Smart Devices

Agenda

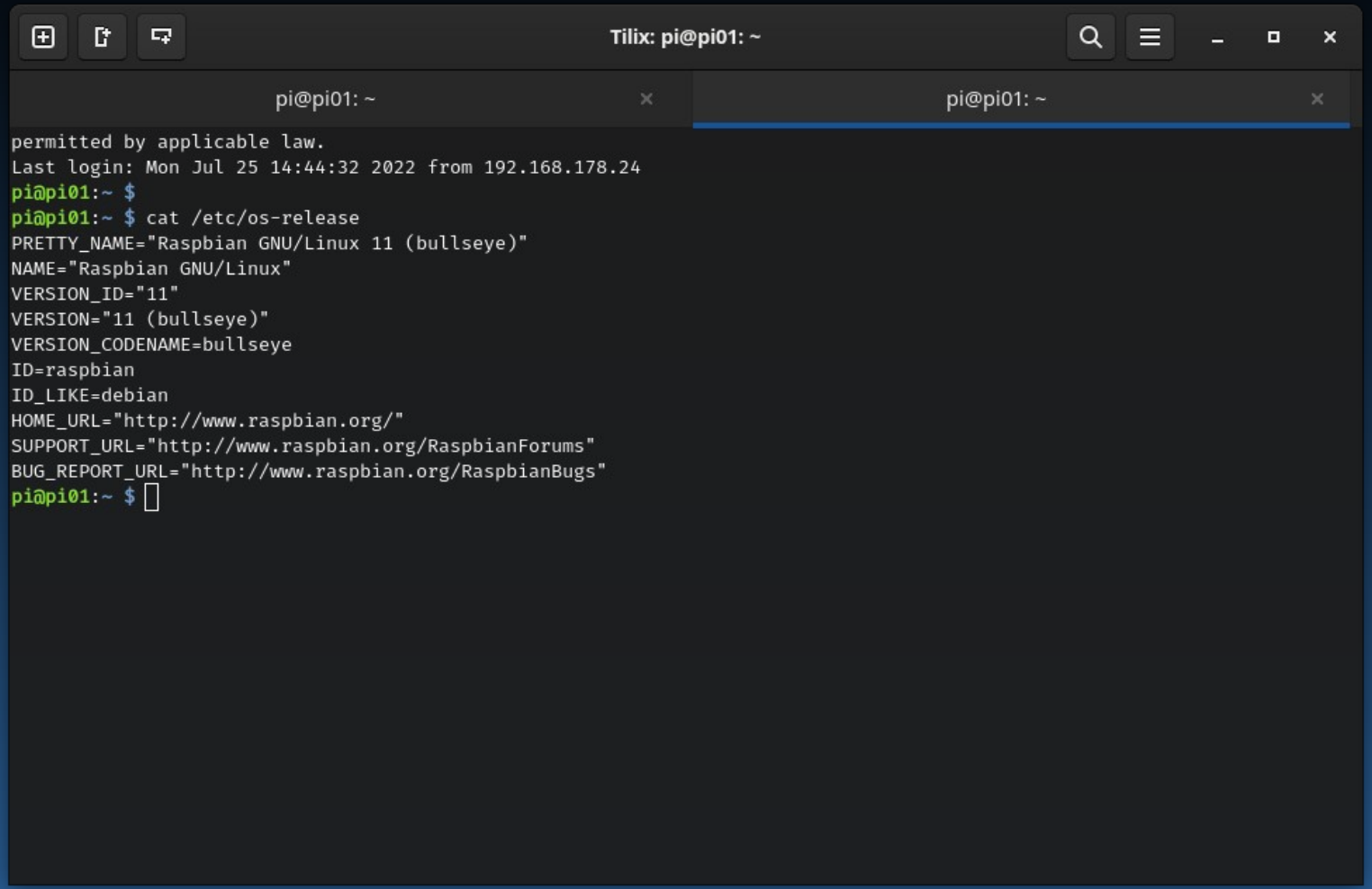
- Requirements
- Preparation
- Cabeling
- First Boot
- Programming
  - Web Server
  - Auto Start Web Server
  - Auto Start Browser

