

Lesson-4: Embedded Linux Device Drivers: User-Mode (Assignment 4)

Command - sudo apt-cache search gpio

```
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code $ sudo apt-cache search gpio
airspyhf - HF+VHF software defined radio receiver - user runtime
ledmon - Enclosure LED Utilities
gpio - Tools for interacting with Linux GPIO character device - binary
libgpio-dev - C library for interacting with Linux GPIO device - static libraries and headers
libgpio-doc - C library for interacting with Linux GPIO device - library documentation
libgpio2 - C library for interacting with Linux GPIO device - shared libraries
python3-libgpio - Python bindings for libgpio (Python 3)
libpigpio-if2-1 - Client library for Raspberry Pi GPIO control
python-periphery-doc - Peripheral I/O (Documentation)
python3-periphery - Peripheral I/O (Python3 version)
python3-rpi.gpio - Module to control Raspberry Pi GPIO channels (Python 3)
rpi.gpio-common - Module to control Raspberry Pi GPIO channels (common files)
stm32flash - STM32 chip flashing utility using a serial bootloader
svxlink-gpio - GPIO control scripts SvxLink amateur radio server
libpigpio-dev - Client tools for Raspberry Pi GPIO control
libpigpio1 - Library for Raspberry Pi GPIO control
libpigpio-if-dev - Development headers for client libraries for Raspberry Pi GPIO control
libpigpio-if1 - Client library for Raspberry Pi GPIO control (deprecated)
pigpio - Raspberry Pi GPIO control transitional package.
pigpio-tools - Client tools for Raspberry Pi GPIO control
pigpiod - Client tools for Raspberry Pi GPIO control
python-gpiozero - Simple API for controlling devices attached to a Pi's GPIO pins.
python-gpiozero-doc - Simple API for controlling devices attached to a Pi's GPIO pins.
python-pigpio - Python module which talks to the pigpio daemon (Python 2)
python3-gpiozero - Simple API for controlling devices attached to a Pi's GPIO pins.
python3-pigpio - Python module which talks to the pigpio daemon (Python 3)
raspi-gpio - Dump the state of the BCM270x GPIOs
raspi-gpio-dbgsym - debug symbols for raspi-gpio
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code $
```

Command - dpkg -L libpigpio-dev

```
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code $ dpkg -L libpigpio-dev
/.
/usr
/usr/include
/usr/include/pigpio.h
/usr/lib
/usr/share
/usr/share/doc
/usr/share/doc/libpigpio-dev
/usr/share/doc/libpigpio-dev/changelog.Debian.gz
/usr/share/doc/libpigpio-dev/copyright
/usr/share/man
/usr/share/man/man3
/usr/share/man/man3/pigpio.3.gz
/usr/lib/libpigpio.so
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code $
```

SourceCode – led21-blink.c

```

GNU nano 5.4                                led21-blink.c
/* Connect Led to GPIO 21 and make it blink */

#include <stdio.h>
#include <pigpio.h>
#include <signal.h>
#include <unistd.h>

#define LED_PIN 21

int running = 1;
void handle_sig_int(int sig)
{
    running = 0;
}

int main()
{
    int result = gpioInitialise();
    if(result<0)
    {
        fprintf(stderr, "gpioInitialise failed\n");
        result = 1;
        goto getOut;
    }

    result = gpioSetMode(LED_PIN, PI_OUTPUT);
    if(result<0)
    {
        fprintf(stderr, "gpioSetMode() failed\n");
        result = 2;
        goto getOut;
    }

    // We need to use Signals
}

```

[Read 55 lines]

^G Help	^O Write Out	^W Where Is	^K Cut	^T Execute	^C Location	M-U Undo	M-A Set Mark
^X Exit	^R Read File	^N Replace	^U Paste	^J Justify	^_ Go To Line	M-E Redo	M-6 Copy

SourceCode – led21-blink.c

```

GNU nano 5.4                                i2c-blink.c
/* i2c-blink.c
 * blink leds connected to i2c device
 * TO BUILD: gcc -Wall -o i2c-blink i2c-blink.c -lpigpio -lrt
 * TO RUN:  sudo ./i2c-blink
 */

#include <stdio.h>
#include <pigpio.h>
#include <signal.h>
#include <unistd.h>

#define MCP23008_I2C_ADDR 0x20

int running = 1;
void handle_sig_int(int sig)
{
    running = 0;
}

int main()
{
    int result = gpioInitialise();

    if(result < 0)
    {
        fprintf(stderr, "gpioInitialise() failed\n");
        result = 1;
        goto getOut;
    }

    // We need to use signals
    int cfg = gpioCfgGetInternals();
    cfg |= PI_CFG_NOSIGHANDLER;
}

```

[Read 77 lines]

^G Help	^O Write Out	^W Where Is	^K Cut	^T Execute	^C Location	M-U Undo	M-A Set Mark
^X Exit	^R Read File	^N Replace	^U Paste	^J Justify	^_ Go To Line	M-E Redo	M-6 Copy

Command - sudo raspi-config

Raspberry Pi 4 Model B Rev 1.5

Raspberry Pi Software Configuration Tool (raspi-config)

- | | |
|------------------------|---|
| 1 System Options | Configure system settings |
| 2 Display Options | Configure display settings |
| 3 Interface Options | Configure connections to peripherals |
| 4 Performance Options | Configure performance settings |
| 5 Localisation Options | Configure language and regional settings |
| 6 Advanced Options | Configure advanced settings |
| 8 Update | Update this tool to the latest version |
| 9 About raspi-config | Information about this configuration tool |

<Select>

<Finish>

Raspberry Pi Software Configuration Tool (raspi-config)

- | | |
|------------------|--|
| I1 Legacy Camera | Enable/disable legacy camera support |
| I2 SSH | Enable/disable remote command line access using SSH |
| I3 VNC | Enable/disable graphical remote access using RealVNC |
| I4 SPI | Enable/disable automatic loading of SPI kernel module |
| I5 I2C | Enable/disable automatic loading of I2C kernel module |
| I6 Serial Port | Enable/disable shell messages on the serial connection |
| I7 1-Wire | Enable/disable one-wire interface |
| I8 Remote GPIO | Enable/disable remote access to GPIO pins |

<Select>

<Back>



Command - lsmod | head

```
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code/i2c $ sudo raspi-config
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code/i2c $ lsmod | head
Module                Size  Used by
i2c_bcm2835           16384  0
rfcomm                53248  0
cmac                   16384  0
algif_hash            16384  0
aes_arm64             16384  0
aes_generic           36864  1 aes_arm64
algif_skcipher        16384  0
af_alg                28672  2 algif_hash,algif_skcipher
bnep                  24576  0
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code/i2c $
```

Output - i2c-blink

```
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code/i2c $ nano i2c-blink.c
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code/i2c $ gcc -Wall -o i2c-blink i2c-blink.c -lp
igpio -lrt
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code/i2c $ sudo ./i2c-blink
i2cWriteByteData() failed
cxr1020@raspberrypi:~/Documents/EmbeddedLinuxRepo/CSR-EmbeddedLinux/Assignment04-Code/i2c $
```