Pybullet Simulator Manual

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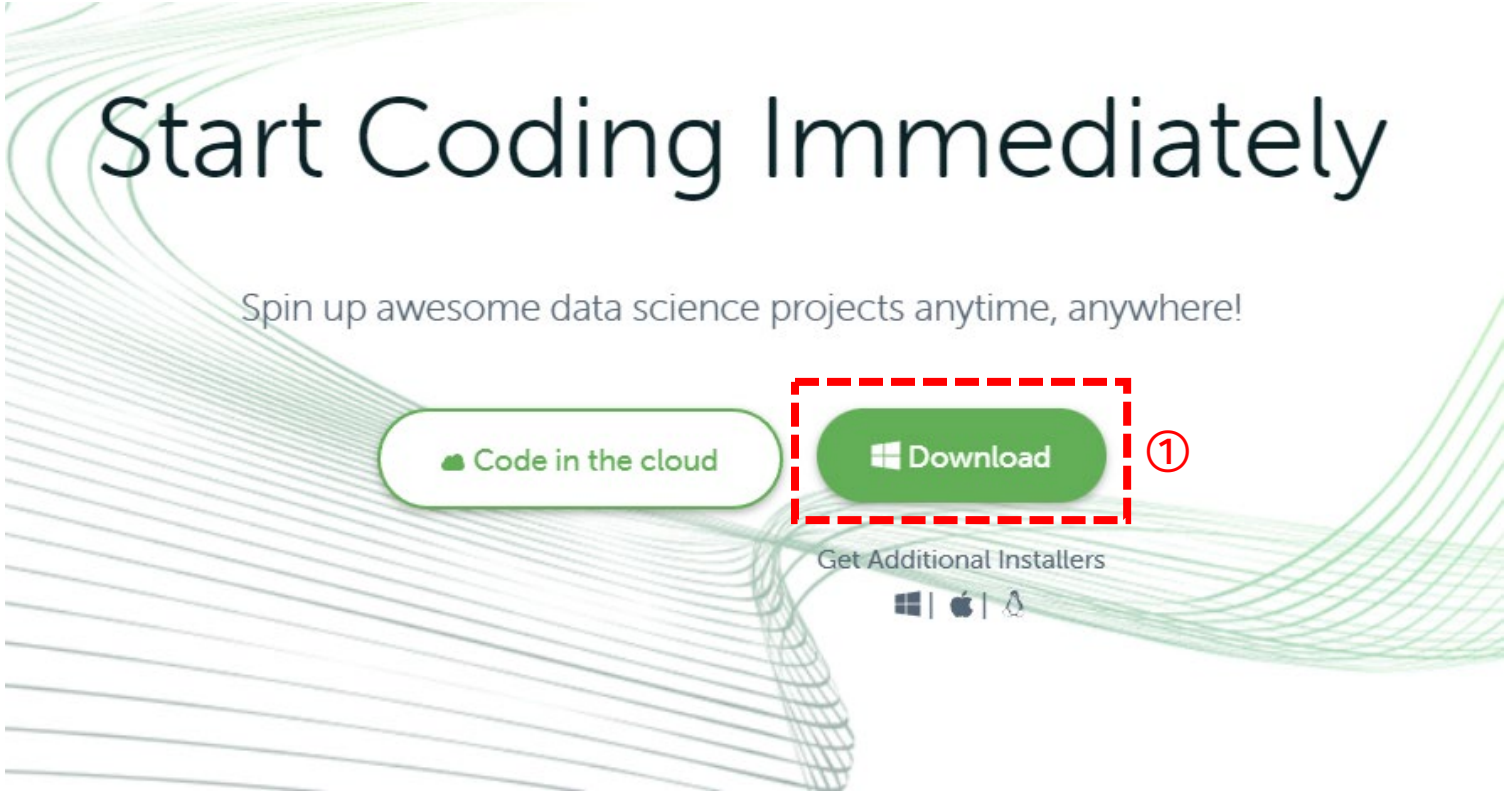
1. Installation

1) Anaconda

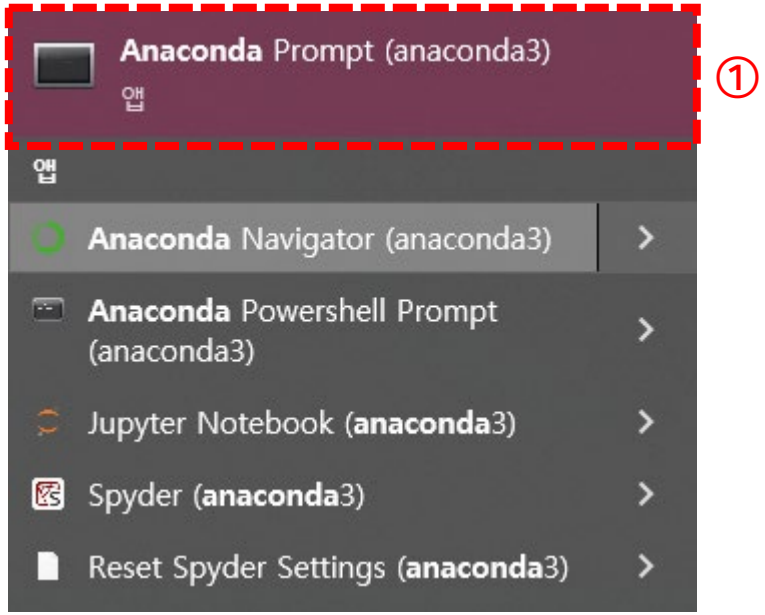
① Install anaconda from https://www.anaconda.com/

