Raspberry Pi Teacher's Workshop

Welcome !

What's in Your Bag, You Keep!

- Raspberry Pi Model 3 B+
- Power supply, 5V 2.5A
- 16 GB microSD card with Raspberry Pi OS operating system.
- Coupé case – protects your Pi but leaves it accessible.
- Pi education parts kit.

Agenda

- 8:15 – 8:45 Check-in and continental breakfast
- 8:45 – 9:30 Introductions, overview of Raspberry Pi; set up your Pi
- 9:30 – 9:45 Familiarization with parts pack
- 9:45 – 12:00 Physical computing – projects with LEDs and buttons (breaks as needed)
- 12:00 – 12:45 Lunch and networking
- 12:45 – 2:00 Original project with LEDs, sensors, buttons, buzzers
- 2:00 – 2:15 Break
- 2:15 – 3:30 Group projects; breaks as needed
- 3:30 – 4:00 Attendees present and discuss projects
- 4:00 – 4:15 Minecraft and Music and Motors and HATs
- 4:15 – 4:30 Wrap-

Set Up Your Raspberry Pi

Please don’t install the case yet!

Inserting the MicroSD Card

The card goes in a slot underneath the printed circuit board, with pins facing upward.

Cable Connections

Insert the power cable last.

The Breadboard and Parts Kit

Breadboard

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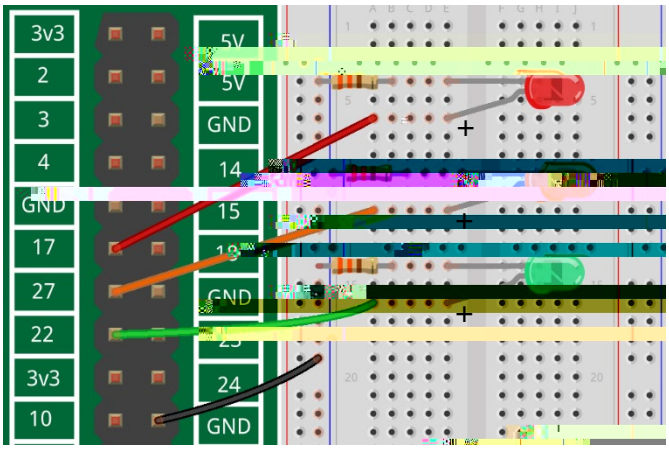
Projects with the Parts Pack

Connecting simple components to the GPIO pins is perfectly safe, but it is important to be careful how you wire things. LEDs should have resistors to limit the current passing through them. Do not use 5V or 3v3 components. Do not connect motors directly to the GPIO pins; you need a motor controller. Notice that the pins are not in numerical order; be sure to use your GPIO Reference. The Raspberry Pi Foundation's GPIO page is here: https://www.raspberrypi.org/documentation/usage/gpio/

If somethi

Traffic Lights

Schematic diagrams like the one at the right abstract away some of the construction details to focus on how the parts are connected. In the schematic diagram, a heavy dot indicates connected wires. Wires with no dot cross without connection. Note the use of the blue rail to give all the resistors access to ground.




```
# Traffic Light example – not a complete program
from gpiozero import LED
from time import sleep
red = LED(17)
amber = LED(27)
green = LED(22)
while True:
        red.on()
        sleep(3)
        red.off()
        green.on()
# And then what?
```

Pushbutton

Wire two pins on the same side of the pushbutton.

Buzzer

The buzzer is connected just like an LED, but does not need a resistor. Connect the positive

Wireless Network Access

Your Raspberry Pi is pre-configured for the KSU guest network, but

The motion sensor has adjustments for sensitivity and delay time, and a jumper block for "retriggering." The explanations are beyond the scope of this handout, but Adafruit has provided a very nice tutorial here:
https://learn.adafruit.com/pir-passive-infrared-proximity-motion-sensor?view=all

More information about using the motion sensor is here:

https://gpiozero.readthedocs.io/en/stable/api_input.html#motion-sensor-d-sun-pir

Light Sensor

The light sensor is called a photoresistor or light dependent resistor (LDR.) Its resistance changes depending upon how much light is striking it. Although it is possible to measure light

This circuit must be attached with the Raspberry Pi turned off. Check your wiring very carefully because incorrect wiring can damage your Raspberry Pi. If you do this in

To make screenshots for your class, you can use the Gnome Screenshot program. It's installed on your microSD card. To use it, Click → Accessories → Screenshot. The documentation is very sparse; Google is your friend.

Software

The software image on your microSD card is available from http://ccse.rocks/rpi. It is based on the version of Raspberry Pi OS from May 7, 2021.

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Copying Your microSD Card

It isn't easy to mess up an SD card, but it's possible, and they're a bit delicate. You will

Before you open a port or use a public Internet address, you will need to harden your Raspberry Pi operating system. That's beyond the scope of this handout, but here is a helpful article here: https://makezine.com/2017/09/07/secure-your-raspberry-pi-against-attackers/

Using a Webcam with the Raspberry Pi

You can buy a nifty camera erygs/Ataspberry Pi