



**DesignNews**

# Embedded Linux Primer

**Day 3:**

**Generate a Custom Base STM32MP157F Yocto Image**

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## Webinar Logistics

- Turn on your system sound to hear the streaming presentation.
- If you have technical problems, click “Help” or submit a question asking for assistance.
- Participate in ‘Attendee Chat’ by maximizing the chat widget in your dock.

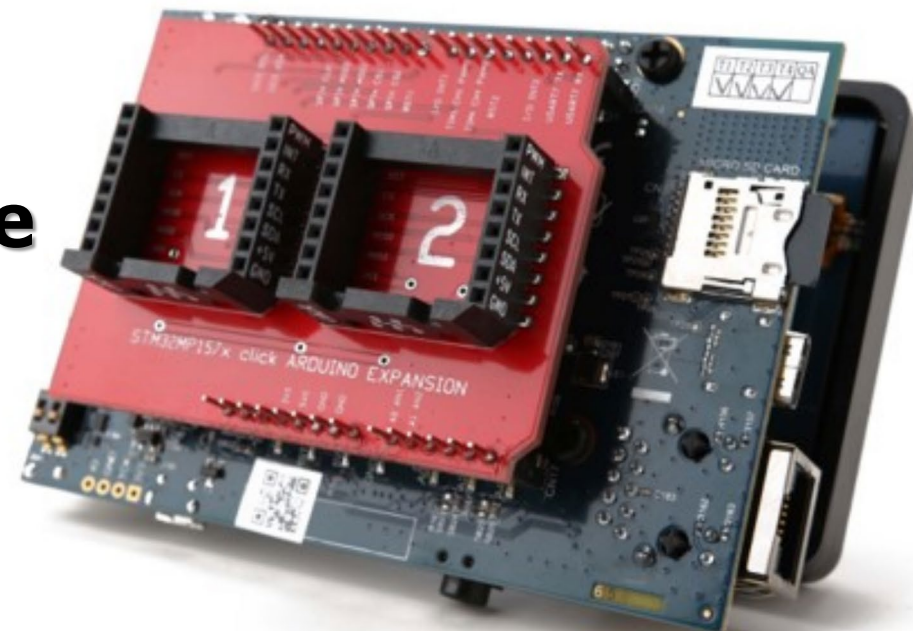


## Fred Eady

Visit 'Lecturer Profile' in your console for more details.

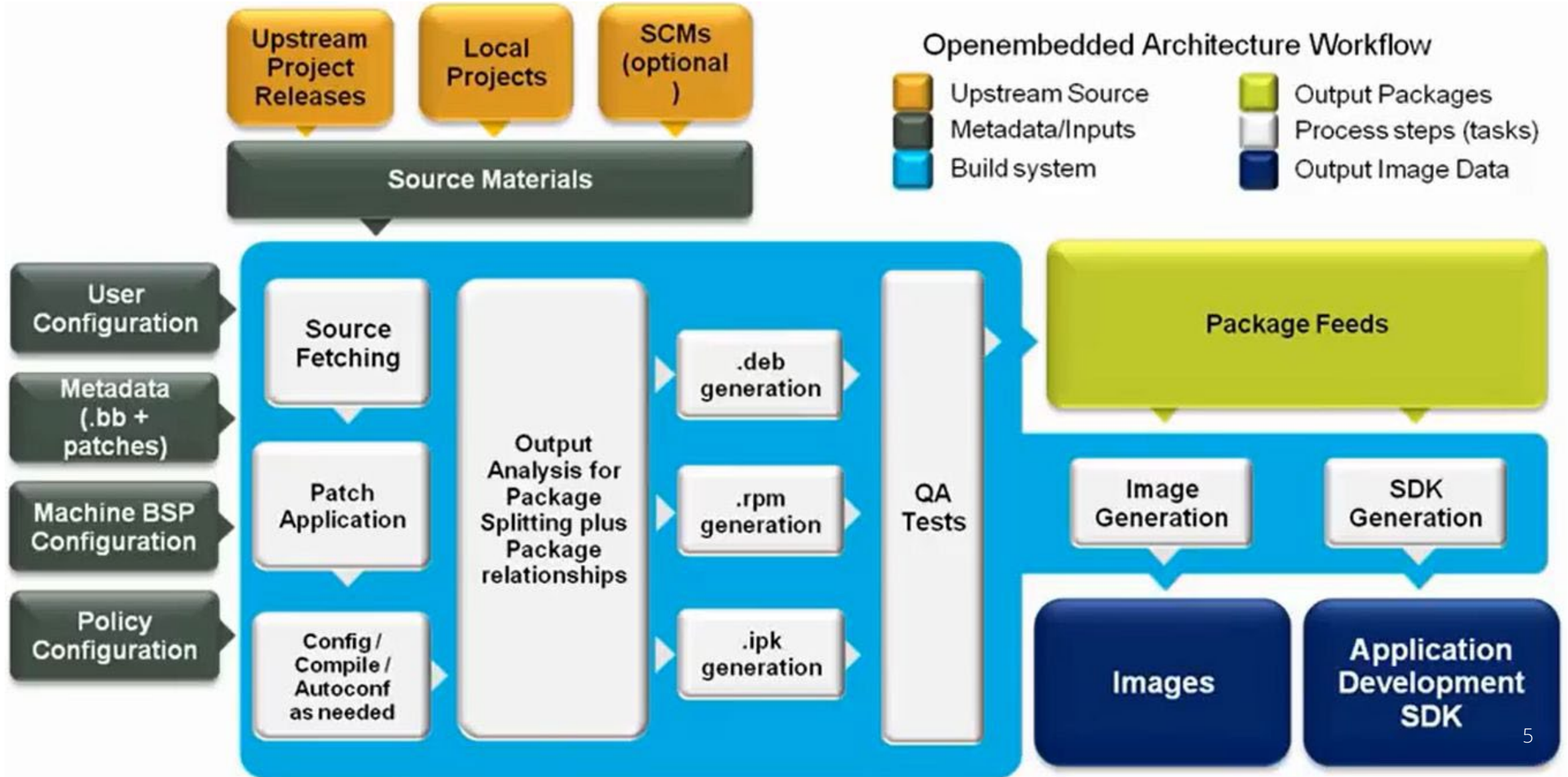
# AGENDA

- **Yocto Base Image Configuration**
- **Cook Our Yocto Base Image**
- **Load and Boot Our Yocto Base Image**
- **Setup WiFi**
- **Create a GPIO Yocto Application**