Requirements

Requirements

- Software
  - Raspberry Imager
  - Raspberry Pi OS
  - Fritzing
  - Putty or other SSH client

Requirements

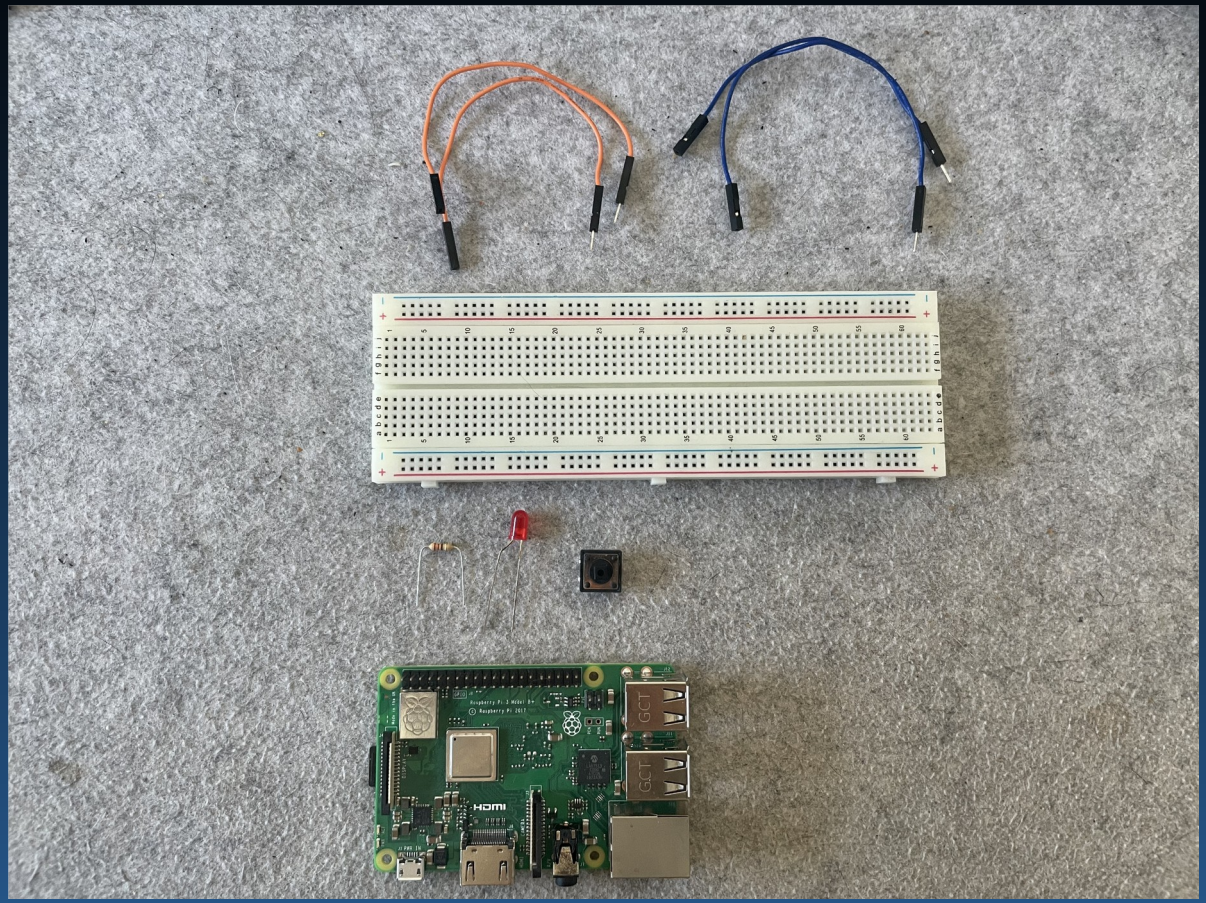


Requirements

Hardware

- Raspberry Pi
- Breadboard
- LED
- Resistor
- Cables
- Some Display