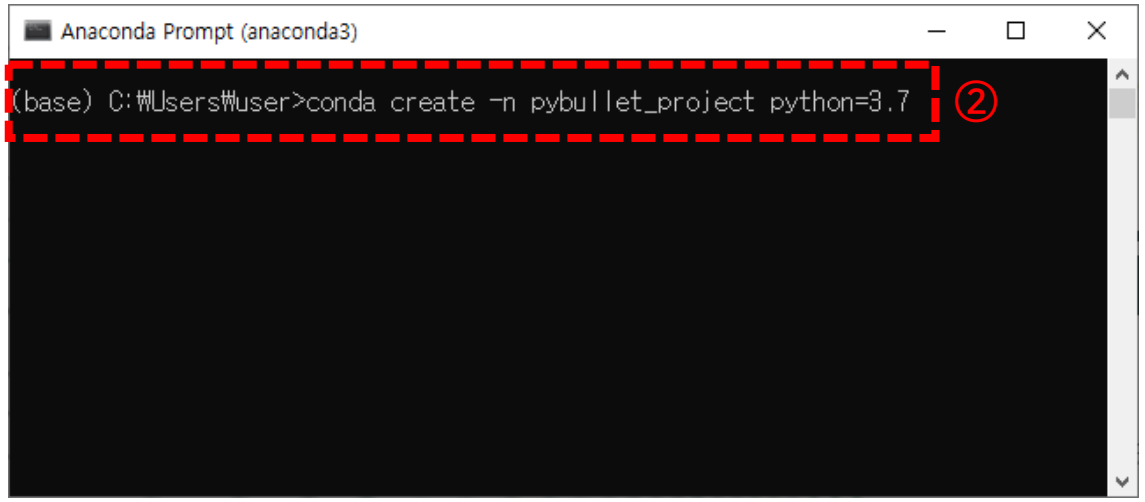


1. Installation

1) Anaconda

② Open anaconda prompt, and create new environment



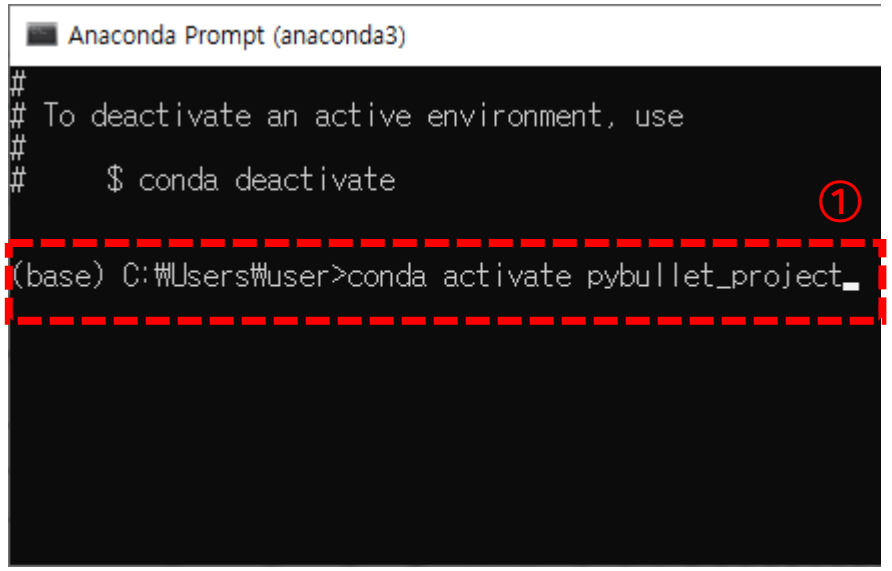


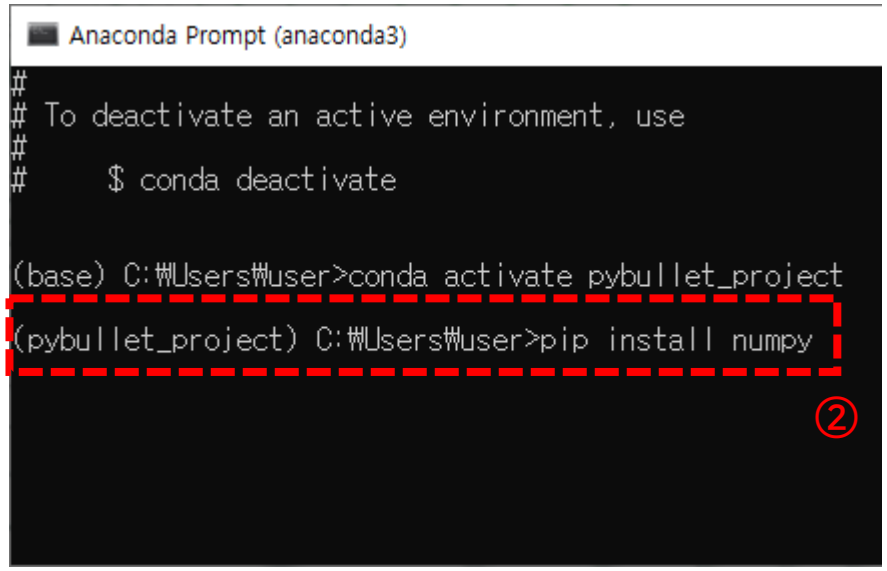
>conda create -n [env name] python=[python version]