yocto •  
PROJECT

# Yocto Workflow



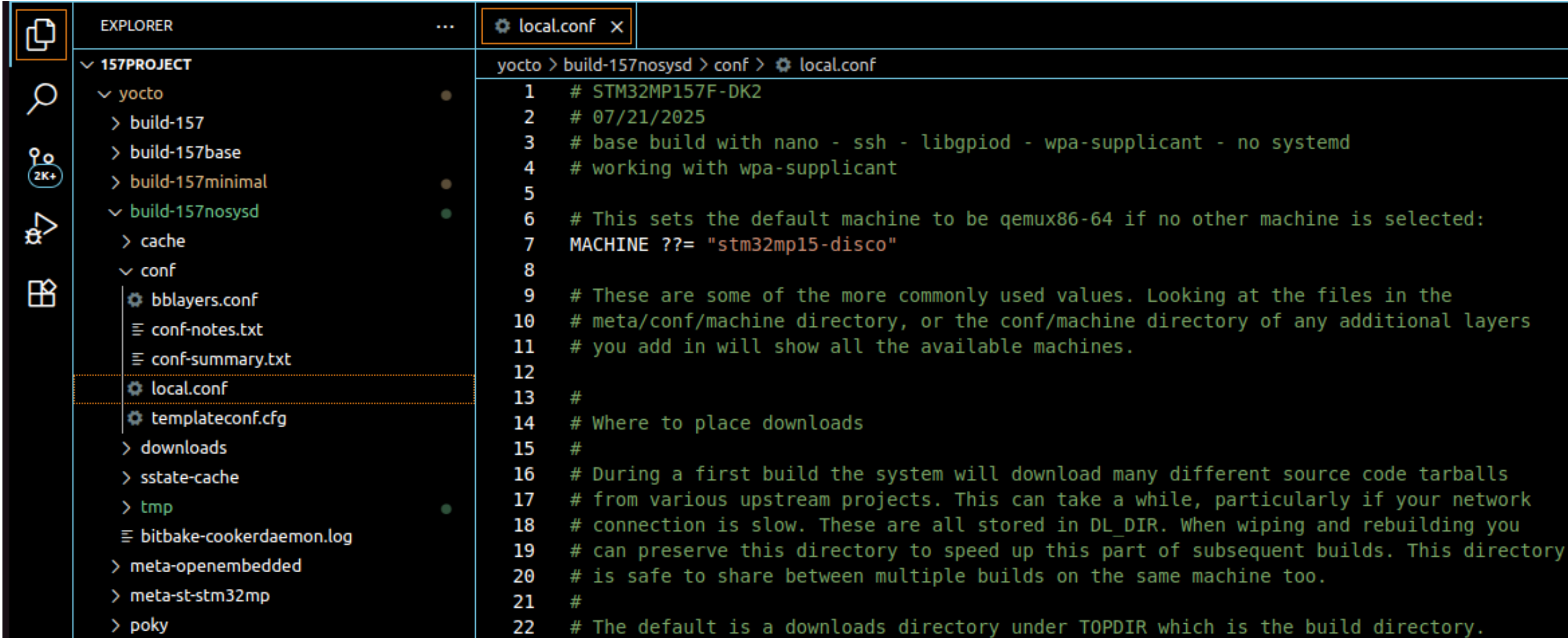
**bblayers.conf**

bblayers.conf ×

yocto &gt; build-157nosysd &gt; conf &gt; bblayers.conf

```
1 # STM32MP157F-DK2
2 # 07/21/2025
3 # working
4 # base build with nano - ssh - libgpiod - wpa-supPLICANT - no systemd
5 # optional /home/fred/X57project/yocto/meta-openembedded/meta-networking \
6 #
7 #
8 # POKY_BBLAYERS_CONF_VERSION is increased each time build/conf/bblayers.conf
9 # changes incompatibly
10 POKY_BBLAYERS_CONF_VERSION = "2"
11
12 BBPATH = "${TOPDIR}"
13 BBFILES ?= ""
14
15 BBLAYERS ?= " \
16 /home/fred/X57project/yocto/poky/meta \
17 /home/fred/X57project/yocto/poky/meta-poky \
18 /home/fred/X57project/yocto/poky/meta-yocto-bsp \
19 /home/fred/X57project/yocto/meta-openembedded/meta-oe \
20 /home/fred/X57project/yocto/meta-openembedded/meta-python \
21 /home/fred/X57project/yocto/meta-st-stm32mp \
22 "
```

## local.conf



The screenshot shows a file explorer interface with a sidebar on the left and a main content area on the right. The sidebar is titled "EXPLORER" and shows a tree view of files and directories. The main content area shows the contents of the selected file, "local.conf", in a terminal-like font.

**EXPLORER**

- 157PROJECT
  - yocto
    - build-157
    - build-157base
    - build-157minimal
    - build-157nosysd
      - cache
      - conf
        - bblayers.conf
        - conf-notes.txt
        - conf-summary.txt
        - local.conf**
        - templateconf.cfg
      - downloads
      - sstate-cache
      - tmp
      - bitbake-cookerdaemon.log
      - meta-openembedded
      - meta-st-stm32mp
      - poky

**local.conf**

```
yocto > build-157nosysd > conf > local.conf
1 # STM32MP157F-DK2
2 # 07/21/2025
3 # base build with nano - ssh - libgpiod - wpa-supPLICANT - no systemd
4 # working with wpa-supPLICANT
5
6 # This sets the default machine to be qemuX86-64 if no other machine is selected:
7 MACHINE ??= "stm32mp15-disco"
8
9 # These are some of the more commonly used values. Looking at the files in the
10 # meta/conf/machine directory, or the conf/machine directory of any additional layers
11 # you add in will show all the available machines.
12
13 #
14 # Where to place downloads
15 #
16 # During a first build the system will download many different source code tarballs
17 # from various upstream projects. This can take a while, particularly if your network
18 # connection is slow. These are all stored in DL_DIR. When wiping and rebuilding you
19 # can preserve this directory to speed up this part of subsequent builds. This directory
20 # is safe to share between multiple builds on the same machine too.
21 #
22 # The default is a downloads directory under TOPDIR which is the build directory.
```

## local.conf



The screenshot shows a Yocto Project IDE interface. On the left is an Explorer pane showing a project tree for '157PROJECT'. The 'conf' directory is expanded, and 'local.conf' is selected. The main editor displays the contents of 'local.conf' with line numbers 250 to 265. The configuration includes comments about CONF\_VERSION, a list of packages to be installed (libgpiod, wpa-supPLICANT, etc.), and a line for ACCEPT\_EULA.

```
yocto > build-157nosysd > conf > local.conf
250 # CONF_VERSION is increased each time build/conf/ changes incompatibly and is used to
251 # track the version of this file when it was generated. This can safely be ignored if
252 # this doesn't mean anything to you.
253 CONF_VERSION = "2"
254
255 IMAGE_INSTALL:append = " \
256     nano \
257     libgpiod \
258     libgpiod-dev \
259     libgpiod-tools \
260     wpa-supPLICANT \
261     openssh \
262     "
263
264 ACCEPT_EULA_${MACHINE} = "1",e.g.:ACCEPT_EULA_stm32mp1 = "1"
265
```

