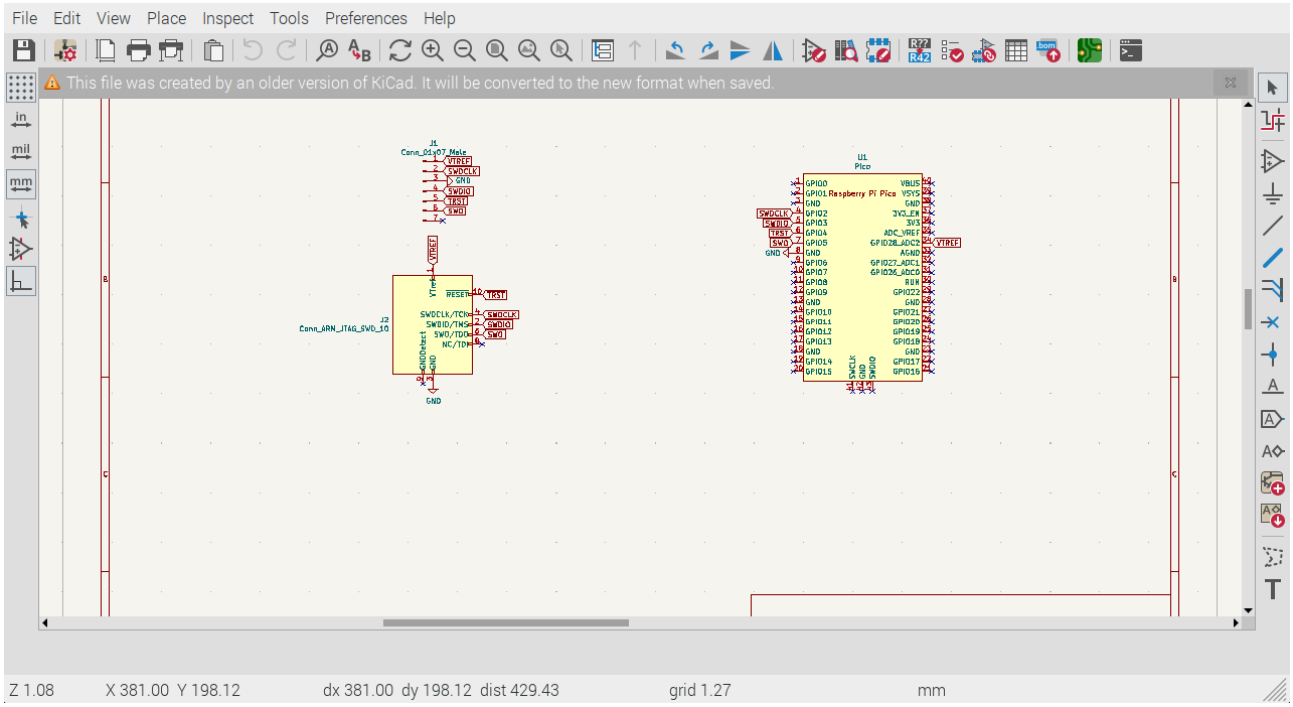
kicad picoprobe-pcb.pro



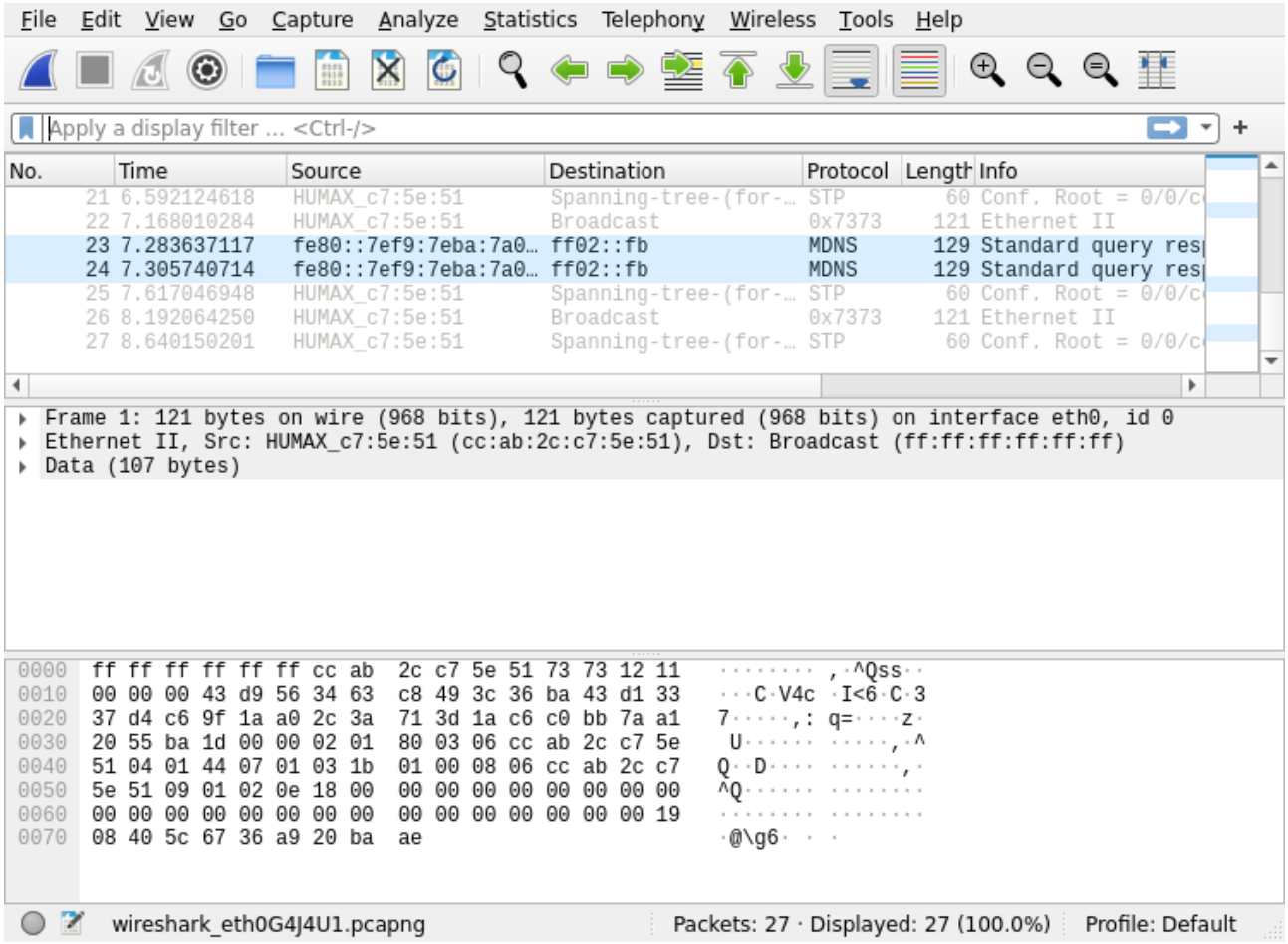
PCB



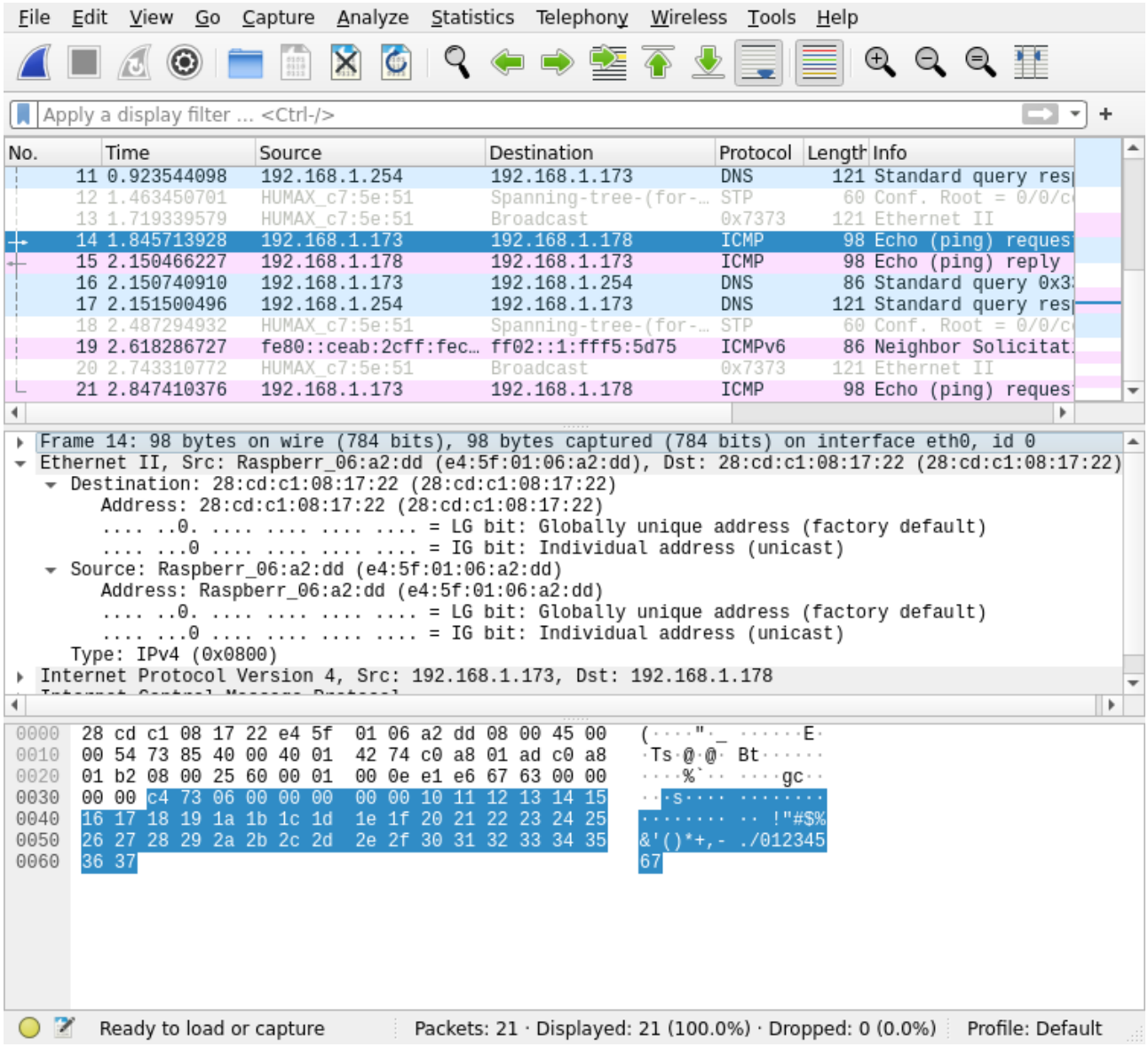
Schematic



Wireshark


File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
No. Time Source Destination Protocol Length Info
21 6.592124618 HUMAX_c7:5e:51 Spanning-tree-(for-… STP 60 Conf. Root = 0/0/c
22 7.168010284 HUMAX_c7:5e:51 Broadcast 0x7373 121 Ethernet II
23 7.283637117 fe80::7ef9:7eba:7a0… ff02::fb MDNS 129 Standard query res
