Lab 5

Roomba Control

Figure 1: iRobot Create 2

In this lab we are finally going to play with the Roomba and start commanding it to move around. This will prepare you for the final project with the Roomba.

You should learn or gain experience with:

- How to command the Roomba
- How to read the sensors and react accordingly
- How to monitor the Roomba robot

Task 1: Simple Commanding

Start off commanding the robot to move forward for 5 seconds and the backwards for 5 seconds.

Basic usage information can be found on: https://pypi.python.org/pypi/pycreate2

```
#!/usr/bin/env python
from __future__ import print_function, division
import pycreate2
import time

if __name__ == "__main__":
    # this creates the robot instance we will use
    bot = pycreate2.Create('/dev/ttyUSB0')
    bot.safe()
```

```
        # your code here
        # move forward
        time.sleep(5)
        # move backwards
        time.sleep(5)

        print('All done ... exiting :)')
```

Task 2: Read Sensors in Real-Time

Now we are not going to command the robot to move anymore, but we are going to read the sensors. With the robot standing completely still, read the light bumper sensors, print the results to the screen, and use your hand to change the readings.

```
# reading the IR sensors
sen = bot.get_sensors()
sen.light_bumper_left
sen.light_bumper_front_left
sen.light_bumper_center_left
sen.light_bumper_center_right
sen.light_bumper_front_right
sen.light_bumper_right

sen.cliff_left_signal
sen.cliff_front_left_signal
sen.cliff_front_right_signal
sen.cliff_right_signal
```

```
    #!/usr/bin/env python
    from __future__ import print_function, division
    import pycreate2
    import time

    if __name__ == "__main__":
        # this creates the robot instance we will use
        bot = pycreate2.Create('/dev/ttyUSB0')
        bot.safe()

        # your code here
        while True:  # press ctrl-c to end it
            sen = bot.get_sensors()
            # print the light bumper sensor readings

        print('All done ... exiting :)')
```

The point of this is to understand the values you need to avoid obstacles in the next task.

Task 3: Avoid Obstacles

Now write a program that runs and reads both the light bumpers and cliff sensors. If the light bumpers detect something within ~2 inches, it should turn away. If the cliff sensors values decreases too much (you will have to determine this level), the back up and turn away from the obstacle.

Task 4: Square

Now using your obstacle avoidance routine from above, have the Roomba travel in a square that is 2 m on each side and end up in the same spot it started in.

Note: You will need to be able to command your Roomba to go places while simultaneously avoiding obstacles in your path for the final project.

When you have this working, show your instructor. You still need to be able to avoid obstacles while doing this, however, if something gets in your way, you do not have to worry about ending in the same location you started in. Just complete the cube (best effort) after avoiding the obstacle.

Explain to your instructor the following questions: - Did it work? - How close were you? - Why did this or why not did this work? - How could you improve it?