wpa = WiFi Protected Access

## Invoke BitBake

```
fred@shop-ubuntu-1660: ~/157project/yocto/build-157nosysd
File Edit View Search Terminal Help
Loading cache: 100% | ETA: --:--:--
Loaded 0 entries from dependency cache.
Parsing recipes: 100% |#####| Time: 0:01:06
Parsing of 2521 .bb files complete (0 cached, 2521 parsed). 4402 targets, 153 skipped, 0 masked, 0 errors.
NOTE: Resolving any missing task queue dependencies

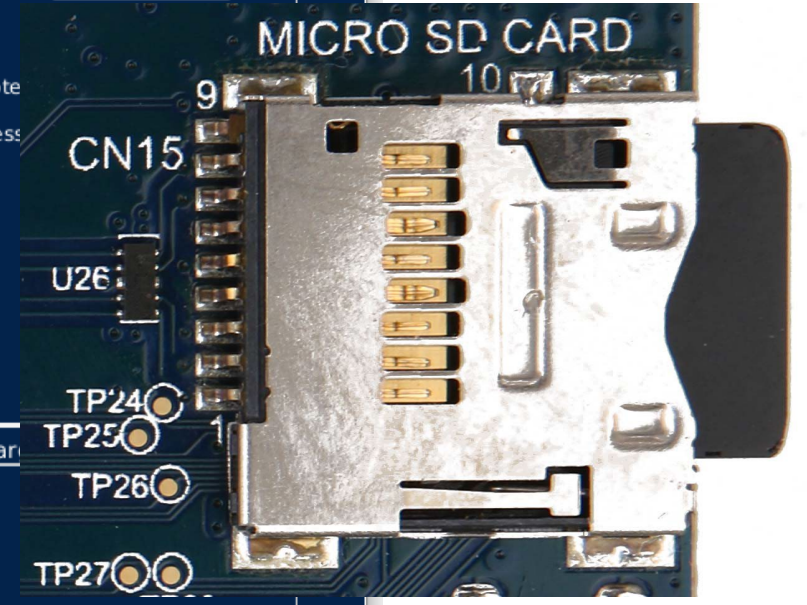
Build Configuration:
BB_VERSION      = "2.8.0"
BUILD_SYS       = "x86_64-linux"
NATIVELSBSTRING = "ubuntu-22.04"
TARGET_SYS      = "arm-poky-linux-gnueabi"
MACHINE         = "stm32mp15-disco"
DISTRO          = "poky"
DISTRO_VERSION  = "5.0.10"
TUNE_FEATURES   = "arm vfp cortexa7 neon vfpv4 thumb callconvention-hard"
TARGET_FPU      = "hard"
meta
meta-poky
meta-yocto-bsp  = "scarthgap:b8f8125f05e8ece078ba6bf01eebb2900cf2f9bf"
meta-oe
meta-python    = "scarthgap:727811eaf256b88fd135be99559f2cbf14c82fce"
meta-st-stm32mp = "scarthgap:8b449a5ffe02a4622a1d404ede53ea9a5e6303d6"

Initialising tasks: 1% |# | ETA: 0:00:10
```

# Load the microSD Card With Our New Base Image

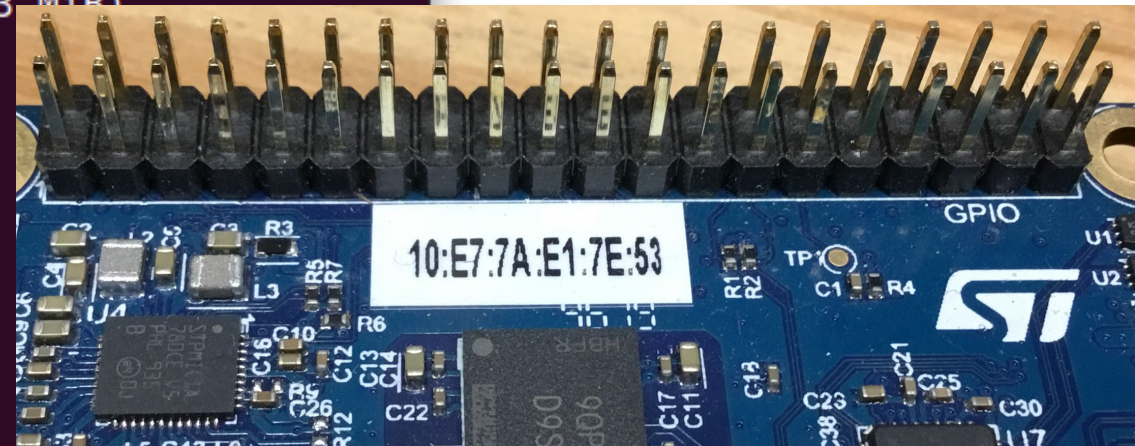
The screenshot shows the STM32CubeProgrammer application window. The main interface is titled "Memory & File editing" and shows a "Partitions" table. The table lists several partitions for a microSD card, including bootloaders and firmware images. On the right side, the "USB configuration" panel is visible, showing a "Connect" button and various device details like Port, Serial number, and PID. At the bottom, a "Log" window displays the progress of the flashing operation, including a warning about a lost connection to the device.

Se...	Opt	Id	Name	Type	IP	Offset	Binary
<input checked="" type="checkbox"/>	-	0x1	fsbl-boot	Binary	none	0x0	arm-trusted-firmware/tf-a-stm32mp157f-dk2-opt
<input checked="" type="checkbox"/>	-	0x3	fip-boot	FIP	none	0x0	fip/fip-stm32mp157f-dk2-opteemin-programmer
<input checked="" type="checkbox"/>	P	0x4	fsbl1	Binary	mm...	0x000044...	arm-trusted-firmware/tf-a-stm32mp157f-dk2-opt
<input checked="" type="checkbox"/>	P	0x5	fsbl2	Binary	mm...	0x000444...	arm-trusted-firmware/tf-a-stm32mp157f-dk2-opt
<input checked="" type="checkbox"/>	PD	0x6	metadata1	FWU_MD...	mm...	0x000844...	arm-trusted-firmware/metadata.bin
<input checked="" type="checkbox"/>	PD	0x7	metadata2	FWU_MD...	mm...	0x000C4...	arm-trusted-firmware/metadata.bin
<input checked="" type="checkbox"/>	P	0x8	fip-a	FIP	mm...	0x001044...	fip/fip-stm32mp157f-dk2-opteemin-sdcard.bin



