deti universidade de aveiro
departamento de eletrónica,
telecomunicações e informática

Raspberry Pi 4 Model B

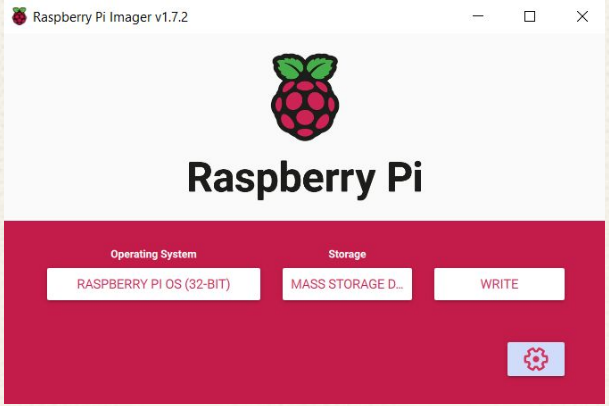
Project - STOP Button for a Bus

TP1 - Grupo 7
Lúcia Sousa 93086
Raquel Pinto 92948

24/05/2022 ASE - Arquitetura de Sistemas Embutidos

Raspberry Pi Imager

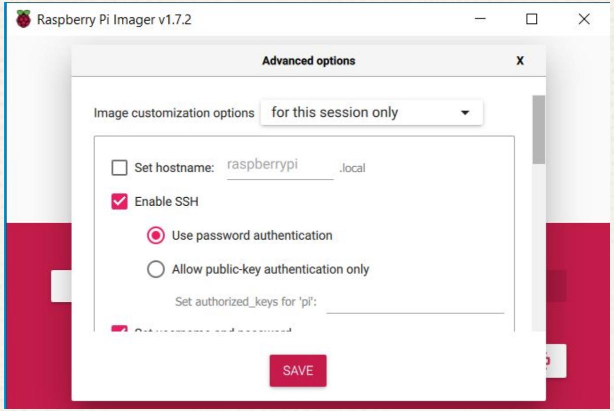
Raspberry Pi Imager is a way to install Raspberry Pi OS or other OS to a microSD card, ready to use with a Raspberry Pi.



Raspberry Pi Imager v1.7.2

Operating System: RASPBERRY PI OS (32-BIT)

Storage: MASS STORAGE D...

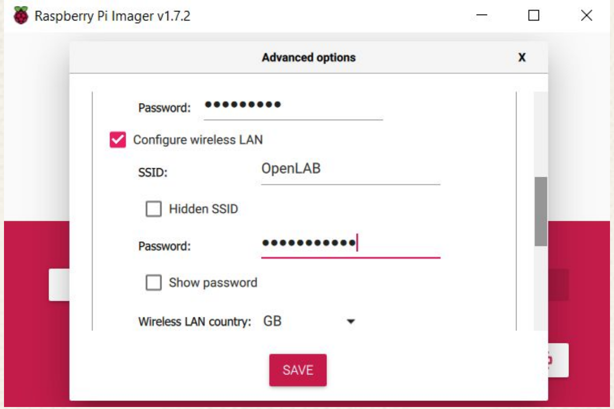


Raspberry Pi Imager v1.7.2

Advanced options

Image customization options: for this session only

- ☐ Set hostname: raspberrypi .local
- ☑ Enable SSH
  - ● Use password authentication
  - ○ Allow public-key authentication only
  - Set authorized_keys for 'pi':



