Mini-sumo with the Zumo 2040

January 6, 2024 at Pololu - Paul Grayson - pdg@alum.mit.edu - paul@pololu.com
https://github.com/pdg137/sumo

Using Thonny

1. Install from https://thonny.org/ (Windows/Mac/Linux)
2. Go to "Tools > Manage plug-ins...", install thonny-pololu, and restart
3. Connect the robot with USB-C cable, select Zumo in the lower-right:
4. Open files on the "MicroPython" drive.
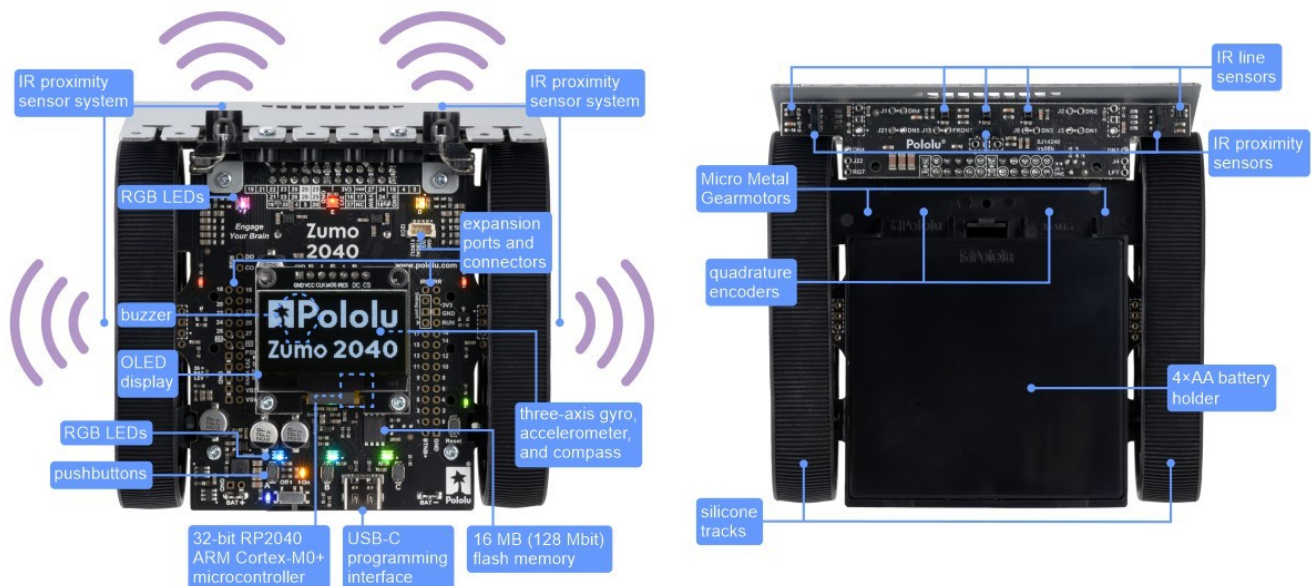5. Find my examples at https://github.com/pdg137/sumo
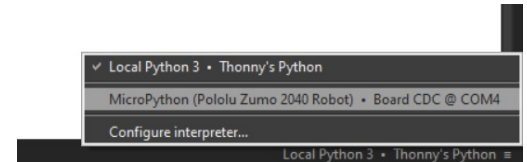
Tips:
- Click "Stop" to reconnect
- When you make progress "Save a copy" on your computer so you don't lose your work!!!

The Zumo 2040

⚡ Static precautions! ⚡

- Avoid touching components and wires as much as possible
- Discharge yourself often (touch a metal door, etc.)
- When handing robot to another person, touch hands first 🤝 🤝

Using MicroPython

Standard libraries: https://docs.micropython.org/en/latest/library

Zumo 2040 examples & libraries: https://github.com/pololu/zumo-2040-robot

Proximity sensing:

- Two sets of modulated IR emitters: left and right
- Three sensors (left, front, right) count reflected pulses
  ----> SIX sensing values.

For example, `proximity_sensors.counts[1][0]` gives the reading from the front sensor (`1`) when the left (`0`) LEDs are activated.

Structure of a robot program

```python
from zumo_2040_robot import robot       1. imports
import time


motors = robot.Motors()                 2. define variables
proximity_sensors = robot.ProximitySensors()
button_a = robot.ButtonA()
display = robot.Display()
buzzer = robot.Buzzer()

display.fill(0)                         3. setup
display.text("Press A", 0, 0)
display.show()
buzzer.play("o5c32>c32")

while not button_a.check():
    pass

display.fill(0)
display.text("Go!!!", 0, 0)
display.show()

buzzer.play("c4r4c4r4")
buzzer.play_in_background("g2")

while True:                             4. main loop
    proximity_sensors.read()

    left = proximity_sensors.counts[0]
    front = proximity_sensors.counts[1]
    right = proximity_sensors.counts[2]

    display.fill(0)
    display.text(str(list(left)), 0, 0)
    display.text(str(list(front)), 0, 10)
    display.text(str(list(right)), 0, 20)
    display.show()

    if sum(front) > 2:
        motors.set_speeds(3000, 3000)
    elif sum(left) > 1:
        motors.set_speeds(-3000, 3000)
    elif sum(right) > 1:
        motors.set_speeds(3000, -3000)
    else:
        motors.off()
```