## Check the Connections

```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
gpiochip8 [GPIOI] (12 lines)  
gpiochip9 [GPIOZ] (8 lines)  
root@stm32mp15-disco:~# ifconfig  
eth0  Link encap:Ethernet  HWaddr 10:E7:7A:E1:7E:53  
       inet addr:192.168.1.69  Bcast:192.168.1.255  Mask:255.255.255.0  
       inet6 addr: 2600:6c5a:c7f:f2a6:12e7:7aff:fee1:7e53/64  Scope:Global  
       inet6 addr: fe80::12e7:7aff:fee1:7e53/64  Scope:Link  
       UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
       RX packets:359610 errors:0 dropped:122 overruns:0 frame:0  
       TX packets:13445 errors:0 dropped:0 overruns:0 carrier:0  
       collisions:0 txqueuelen:1000  
       RX bytes:116470699 (111.0 MiB)  TX bytes:1376058 (1.3 MiB)  
       Interrupt:53 Base address:0x2000  
  
lo    Link encap:Local Loopback  
       inet addr:127.0.0.1  Mask:255.0.0.0  
       inet6 addr: ::1/128  Scope:Host  
       UP LOOPBACK RUNNING  MTU:65536  Metric:1  
       RX packets:9 errors:0 dropped:0 overruns:0 frame:0  
       TX packets:9 errors:0 dropped:0 overruns:0 carrier:0  
       collisions:0 txqueuelen:1000  
       RX bytes:1605 (1.5 KiB)  TX bytes:1605 (1.5 KiB)  
  
root@stm32mp15-disco:~#
```



## Modify /etc/network/interfaces

```
fred@shop-ubuntu-1660: ~
File Edit View Search Terminal Help
GNU nano 7.2 /etc/network/interfaces Modified
# /etc/network/interfaces -- configuration file for ifup(8), ifdown(8)

# The loopback interface
auto lo
iface lo inet loopback

# Wireless interfaces
allow-hotplug wlan0
auto wlan0
iface wlan0 inet dhcp
    wireless_mode managed
    wireless_essid any
    wpa-driver wext
    wpa-conf /etc/wpa_supplicant.conf

iface atml0 inet dhcp

# Wired or wireless interfaces including predictable names
auto eth0
iface eth0 inet dhcp

^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute   ^C Location
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify   ^/ Go To Line
```

Add these lines

```
fred@shop-ubuntu-1660: ~
File Edit View Search Terminal Help

root@stm32mp15-disco:~# nano /etc/network/interfaces
```

## Modify /etc/wpa\_supplicant.conf

```
fred@shop-ubuntu-1660: ~
File Edit View Search Terminal Help
GNU nano 7.2 /etc/wpa_supplicant.conf
ctrl_interface=/var/run/wpa_supplicant
ctrl_interface_group=0
update_config=1

network={
    key_mgmt=NONE }
}

[ Read 7 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut      ^T Execute  ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste    ^J Justify  ^/ Go To Line
```

Delete these lines

```
fred@shop-ubuntu-1660: ~
File Edit View Search Terminal Help

root@stm32mp15-disco:~# nano /etc/wpa_supplicant.conf
```

## Populate /etc/wpa\_supplicant.conf

```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
GNU nano 7.2 /etc/wpa_supplicant.conf Modified  
ctrl_interface=/var/run/wpa_supplicant  
ctrl_interface_group=0  
update_config=1  
  
network={  
    ssid="SSID"  
    #psk="PASSWORD"  
    psk=9c792aa9d02f7054501f156a58f9c73478f81f82b972a73da347fb19971bf045  
}
```

```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
root@stm32mp15-disco:~# wpa_passphrase "SSID" "PASSWORD" >> /etc/wpa_supplicant.conf
```

```
^G Help  
^X Exit
```

```
^O Write Out  
^R Read File
```

```
^W Where Is  
^_ Replace
```

```
^K Cut  
^U Paste
```

```
^T Execute  
^J Justify
```

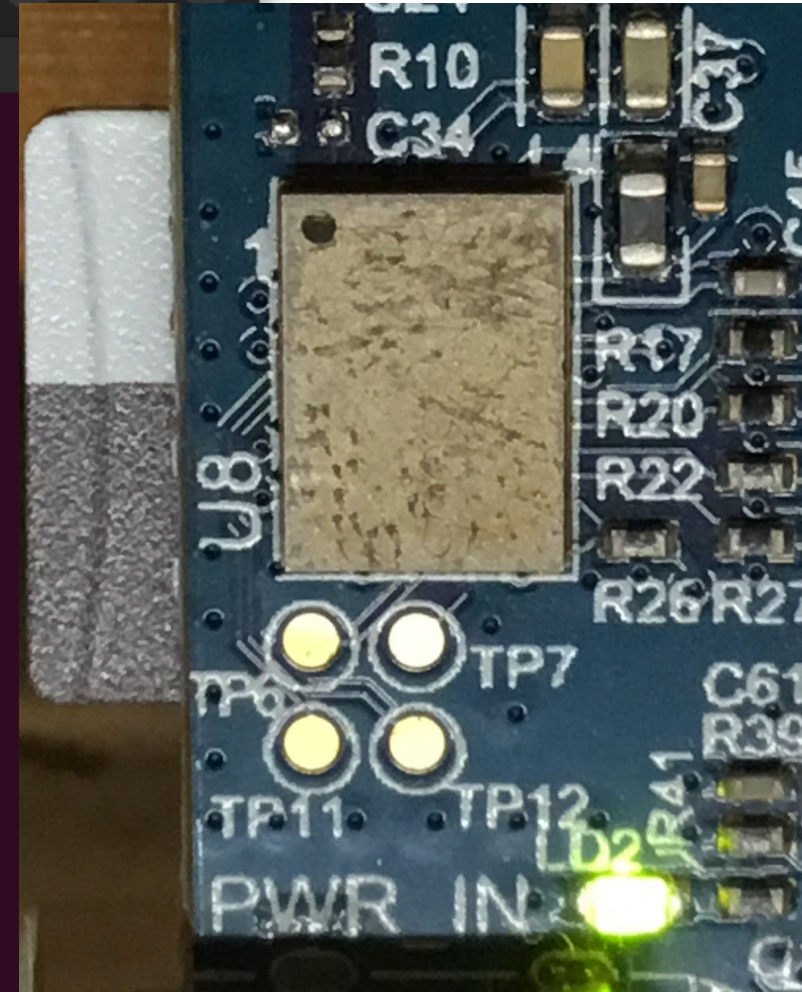
```
^C Location  
^/ Go To Line
```

## Enable wlan0

```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0  
collisions:0 txqueuelen:1000  
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)  
Interrupt:53 Base address:0xa000  
  
lo  
Link encap:Local Loopback  
inet addr:127.0.0.1 Mask:255.0.0.0  
inet6 addr: ::1/128 Scope:Host  
UP LOOPBACK RUNNING MTU:65536 Metric:1  
RX packets:8 errors:0 dropped:0 overruns:0 frame:0  
TX packets:8 errors:0 dropped:0 overruns:0 carrier:0  
collisions:0 txqueuelen:1000  
RX bytes:1544 (1.5 KiB) TX bytes:1544 (1.5 KiB)  
  
wlan0  
Link encap:Ethernet HWaddr 00:9D:6B:92:B3:F1  
UP BROADCAST MULTICAST MTU:1500 Metric:1  
RX packets:0 errors:0 dropped:0 overruns:0 frame:0  
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0  
collisions:0 txqueuelen:1000  
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)  
  
root@stm32mp15-disco:~# wpa_supplicant -B -iwlan0 -c /etc/wpa_supplicant.conf  
Successfully initialized wpa_supplicant  
root@stm32mp15-disco:~#
```