Raspberry Pi Imager v1.7.2

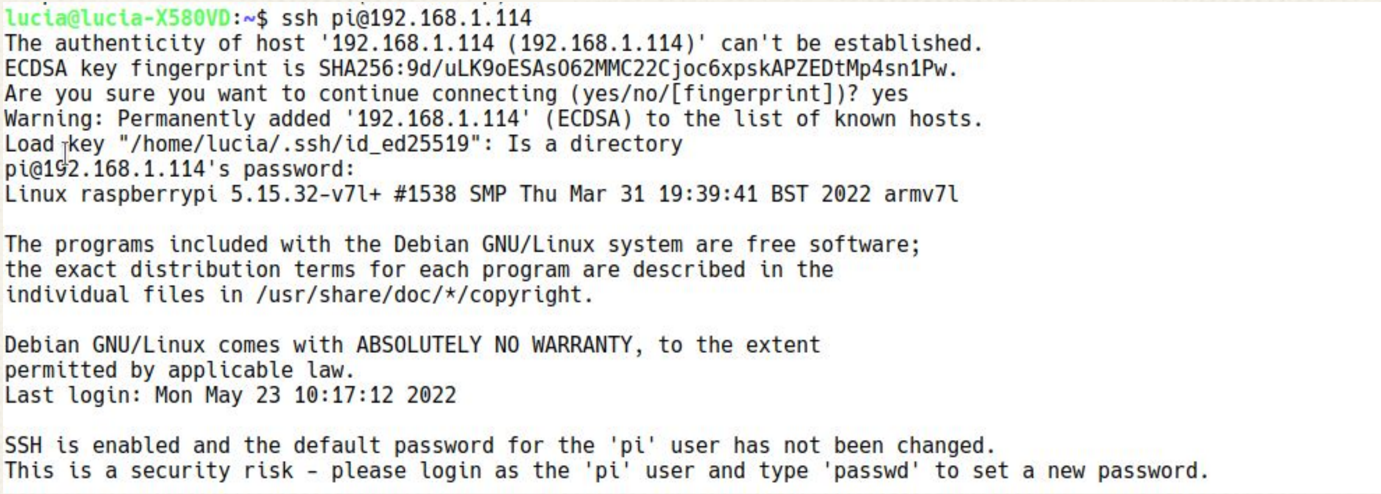
Advanced options

Password: •••••••••

- ☑ Configure wireless LAN
  - SSID: OpenLAB
  - ☐ Hidden SSID
  - Password: ••••••••••••
  - ☐ Show password
  - Wireless LAN country: GB

Access to Raspberry

- Find Raspberry Pi IP address by *nmap -sP 192.168.1.0/24*.
- Access to Raspberry Pi by SSH *ssh pi@192.168.1.114*.
- Define IP address as static.