Programming - Preparation

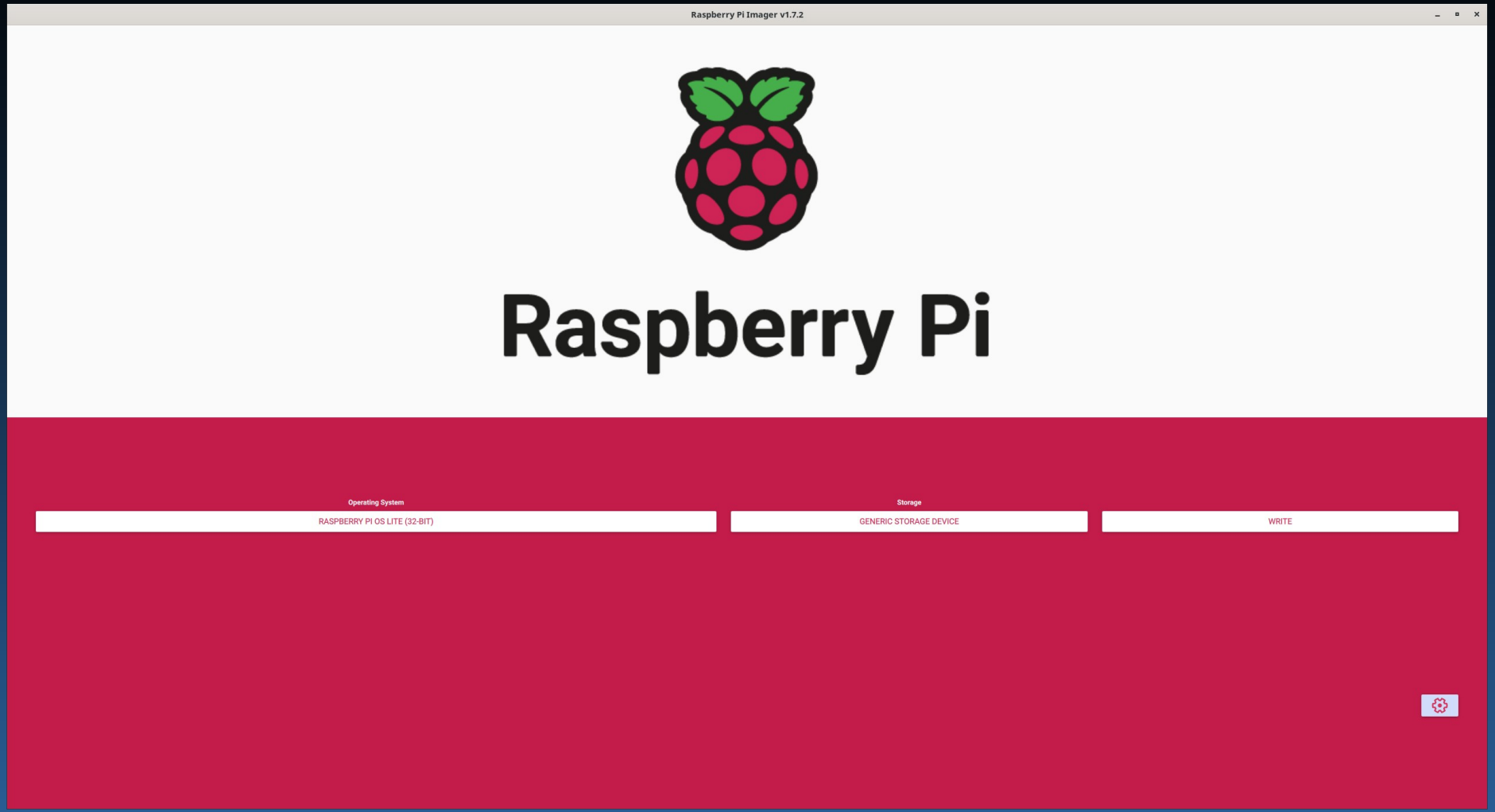


Preparation

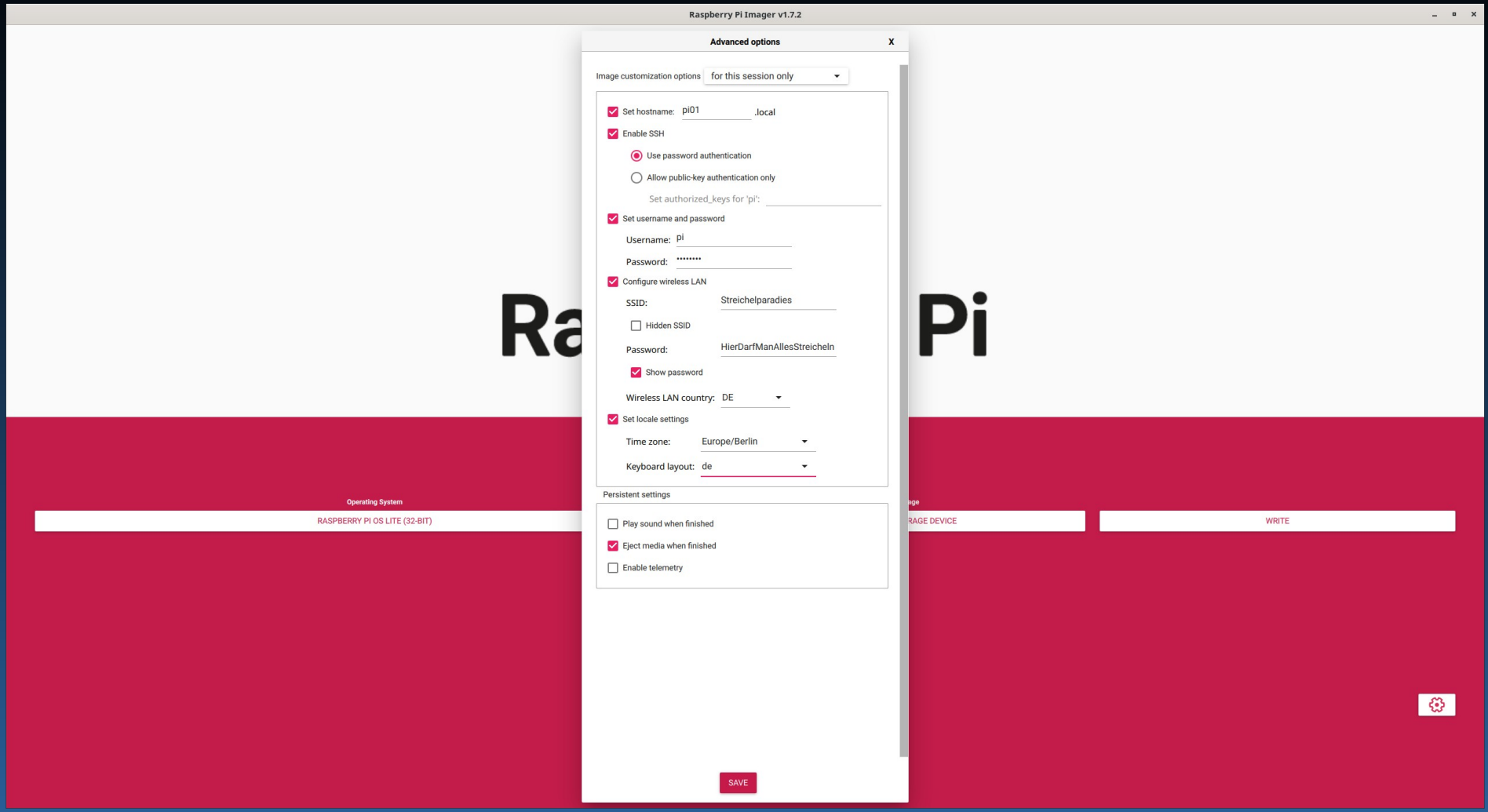
Preparation

- Manual Install
  - Download lite image
    ```
    $ wget https://downloads.raspberrypi.org/raspios_lite_armhf_latest
    ```
  - Download regular image