Success!

```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
collisions:0 txqueuelen:1000  
RX bytes:648738 (633.5 KiB) TX bytes:25054 (24.4 KiB)  
Interrupt:53 Base address:0x6000  
  
lo  
Link encap:Local Loopback  
inet addr:127.0.0.1 Mask:255.0.0.0  
inet6 addr: ::1/128 Scope:Host  
UP LOOPBACK RUNNING MTU:65536 Metric:1  
RX packets:8 errors:0 dropped:0 overruns:0 frame:0  
TX packets:8 errors:0 dropped:0 overruns:0 carrier:0  
collisions:0 txqueuelen:1000  
RX bytes:1544 (1.5 KiB) TX bytes:1544 (1.5 KiB)  
  
wlan0  
Link encap:Ethernet HWaddr 00:9D:6B:92:B3:F1  
inet addr:192.168.1.37 Bcast:192.168.1.255 Mask:255.255.255.0  
inet6 addr: fe80::29d:6bff:fe92:b3f1/64 Scope:Link  
inet6 addr: 2600:6c5a:c7f:f2a6:29d:6bff:fe92:b3f1/64 Scope:Global  
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1  
RX packets:1398 errors:0 dropped:0 overruns:0 frame:0  
TX packets:1441 errors:0 dropped:0 overruns:0 carrier:0  
collisions:0 txqueuelen:1000  
RX bytes:529962 (517.5 KiB) TX bytes:160973 (157.2 KiB)  
  
root@stm32mp15-disco:~#
```



## Just In Case WiFi Does Not Cooperate

```
fred@shop-ubuntu-1660: ~  
wlan0    Link encap:Ethernet  HWaddr 00:9D:6B:92:B3:F1  
         UP BROADCAST MULTICAST  MTU:1500  Metric:1  
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0  
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0  
         collisions:0 txqueuelen:1000  
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)  
  
root@stm32mp15-disco:~# wpa_supplicant -B -iwlan0 -c /etc/wpa_supplicant.conf  
Successfully initialized wpa_supplicant  
ctrl_iface exists and seems to be in use - cannot override it  
Delete '/var/run/wpa_supplicant/wlan0' manually if it is not used anymore  
Failed to initialize control interface '/var/run/wpa_supplicant'.  
You may have another wpa_supplicant process already running or the file was  
left by an unclean termination of wpa_supplicant in which case you will need  
to manually remove this file before starting wpa_supplicant again.  
  
wlan0: CTRL-EVENT-DSCP-POLICY clear_all  
wlan0: CTRL-EVENT-DSCP-POLICY clear_all  
nl80211: deinit ifname=wlan0 disabled_11b_rates=0  
root@stm32mp15-disco:~# cd /var/run/wpa_supplicant  
root@stm32mp15-disco:/var/run/wpa_supplicant# ls  
wlan0  
root@stm32mp15-disco:/var/run/wpa_supplicant# rm wlan0  
root@stm32mp15-disco:/var/run/wpa_supplicant# ls
```

## Connect to the STM32MP157-DK2 Using WiFi and FileZilla Pro

## Site Manager

Select entry:

- My Sites
  - Google
  - shop\_tc885
  - stm157\_wifi\_37
  - ubuntu\_laptop



- |              |            |
|--------------|------------|
| New site     | New folder |
| New Bookmark | Rename     |
| Delete       | Duplicate  |

General Advanced Transfer Settings Charset

Protocol: SFTP - SSH File Transfer Protocol

Host: 192.168.1.37

Port:

Logon Type: Normal

User: root

Password:

Background color: None

Comments:

Connect

OK

Cancel

## Create stmprojects Directory Using FileZilla Pro

Remote site: /home/root/stmprojects

- /
- bin
- boot
- dev
- etc
- home
- root
  - stmprojects

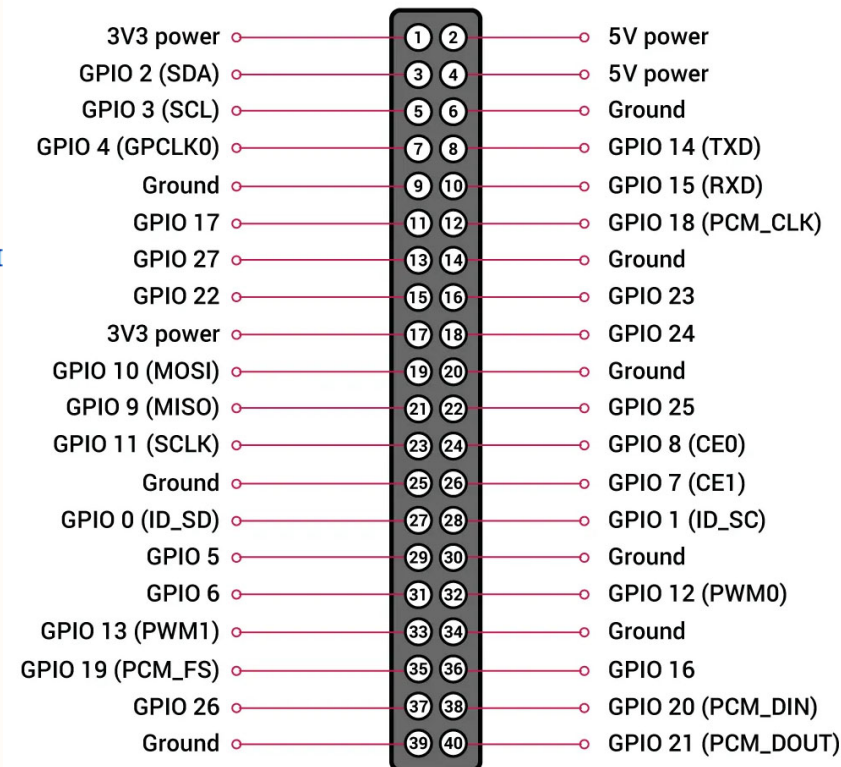
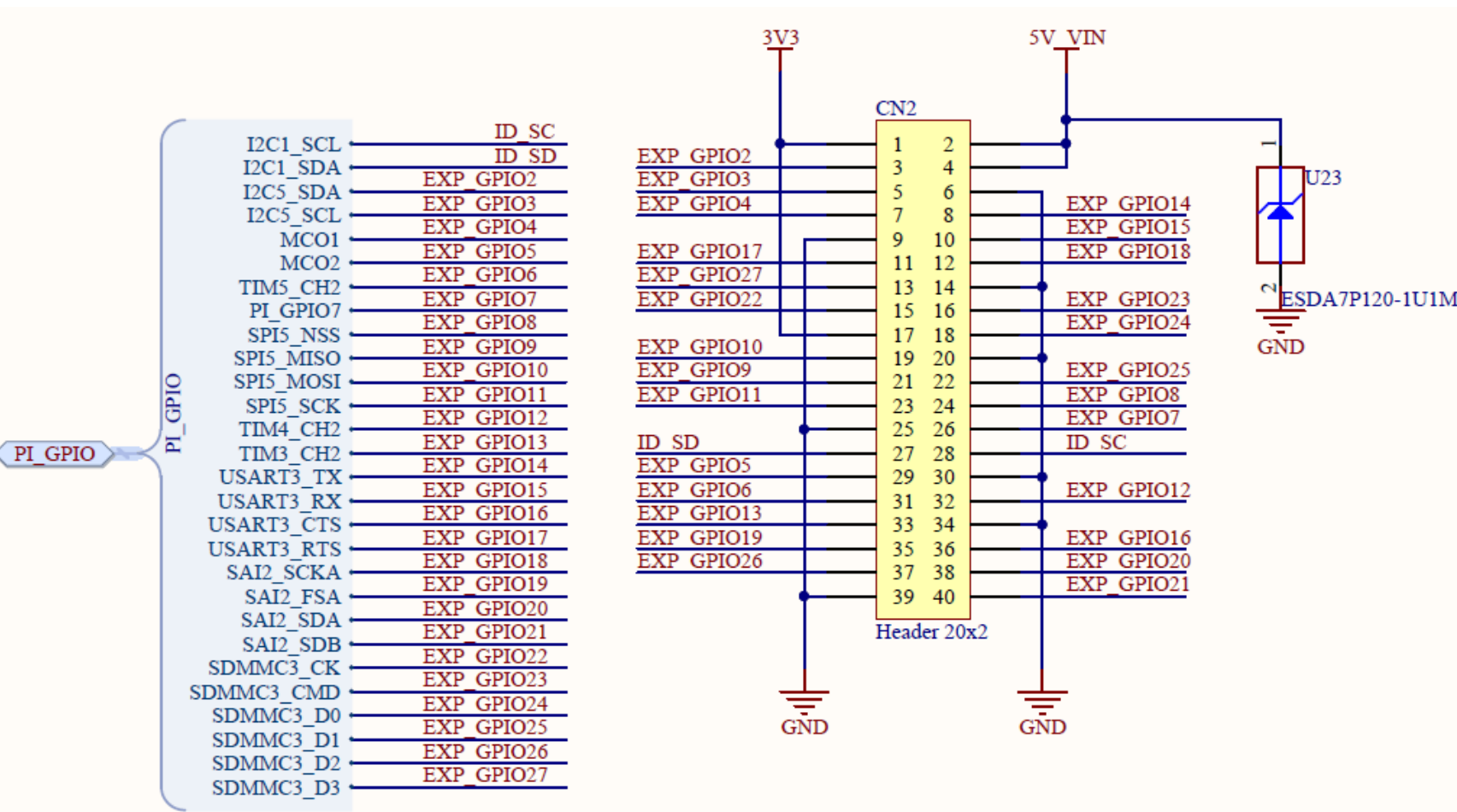
Filename ^	Filesize	Filetype	Last modified	Permission	Owner/Group
..					

Empty directory listing

- Download
- Add files to queue
- View/Edit
- Create directory**
- Create directory and enter it
- Create new file
- Refresh
- Delete
- Rename
- Copy URL(s) to clipboard
- File permissions...

Empty directory.

## The Target STM32MP157-DK2 Hardware



## The Target STM32MP157-DK2 Hardware

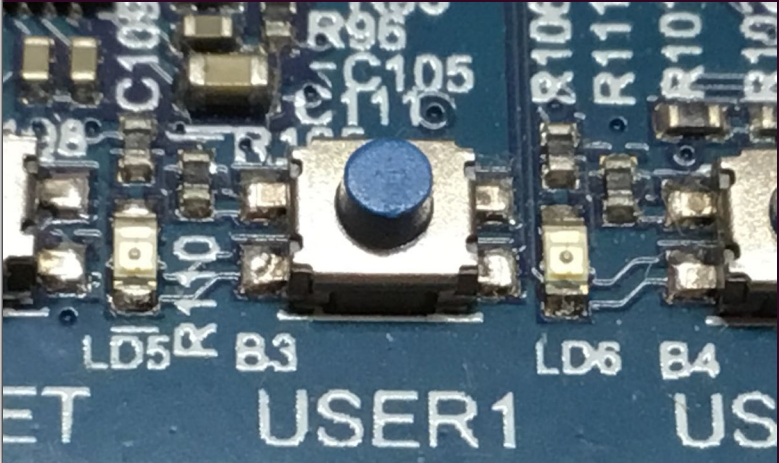
```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
root@stm32mp15-disco:/usr/lib# ls -l libgpio*  
lrwxrwxrwx 1 root root 17 Mar 9 12:34 libgpiod.so -> libgpiod.so.3.1.1  
lrwxrwxrwx 1 root root 17 Mar 9 12:34 libgpiod.so.3 -> libgpiod.so.3.1.1  
-rwxr-xr-x 1 root root 25896 Mar 9 12:34 libgpiod.so.3.1.1  
lrwxrwxrwx 1 root root 20 Mar 9 12:34 libgpiodcxx.so -> libgpiodcxx.so.2.1.0  
lrwxrwxrwx 1 root root 20 Mar 9 12:34 libgpiodcxx.so.2 -> libgpiodcxx.so.2.1.0  
-rwxr-xr-x 1 root root 116116 Mar 9 12:34 libgpiodcxx.so.2.1.0  
lrwxrwxrwx 1 root root 19 Mar 9 12:34 libgpiosim.so -> libgpiosim.so.1.0.1  
lrwxrwxrwx 1 root root 19 Mar 9 12:34 libgpiosim.so.1 -> libgpiosim.so.1.0.1  
-rwxr-xr-x 1 root root 13556 Mar 9 12:34 libgpiosim.so.1.0.1  
  
libgpiod:  
total 1  
drwxr-xr-x 3 root root 1024 Mar 9 12:34 ptest  
root@stm32mp15-disco:/usr/lib#
```

## The Target STM32MP157-DK2 Hardware

fred@shop-ubuntu-1660: ~

File Edit View Search Terminal Help

```
root@stm32mp15-disco:~# gpiodetect
gpiochip0 [GPIOA] (16 lines)
gpiochip1 [GPIOB] (16 lines)
gpiochip2 [GPIOC] (16 lines)
gpiochip3 [GPIOD] (16 lines)
gpiochip4 [GPIOE] (16 lines)
gpiochip5 [GPIOF] (16 lines)
gpiochip6 [GPIOG] (16 lines)
gpiochip7 [GPIOH] (16 lines)
gpiochip8 [GPIOI] (12 lines)
gpiochip9 [GPIOZ] (8 lines)
root@stm32mp15-disco:~#
```