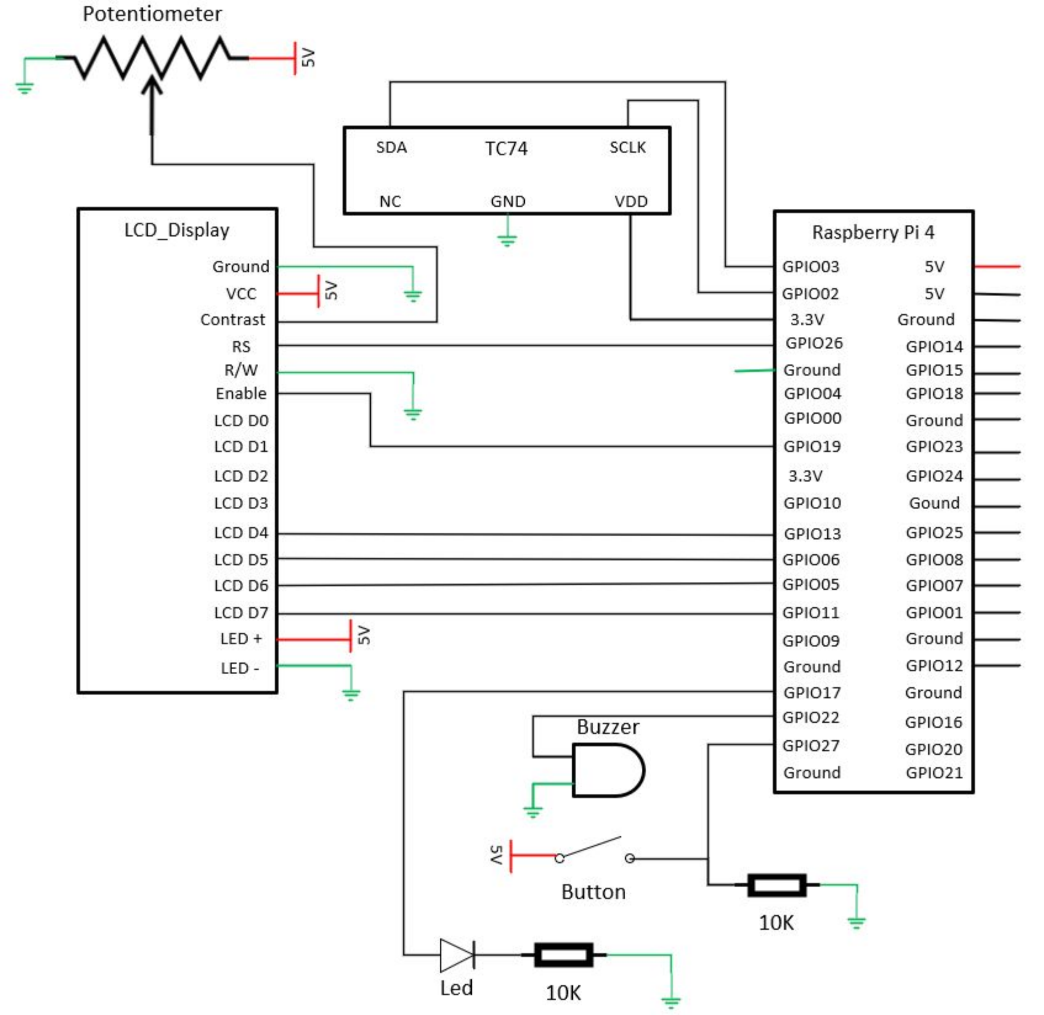


```
lucia@lucia-X580VD:~$ ssh pi@192.168.1.114
The authenticity of host '192.168.1.114 (192.168.1.114)' can't be established.
ECDSA key fingerprint is SHA256:9d/uLK9oESAsO62MMC22Cjoc6xpskAPZEDtMp4sn1Pw.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.1.114' (ECDSA) to the list of known hosts.
Load key "/home/lucia/.ssh/id_ed25519": Is a directory
pi@192.168.1.114's password:
Linux raspberrypi 5.15.32-v7l+ #1538 SMP Thu Mar 31 19:39:41 BST 2022 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Mon May 23 10:17:12 2022

SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set a new password.
```

Project Idea

- Create a STOP button for a bus.
- What was required:
  - Button
  - Buzzer
  - LCD Display
  - Led
  - Temperature Sensor
  - Potentiometer (to regulate LCD’s contrast)
  - Resistors (10k Ohms)

Project Diagram



Project Implementation

- **Documents**
  - **project**
    - main.py
    - lcd.py

Functions from lcd.py

```
lcd_init()
lcd_string(message,style)
lcd_byte(bits, mode)
```

