

## Exercise 5

I have made the file directory “**balance-bot**” as described and created files in them as described in the pdf training manual. The result is the creation of a successful GYM environment which I have checked by installing it. The screenshot is as follows:

```
.user@d88aaf14445b:/opt/balance-bot$ sudo pip install -e .
WARNING: The directory '/home/user/.cache/pip' or its parent directory is not owned or is not writable by the current user. The cache has been disabled
permissions and owner of that directory. If executing pip with sudo, you may want sudo's -H flag.
Obtaining file:///opt/balance-bot
Requirement already satisfied: gym in /usr/local/lib/python3.5/dist-packages (from balance-bot==0.0.1) (0.16.0)
Requirement already satisfied: pybullet in /usr/local/lib/python3.5/dist-packages (from balance-bot==0.0.1) (2.5.0)
Requirement already satisfied: six in /usr/lib/python3/dist-packages (from gym->balance-bot==0.0.1) (1.10.0)
Requirement already satisfied: scipy in /usr/local/lib/python3.5/dist-packages (from gym->balance-bot==0.0.1) (1.4.1)
Requirement already satisfied: numpy>=1.10.4 in /usr/local/lib/python3.5/dist-packages (from gym->balance-bot==0.0.1) (1.17.4)
Collecting enum34==1.1.6
  Downloading enum34-1.1.10-py3-none-any.whl (11 kB)
Requirement already satisfied: cloudpickle==1.2.0 in /usr/local/lib/python3.5/dist-packages (from gym->balance-bot==0.0.1) (1.2.2)
Requirement already satisfied: pygame<=1.5.0,>=1.4.0 in /usr/local/lib/python3.5/dist-packages (from gym->balance-bot==0.0.1) (1.5.0)
Requirement already satisfied: future in /usr/local/lib/python3.5/dist-packages (from pygame<=1.5.0,>=1.4.0->gym->balance-bot==0.0.1) (0.18.2)
Installing collected packages: balance-bot, enum34
  Running setup.py develop for balance-bot
Successfully installed balance-bot enum34-1.1.10
.user@d88aaf14445b:/opt/balance-bot$ python3
Python 3.5.2 (default, Oct 8 2019, 13:06:37)
[GCC 5.4.0 20160609] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import balance_bot
>>>
```

As we can see that the environment is successfully imported without any error.

## Exercise 6

I have run 6 experiments for the seeds of 1, 3, 5, 10, 11, 12 whose results are present in directory “**xdiscrim**”. I observed that robots evolved with higher seeds tend to rotate around the cylinder whereas the robots evolved with lower seeds tend to stay at one point very near to the cylinder. So I would group 1,3, 5 seed as one group whose robots come close to cylinder and then just stay in front of cylinder trying to be stationary or does small forward and backward movements continuously.. The other group consists for seeds 10, 11, 12 whose robots come close to the cylinder but instead of stopping at one point the Khepra robot starts to rotate around the cylinder.

In my opinion, the second group with high seed exhibits more realistic scenario because laws of Physics allow an object to rotate around the cylinder easily but for an object to just start moving continuously forward and backward is not really realistic.