24 7.305740714 fe80::7ef9:7eba:7a0… ff02::fb MDNS 129 Standard query res
25 7.617046948 HUMAX_c7:5e:51 Spanning-tree-(for-… STP 60 Conf. Root = 0/0/c
26 8.192064250 HUMAX_c7:5e:51 Broadcast 0x7373 121 Ethernet II
27 8.640150201 HUMAX_c7:5e:51 Spanning-tree-(for-… STP 60 Conf. Root = 0/0/c
Frame 1: 121 bytes on wire (968 bits), 121 bytes captured (968 bits) on interface eth0, id 0
Ethernet II, Src: HUMAX_c7:5e:51 (cc:ab:2c:c7:5e:51), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
Data (107 bytes)
0000 ff ff ff ff ff ff cc ab 2c c7 5e 51 73 73 12 11
0010 00 00 00 43 d9 56 34 63 c8 49 3c 36 ba 43 d1 33
0020 37 d4 c6 9f 1a a0 2c 3a 71 3d 1a c6 c0 bb 7a a1
0030 20 55 ba 1d 00 00 02 01 80 03 06 cc ab 2c c7 5e
0040 51 04 01 44 07 01 03 1b 01 00 08 06 cc ab 2c c7
0050 5e 51 09 01 02 0e 18 00 00 00 00 00 00 00 00 00
0060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 19
0070 08 40 5c 67 36 a9 20 ba ae
wireshark_eth0G4J4U1.pcapng
Packets: 27 · Displayed: 27 (100.0%)
Profile: Default