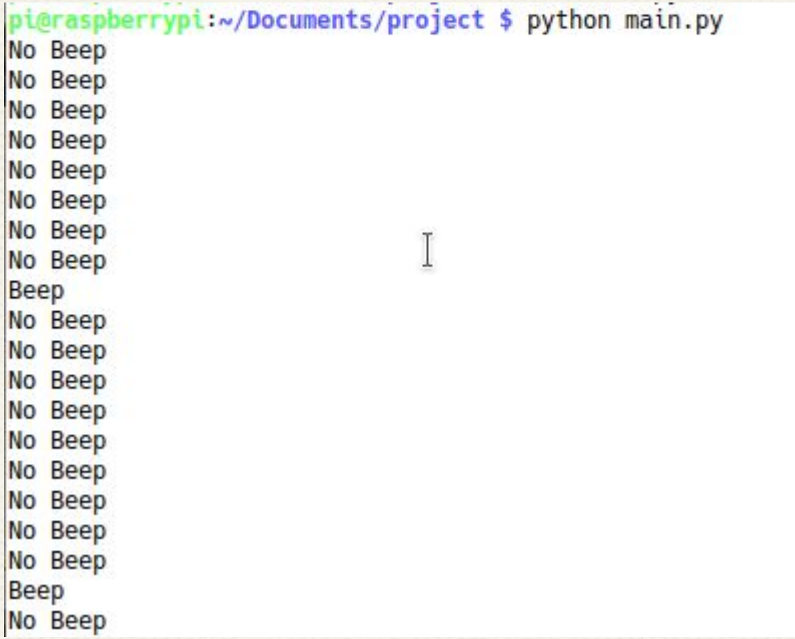
Fraction of code from main.py

```
time = datetime.now()                                      #hours and minutes
temperature = read_temp()                                  #temperature Celsius
lcd.lcd_byte(lcd.LCD_LINE_2, lcd.LCD_CMD)                  #select second line LCD
lcd.lcd_string(time_temperature, 2)                        #print in center
  if GPIO.input(button) == True:                           #if button pressed
    GPIO.output(led, GPIO.HIGH)                            #turn on led
    lcd.lcd_byte(lcd.LCD_LINE_1, lcd.LCD_CMD)              #select first line LCD
    lcd.lcd_string("STOP",2)                               #print in center STOP
    Buzz.start(50)                                         #start buzzer
    Buzz.ChangeFrequency(44)                               #change frequency
Buzz.stop()                                                #stop buzzer
GPIO.output(led, GPIO.LOW)                                 #turn off led
```

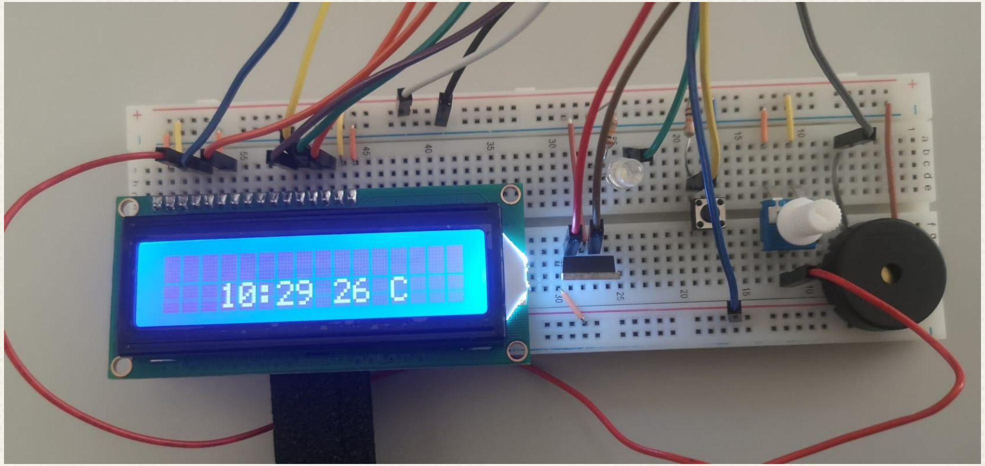
```
def read_temp():  temp = bus.read_byte_data(i2c_address,0)
```

Compilation, Execution and Demo

- Run file *python main.py*.



```
pi@raspberrypi:~/Documents/project $ python main.py
No Beep
No Beep
No Beep
No Beep
No Beep
No Beep
No Beep
No Beep
Beep
No Beep
No Beep
No Beep
No Beep
No Beep
No Beep
No Beep
No Beep
No Beep
Beep
No Beep
```



Bibliography

- https://www.youtube.com/watch?v=cVdSc8VYVBM
- https://learn.adafruit.com/drive-a-16x2-lcd-directly-with-a-raspberry-pi/wiring
- https://www.raspberrypi.com/software/
- https://learn.adafruit.com/adafruits-raspberry-pi-lesson-4-gpio-setup/configuring-i2c
- https://www.tomshardware.com/how-to/buzzer-music-raspberry-pi-pico