PA13

3V3

R106 1K

LD6 RED

1 2

B4 3 4

R111 100R

SW-PUSH-TS-02H-Blue

PA14

3V3

R105 330R

LD5 GREEN

1 2

B3 3 4

R110 100R

SW-PUSH-TS-02H-Blue

## The Target STM32MP157-DK2 Hardware

fred@shop-ubuntu-1660: ~

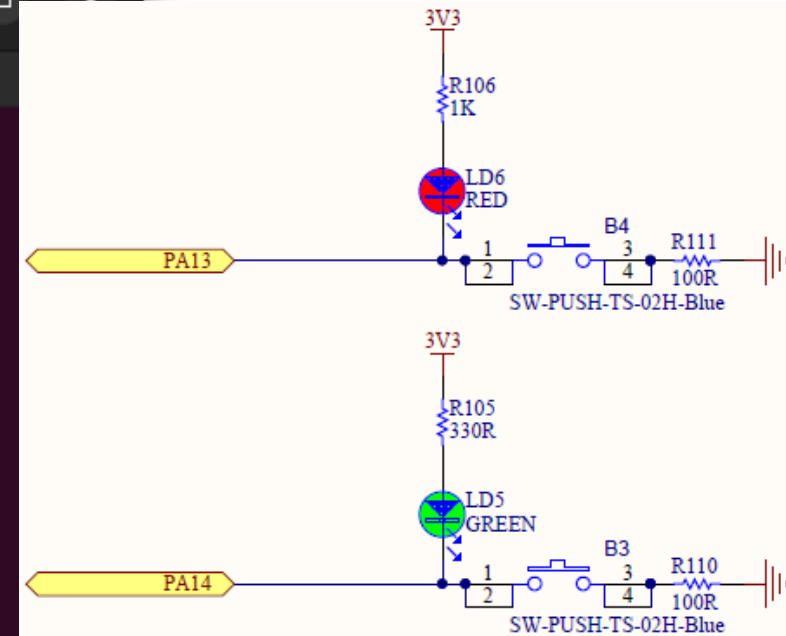
File Edit View Search Terminal Help

root@stm32mp15-disco:~/stmprojects# gpioinfo -c 0

gpiochip0 - 16 lines:

line 0:	"PA0"	input	consumer="wake-up pin"
line 1:	"PA1"	input	consumer="kernel"
line 2:	"PA2"	input	consumer="kernel"
line 3:	"PA3"	input	consumer="kernel"
line 4:	"PA4"	input	consumer="kernel"
line 5:	"PA5"	input	consumer="kernel"
line 6:	"PA6"	input	
line 7:	"PA7"	input	consumer="kernel"
line 8:	"PA8"	input	
line 9:	"PA9"	input	consumer="kernel"
line 10:	"PA10"	output	active-low consumer="reset"
line 11:	"PA11"	input	
line 12:	"PA12"	input	
line 13:	"PA13"	input	
line 14:	"PA14"	input	
line 15:	"PA15"	input	

root@stm32mp15-disco:~/stmprojects#



## Create and Compile the Application Code

```
130 int main(void)
131 {
132     /* Example configuration - customize to suit your situation. */
133     static const char *const chip_path = "/dev/gpiochip0";
134     static const unsigned int line_offsets[NUM_LINES] = { 13, 14 };
135
136     enum gpiod_line_value line_values[NUM_LINES] = { GPIOD_LINE_VALUE_ACTIVE,
137                                                       GPIOD_LINE_VALUE_INACTIVE };
138     struct gpiod_line_request *line_request;
139
140     line_request = request_output_lines(chip_path, line_offsets, line_values,
141                                       NUM_LINES,
142                                       "CEC-toggle-multiple-lines");
143     if (!line_request) {
144         fprintf(stderr, "ERROR: Failed to request line: %s\n",
145               strerror(errno));
146         return EXIT_FAILURE;
147     }
148
149     for (;;) {
150         print_line_values(line_offsets, line_values, NUM_LINES);
151         sleep(1);
152         toggle_line_line_values(line_values, NUM_LINES);
153         gpiod_line_request_set_values(line_request, line_values);
154     }
155
156     gpiod_line_request_release(line_request);
157
158     return EXIT_SUCCESS;
159 }
```