XX



nmap
devel@pi4-37:~/my-projects-docs $ namp 192.168.1.0/24
bash: namp: command not found
devel@pi4-37:~/my-projects-docs $ nmap 192.168.1.0/24
Starting Nmap 7.80 (https://nmap.org) at 2022-11-06 09:41 MST
Nmap scan report for amazon-c9fc00e54.attlocal.net (192.168.1.67)
Host is up (0.0037s latency).
Not shown: 999 closed ports
PORT STATE SERVICE
8009/tcp open ajp13

Nmap scan report for EPSON663615.attlocal.net (192.168.1.87)
Host is up (0.022s latency).
Not shown: 993 closed ports
PORT STATE SERVICE
80/tcp open http
139/tcp open netbios-ssn
443/tcp open https
445/tcp open microsoft-ds

515/tcp open printer
631/tcp open ipp
9100/tcp open jetdirect

Nmap scan report for unknown24ce3396b722.attlocal.net (192.168.1.149)
Host is up (0.0039s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE
8009/tcp open ajp13

Nmap scan report for unknownb4e454b54364.attlocal.net (192.168.1.170)
Host is up (0.0038s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE
8009/tcp open ajp13

Nmap scan report for pi4-37.attlocal.net (192.168.1.173)
Host is up (0.0011s latency).
Not shown: 995 closed ports
PORT   STATE SERVICE
22/tcp   open ssh
111/tcp open rpcbind
139/tcp open netbios-ssn
445/tcp open microsoft-ds
2049/tcp open nfs

Nmap scan report for livingRm.attlocal.net (192.168.1.178)
Host is up (0.0036s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE
5001/tcp open commplex-link

Nmap scan report for arduino-8f48.attlocal.net (192.168.1.179)
Host is up (0.038s latency).
All 1000 scanned ports on arduino-8f48.attlocal.net (192.168.1.179) are closed

Nmap scan report for pi3-10.attlocal.net (192.168.1.206)
Host is up (0.0046s latency).
Not shown: 995 closed ports
PORT   STATE SERVICE
22/tcp   open ssh
111/tcp open rpcbind
139/tcp open netbios-ssn
445/tcp open microsoft-ds
2049/tcp open nfs

Nmap scan report for nixplay_W10F-09.attlocal.net (192.168.1.210)
Host is up (0.019s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE
8080/tcp open http-proxy

Nmap scan report for pi4-38.attlocal.net (192.168.1.211)
Host is up (0.0011s latency).
Not shown: 995 closed ports
PORT STATE SERVICE
22/tcp open ssh
111/tcp open rpcbind
139/tcp open netbios-ssn
445/tcp open microsoft-ds
2049/tcp open nfs

Nmap scan report for pi4-27.attlocal.net (192.168.1.229)
Host is up (0.0011s latency).
Not shown: 995 closed ports
PORT STATE SERVICE
22/tcp open ssh
111/tcp open rpcbind
139/tcp open netbios-ssn
445/tcp open microsoft-ds
2049/tcp open nfs

Nmap scan report for pi4-28.attlocal.net (192.168.1.245)
Host is up (0.00091s latency).
Not shown: 995 closed ports
PORT STATE SERVICE
22/tcp open ssh
111/tcp open rpcbind
139/tcp open netbios-ssn
445/tcp open microsoft-ds
2049/tcp open nfs

Nmap scan report for pi4-33.attlocal.net (192.168.1.250)
Host is up (0.0049s latency).
Not shown: 995 closed ports
PORT STATE SERVICE
22/tcp open ssh
111/tcp open rpcbind
139/tcp open netbios-ssn
445/tcp open microsoft-ds
2049/tcp open nfs

Nmap scan report for dsldevice.attlocal.net (192.168.1.254)
Host is up (0.00092s latency).
Not shown: 996 closed ports
PORT STATE SERVICE
53/tcp open domain
80/tcp open http
111/tcp filtered rpcbind
443/tcp open https

Nmap done: 256 IP addresses (14 hosts up) scanned in 24.94 seconds