Automatic Door Simulation using Rack & Pinion, Servo, Pressure Sensor and Limit Switches
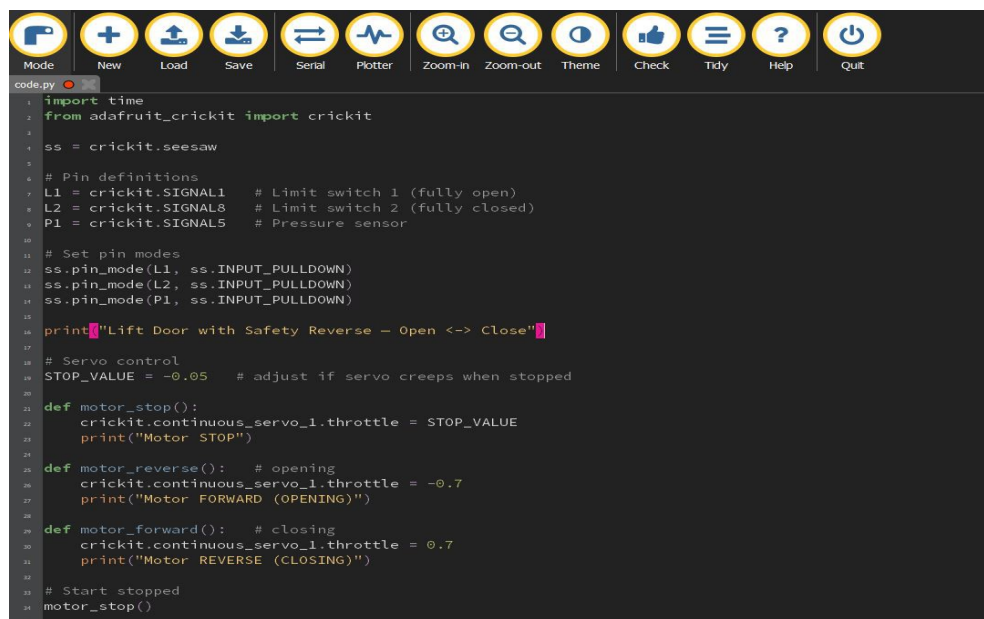
Step 1: Components Required

- Crickit board (or Arduino/CPX board)
- MG995 Servo motor (for strong torque)
- Rack & Pinion gear set
- Pressure sensor (force sensor or push button)
- 2 × Limit switches (left and right ends)
- Jumper wires and breadboard
- Power supply (5–6V, 2A for servo)
- Mounting board (wood/acrylic)

Step 2: Connect Components

- Fix rack and pinion to simulate the sliding door.
- Connect the servo motor to the Crickit/Arduino board.
- Place limit switches on both ends of the rack to stop movement at limits.
- Connect the pressure sensor to trigger the door movement.

Step 3:Code

```python
import time
from adafruit_crickit import crickit

ss = crickit.seesaw

# Pin definitions
L1 = crickit.SIGNAL1    # Limit switch 1 (fully open)
L2 = crickit.SIGNAL8    # Limit switch 2 (fully closed)
P1 = crickit.SIGNAL5    # Pressure sensor

# Set pin modes
ss.pin_mode(L1, ss.INPUT_PULLDOWN)
ss.pin_mode(L2, ss.INPUT_PULLDOWN)
ss.pin_mode(P1, ss.INPUT_PULLDOWN)

print("Lift Door with Safety Reverse — Open <-> Close")

# Servo control
STOP_VALUE = -0.05    # adjust if servo creeps when stopped

def motor_stop():
    crickit.continuous_servo_1.throttle = STOP_VALUE
    print("Motor STOP")

def motor_reverse():    # opening
    crickit.continuous_servo_1.throttle = -0.7
    print("Motor FORWARD (OPENING)")

def motor_forward():    # closing
    crickit.continuous_servo_1.throttle = 0.7
    print("Motor REVERSE (CLOSING)")

# Start stopped
motor_stop()
```

```
while True:
    # If pressure detected → OPEN door
    if ss.digital_read(P1):
        print("Pressure detected → opening door")
        motor_reverse()

        # Keep opening until fully open (L1 triggered)
        while ss.digital_read(L1) == 1:
            time.sleep(0.01)

        # Door is fully open → start closing
        print("Door fully open → start closing")
        motor_forward()

        # Keep closing until fully closed OR pressure sensor pressed again
        while True:
            if ss.digital_read(P1):    # SAFETY REVERSE
                print("Pressure detected while closing → reopen immediately")
                motor_reverse()
                break  # break closing loop → reopen again
            if ss.digital_read(L2) == 0:   # fully closed
                print("Door fully closed → stop")
                motor_stop()
                break
            time.sleep(0.01)

    time.sleep(0.05)
```

Step 4: Save & Run

- Save the code as **code.py** (for CircuitPython) or upload Arduino sketch.

- Upload to the board and test the mechanism.

- Press the pressure sensor to simulate a person → door opens until open limit switch.

- After 2 seconds, door closes until close limit switch.