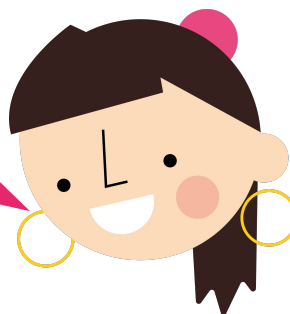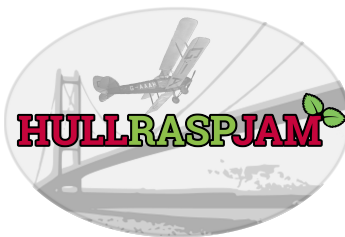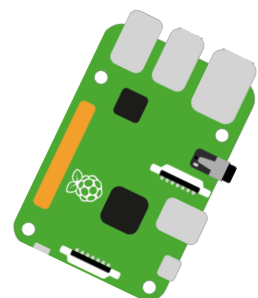# CAMJAM EDUKIT 3 ROBOT GPIO ZERO

Introduction

In this worksheet we are going to learn the basics of building a robot using the CamJam EduKit3 Robotics kit and using the Python 3 GPIO Zero library to control our robot's motors. This kit is available from The Pi Hut for £18 - https://thepihut.com/collections/camjam-edukit/products/camjam-edukit-3-robotics

There is not time to build a complete robot chassis, so we will look at connected the required hardware to our Raspberry Pi and wiring up our motors and then look at writing some Python programmes to control our motors. Hopefully this will whet your appetite enough to inspire you to go and build your own robot!

Hardware Set Up

As motors can pull a large ammount of electrical current, it is not advisable to try to drive them directly from the GPIO pins on your Raspberry Pi. You would end up with a broken Raspberry Pi and a non-functioning robot! To get around this we use something known as a H-Bridge to power our motors from a battery pack but to control them using the GPIO pins from our Pi.

The EduKit 3 comes with it's own Motor Controller Board to do this. First off you need to wire up your motors and battery pack to the controller board as shown. Pay particular attention to the battery box wires!
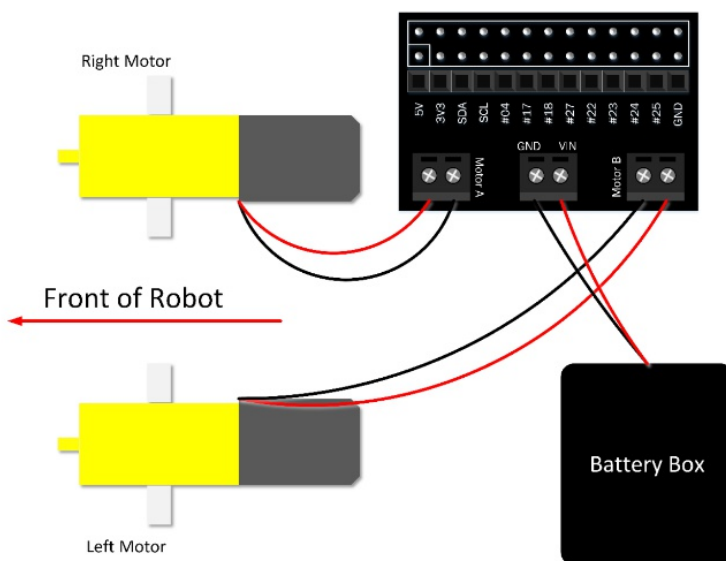
Hardware Set Up

Attach your wheels to your motors, and then use two pieces of blue tac to stand your motors up so that the wheels can move freely. You also need to insert the 4 AA batteries into your battery pack the correct way round!

We now need to attach our EduKit Motor Controller board to our Raspberry Pi. Make sure your Raspberry Pi is turned off before you do this step! Pay close attention to the diagram below, as if you attach the board incorrectly you could damage both the board and your Pi irreparably!
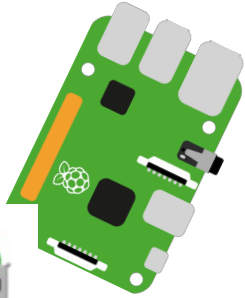
Running the Motors

We are now going to write a small Python program which will run our motors. Open Python 3 from the Programming folder of the main menu and then press "Ctrl + N" when the IDLE3 window opens to start a new Python file. Save the file as "motors.py". Type the following code into your file and save and run it by pressing "Ctrl + S" followed by the F5 key - make sure you have turned your battery pack on at this point!
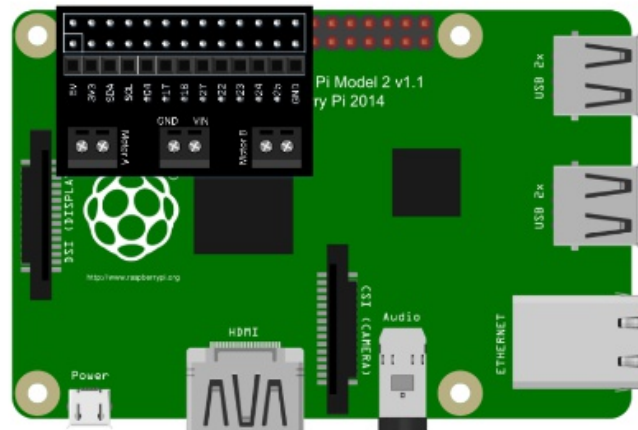
Your wheels should turn - check they are both turning the same way, and if they are not then reverse the red and black cables for one of the motors into the controller board.

```
# CamJam EduKit 3 - Robotics
# Motor Test Code

# Import CamJamKitRobot class from GPIOZero
from gpiozero import CamJamKitRobot
# Import sleep function from time
from time import sleep

# define our robot
robot = CamJamKitRobot()

# run the motors forward for 2 seconds
robot.forward(1)
sleep(2)
```

Driving and Turning

Now we have our motors connected the right way round, we can write another short Python program which allow us to make our motors turn forwards, backwards, left and right. We could then combine them with a Python controller program like the fantastic "Blue Dot" Android and Python Bluetooth controller program!

Create another new Python file and this time save it as "driving.py". Enter the code show into the file and then run it by pressing "Ctrl +S" followed by the F5 key.

```
# CamJam EduKit 3 - Robotics
# Driving

# Import CamJamKitRobot class from GPIOZero
from gpiozero import CamJamKitRobot
# Import sleep function from time
from time import sleep

# define our robot
robot = CamJamKitRobot()

# Make our motors run forwards, backwards,
# left and then right for 4 seconds each
robot.forward()
sleep(4)
robot.backward()
sleep(4)
robot.left()
sleep(4)
robot.right()
sleep(4)
robot.stop()
```

Challenge

* Get yourself a CamJam EduKit 3 Robot kit and build your own robot
* Use the Blue Dot app to control your robot with an android phone or tablet - http://bluedot.readthedocs.io/en/latest/
* Bring your robot to the next Jam for a robot race!