    ```
    $ wget https://downloads.raspberrypi.org/raspios_armhf_latest
    ```
  - Write SD card
    ```
    $ unzip -p <IMAGE> | sudo dd of=/dev/mmcblk0 oflag=sync status=progress bs=4M
    ```
- Guided Install
  - Download Raspberry Imager

Preparation



Preparation

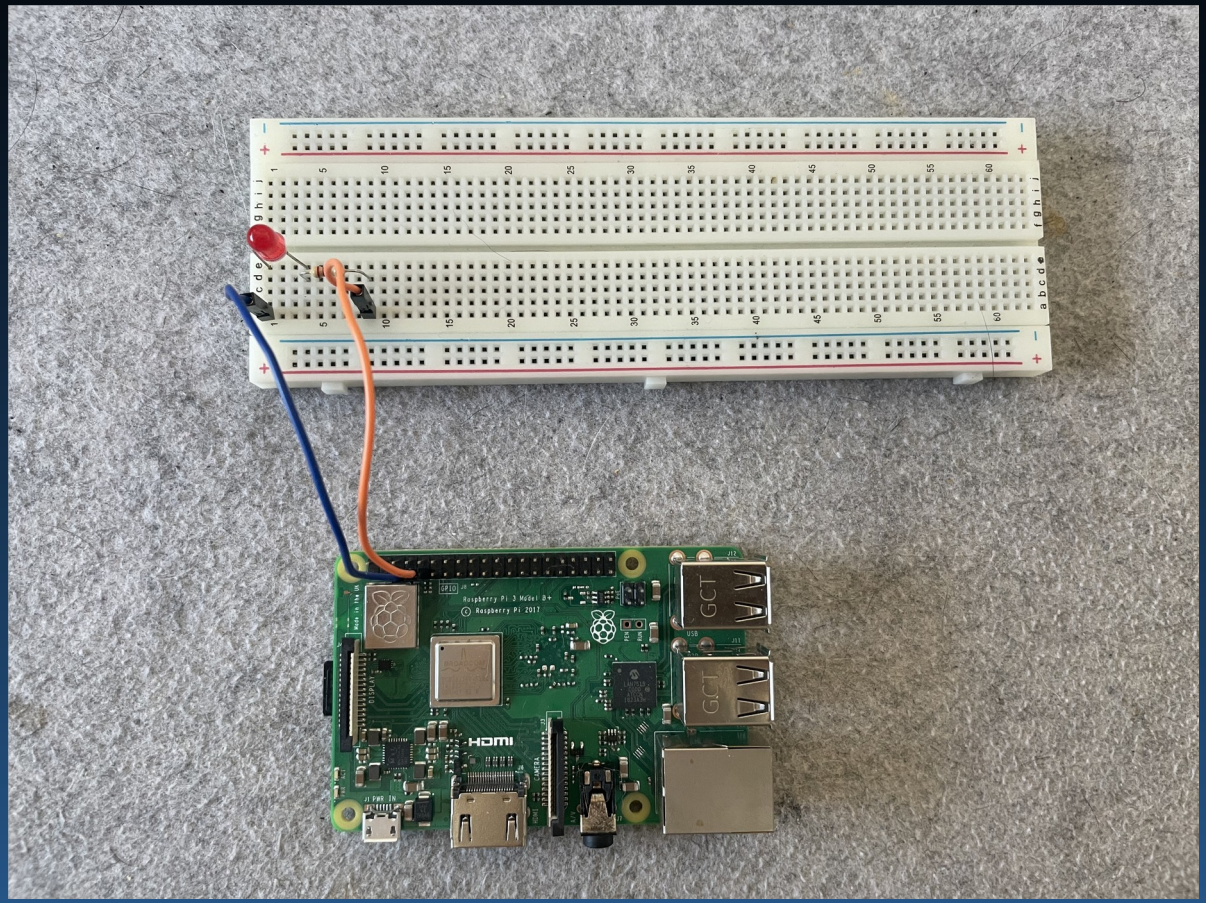


Programming

Programming - Preparation

- Create a working directory
  ```
  $ mkdir project
  ```
- Navigate there
  ```
  $ cd project/
  ```
- Start a new file
  ```
  $ nano led_1.py
  ```
- Continue with the exercises

