Lab 1 Linux and Python

Overview

This lab will test your understanding of both linux command line and python.

You should learn or gain experience with:

- Learn how to use the command line for when we work on the Roomba
- Basic testing of your understanding of Python and some of the data types and flow controls we will use on the robots

For this coding, let the EE's do most of the work, CompE's help out, but you have more experience already with python than they do, so help but don't do it unless time is running out in the lab

Task 1 Prelab: Install

If you have not already, please install python on your computer following the software install instructions. This could take some time!!!

Task 2: Command Line

For this, do not use the GUI, you will need to use the command line when we work on the Roomba

1. Open a terminal window and in your home directory, create a folder called `lab_1` (note the underscore between lab and 1)

2. Next, enter that folder and create an empty text file called `task_2.py`

3. Next, open the file from the command line and write a simple python script that produces the following:

   ```
   ./task_2.py
   blah ...
   ```

   This skeleton code will get you started:

   ```python
   #!/usr/bin/env python
   from __future__ import print_function division
   from math import pi

   data = {
       ['one', 3/4, pi/2],
       ['two', 7/5, pi],
       ['three', ]
   }
   ```

```python
def print_stuff(things):
    # insert code here

if __name__ == "__main__":
    print_stuff(data)
```

4. When you have this working, show your instructor.

Task 3: Jupyter

1. From the command line, start the `jupyter` program by typing:

   `jupyter notebook`

   A web browser should open. From the top right, create a new `Python 2` notebook called *Lab 1*

2. Write a program called `task_3.py`, which takes the following 2 matrices and performs the following operations on them. Remember to use `numpy` by adding the following to your program:

   ```python
   from __future__ import division
   from __future__ import print_function
   import numpy as np
   ```

   Print out the results of `C` and `D`

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \tag{1}$$

$$B = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix} \tag{2}$$

$$C = A * B \tag{3}$$

$$D = C + B \tag{4}$$

3. Next let's plot some stuff. In a new cell, add the following:

   ```python
   %matplotlib inline
   from matplotlib import pyplot as plt
   ```

   Now write a program that plots the following 2 lines in plots side-by-side

$$y = 5x + 6 \tag{5}$$

$$z = \frac{1}{3}x - 4 \tag{6}$$

Remember to set the title and the axes as shown in the image below. Your plot should look like this:
insert image

            Robots are cool!