CMSC 143: Object-Oriented Programming with Robots

Lab 1: Personal Robots

Due September 11, 2014

This lab introduces you to your robot, Calico (our Python programming environment), and the wiki[1].

Learning Objectives

- Become familiar with the IPRE robot kit.
- Learn how to start Calico and save programs.
- Write simple functions.
- Learn how to issue robot commands.
- Learn how navigate the myro wiki.

Deliverables

Submit an electronic copy of your lab using moodle. Your submission should be a zip file that expands to a folder with two files:

```
cmsc143_lab1_LASTNAME/
      lab1.py
      lab1.pdf
```

Your Python program should begin with a comment with your names and the date. Your lab report should address the questions throughout this document. Submit the report as a PDF; be sure to include your names and the date.

Getting to Know Your Robot

1. What COM port did you use to connect to your robot (keep in mind this will change often)?
2. What was the name of your robot? What did you name it?
3. What battery voltage does your robot report?

Self Portrait

Use the robot's camera to take your picture and save it to a file using the following code snippet:

```
p = takePicture()
show(p)
savePicture(p, "me.jpg")
```

[1] http://wiki.roboteducation.org

Driving Your Robot

There a variety of ways of getting your robot to move; in this lab we will stick to using `motors`. The function `motors` asks for two power values in the range $[-1, 1]$ for both the left and right wheels. Experiment with the `motors()` function. Describe the behavior of the robot for the following invocations of `motors`:

`motors(1, 1)`	
`motors(0, 0)`	
`motors(.8, .8)`	
`motors(-1, -1)`	
`motors(1, -1)`	
`motors(-.75, .75)`	
`motors(-1, 0)`	

How can you use motors to make the robot follow an arc? Fill in the blanks in the following functions. They act as shortcuts for making the robot stop, go forward, backward, spin left and right:

```
def stopWheels():
    motors (_____, _____)

def goForward():
    motors (_____, _____)

def goBackward():
    motors (_____, _____)

def spinLeft():
    motors (_____, _____)

def spinRight():
    motors (_____, _____)

def test():
    goForward()           # start going forward
    wait(1)               # wait for one second
    spinLeft()            # spin left
    wait(.1)              # wait for one tenth of a second
    stopWheels()          # stop the robot
```

General-Purpose Movement Functions

Write eight functions that act as more general purpose shortcuts for these various motor patterns; these will allow you drive the robot forward, backward, left, right with varying speeds and durations:

```
def goBackward(p):
    # go backward with power p that ranges from 0-1
    motors (-p, -p)

def goBackwardAndStop(p, secs):
    # complete this comment
    motors (-p, -p)
    wait(secs)
    stopWheels()

def test2():
    goBackwardAndStop(1, .5)
    goForwardAndStop(1, 1.5)
    spinLeftAndStop(.9, .5)
    goForward(.5)
    goBackward(1)
    spinRight(.9)
    spinLeft(.9)
    spinRightAndStop(.9, .5)
```

Scribbling

Use your robot to draw a square, a 5-point star, or another shape using (a) the `gamepad()` and (b) the functions you wrote. Write a paragraph reflecting on the differences between these two approaches.