Programming – LED and Web Server



Programming – LED 1

```
from gpiozero import LED
from time import sleep

led = LED(4)

led.on()
sleep(1)
led.off()
```

Programming – Web Server 1

```
from http.server import BaseHTTPRequestHandler, HTTPServer
import time

hostName = ""
serverPort = 8080

class MyServer(BaseHTTPRequestHandler):

    def do_GET(self):
        self.send_response(200)
        self.send_header("Content-type", "text/html")
        self.end_headers()
        html = '''
           <html>
           <body
            style="width:960px; margin: 20px auto;">
           <h1>Welcome to my Raspberry Pi</h1>
           <form action="/" method="POST">
               Turn LED_1 :
               <input type="submit" name="LED_1" value="On">
               <input type="submit" name="LED_1" value="Off">
           </form>
           </body>
           </html>
        '''
        self.wfile.write(html.encode("utf-8"))

### Main ###

if __name__ == "__main__":
    webServer = HTTPServer((hostName, serverPort), MyServer)
    print("Server started http://%s:%s" % (hostName, serverPort))

    try:
        webServer.serve_forever()
    except KeyboardInterrupt:
        pass

    webServer.server_close()
    print("Server stopped.")
```

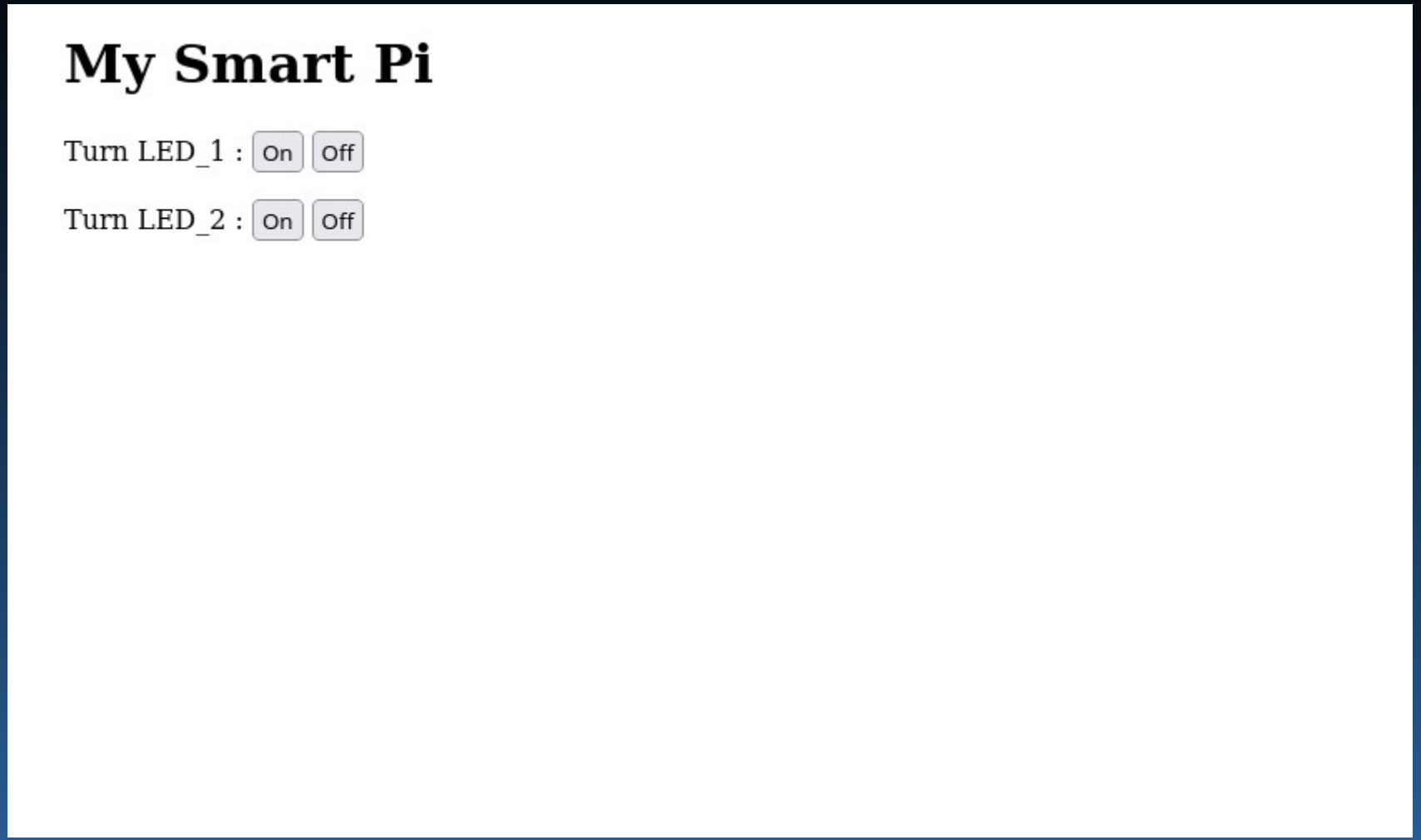
Programming – Web Server 2

```
...SNIP...
    def do_POST(self):

        content_length = int(self.headers['Content-Length'])
        post_data = self.rfile.read(content_length).decode("utf-8")
        print(post_data)

        if post_data == 'LED_1=On':
            led_1.on()
        elif post_data == 'LED_1=Off':
            led_1.off()

        self._redirect('/')
...SNIP...
```