## The Target STM32MP157-DK2 Hardware

fred@shop-ubuntu-1660: ~

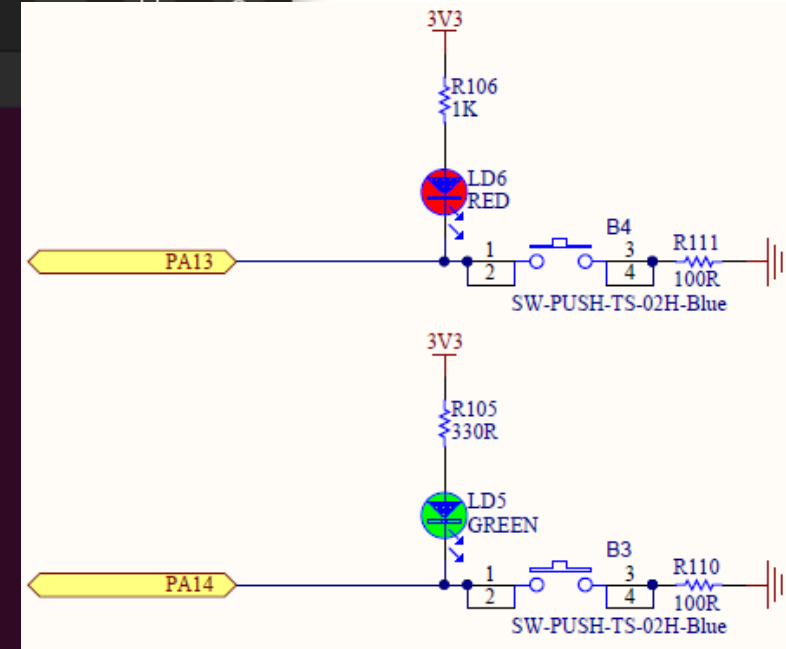
File Edit View Search Terminal Help

root@stm32mp15-disco:~/stmprojects# gpioinfo -c 0

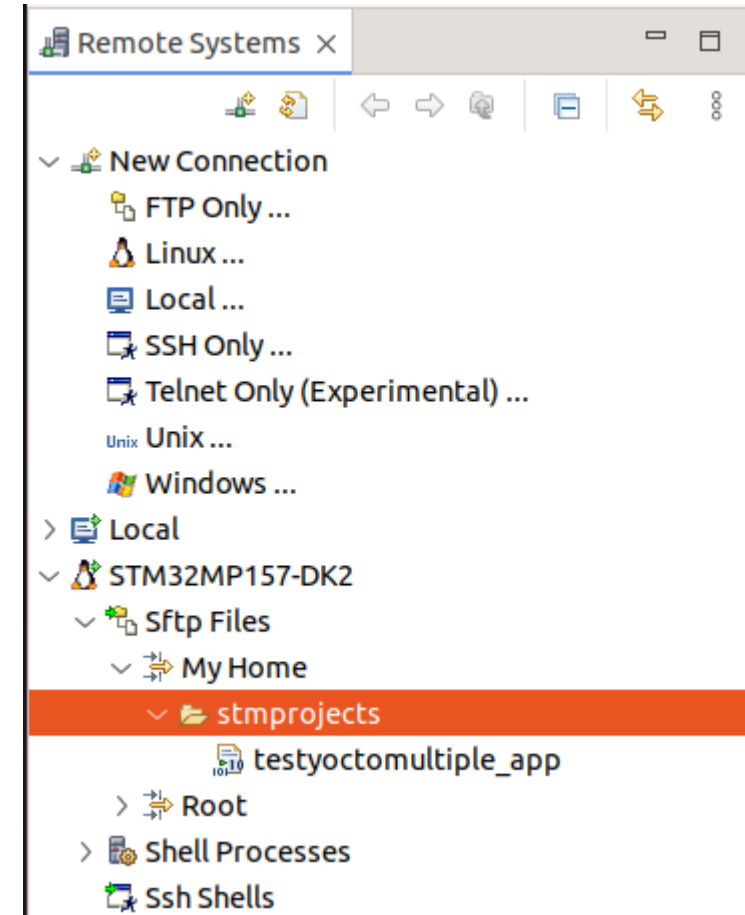
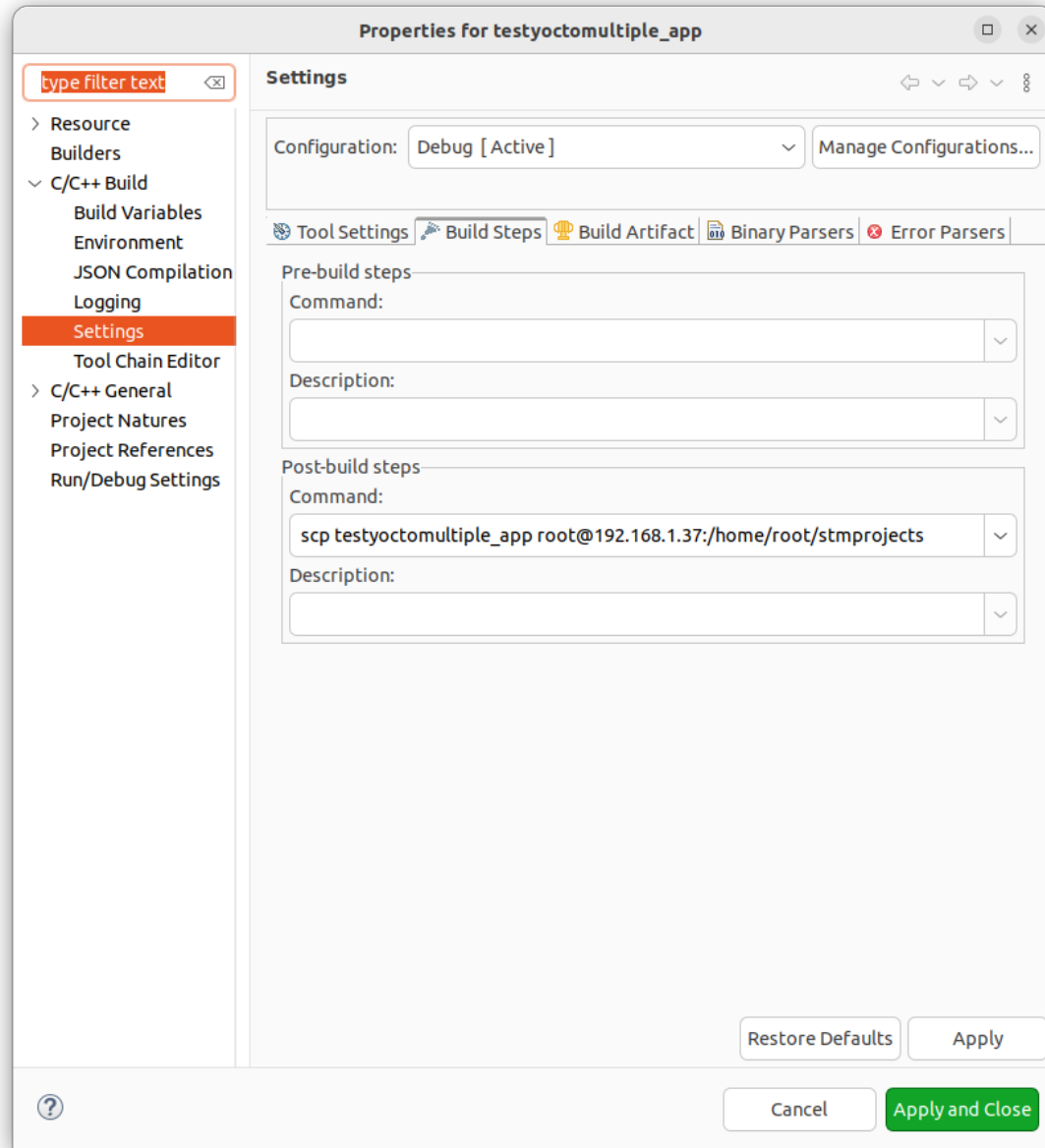
gpiochip0 - 16 lines:

line 0:	"PA0"	input	consumer="wake-up pin"
line 1:	"PA1"	input	consumer="kernel"
line 2:	"PA2"	input	consumer="kernel"
line 3:	"PA3"	input	consumer="kernel"
line 4:	"PA4"	input	consumer="kernel"
line 5:	"PA5"	input	consumer="kernel"
line 6:	"PA6"	input	
line 7:	"PA7"	input	consumer="kernel"
line 8:	"PA8"	input	
line 9:	"PA9"	input	consumer="kernel"
line 10:	"PA10"	output	active-low consumer="reset"
line 11:	"PA11"	input	
line 12:	"PA12"	input	
line 13:	"PA13"	output	
line 14:	"PA14"	output	
line 15:	"PA15"	input	

root@stm32mp15-disco:~/stmprojects#



## Following a Successful Compile - Copy the Application to the stmprojects Directory



## Execute the Application Code

```
fred@shop-ubuntu-1660: ~  
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root@stm32mp15-disco:~# cd stmprojects  
root@stm32mp15-disco:~/stmprojects# ls -l  
total 77  
-rwxr-xr-x 1 root root 78068 Mar 10 11:47 testyoctomultiple_app  
root@stm32mp15-disco:~/stmprojects# ./testyoctomultiple_app  
13=Active 14=Inactive  
13=Inactive 14=Active  
13=Active 14=Inactive  
13=Inactive 14=Active  
13=Active 14=Inactive  
13=Inactive 14=Active  
13=Active 14=Inactive  
13=Inactive 14=Active  
13=Active 14=Inactive  
13=Inactive 14=Active  
13=Active 14=Inactive  
█
```

**Execute the Application Code**

PLEASE INSERT VIDEO HERE





Thank You

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