Programming – Web Server 3

```
...SNIP...
    def _redirect(self, path):
        self.send_response(303)
        self.send_header('Content-type', 'text/html')
        self.send_header('Location', path)
        self.end_headers()
...SNIP...
```

Configuring – Autostart Web Server



Configuring – Autostart Web Server

```
# Copy your server program
$ sudo cp web_3.py /usr/local/bin/
```

```
# Create a new systemd service unit
$ sudo nano /etc/systemd/system/webpi.service
```

```
# /etc/systemd/system/webpi.service

[Unit]
Description=A bit about your service

[Service]
Type=simple
ExecStart=python /usr/local/bin/web_3.py
Restart=on-failure

[Install]
WantedBy=multi-user.target
```

Configuring – Autostart Web Server

```
# Enable the server
$ sudo systemctl daemon-reload
$ sudo systemctl enable webpi.service
$ sudo systemctl start webpi.service
```

```
# Test
$ netstat -tlpn
$ curl localhost:8080
```

Configuring – Autostart Browser

Configuring – Autostart Browser

```
# Install (this will take a while)
$ sudo apt-get update
$ sudo apt-get install ttf-mscorefonts-installer \
  x11-xserver-utils midori lxsession lightdm
```

```
# Configure Autostart Desktop (with automatic login)
$ sudo raspi-config
$ reboot
```

Configuring – Autostart Browser

```
# Change Autostart
$ sudo nano .config/lxsession/LXDE/autostart
```

```
# .config/lxsession/LXDE/autostart
@midori -e fullscreen -a http://localhost:8080
@xset s noblank
@xset s off
@xset -dpms
```

Docs & Links

- https://www.raspberrypi.org/
- https://www.raspberrypi.com/documentation/computers/os.html#gpio-and-the-40-pin-header
- https://gpiozero.readthedocs.io/en/stable/
- https://github.com/dschier-wtd/presentations/