1. Installation

1) Anaconda

② Activate new environment, and install libraries





>conda create activate [env name]

>pip install numpy matplotlib jupyter pybullet

1. Installation

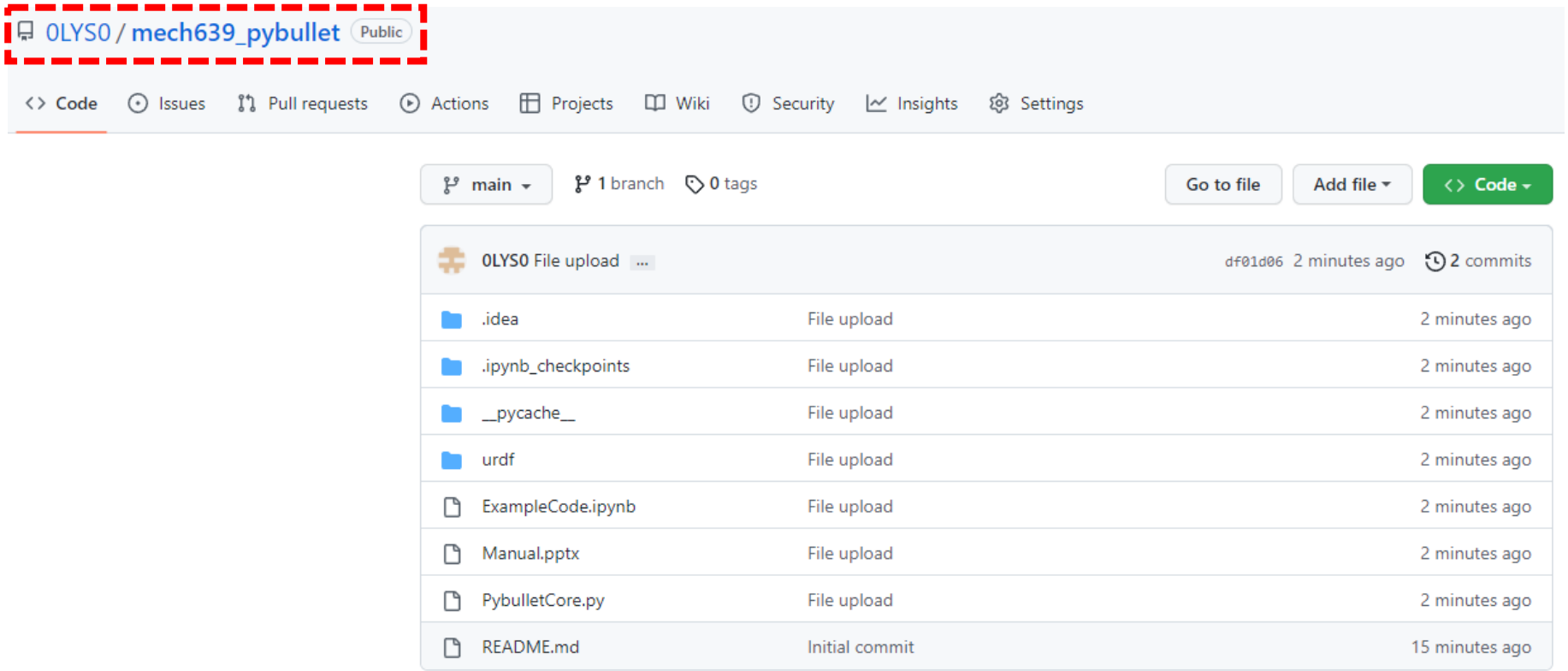
2) Pycharm (or any python IDE)

① Install pycharm from https://www.jetbrains.com/ko-kr/pycharm/

1. Installation

2) Pycharm

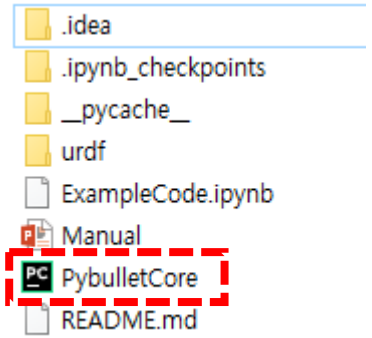
② Download source code from https://github.com/0LYS0/mech639_pybullet

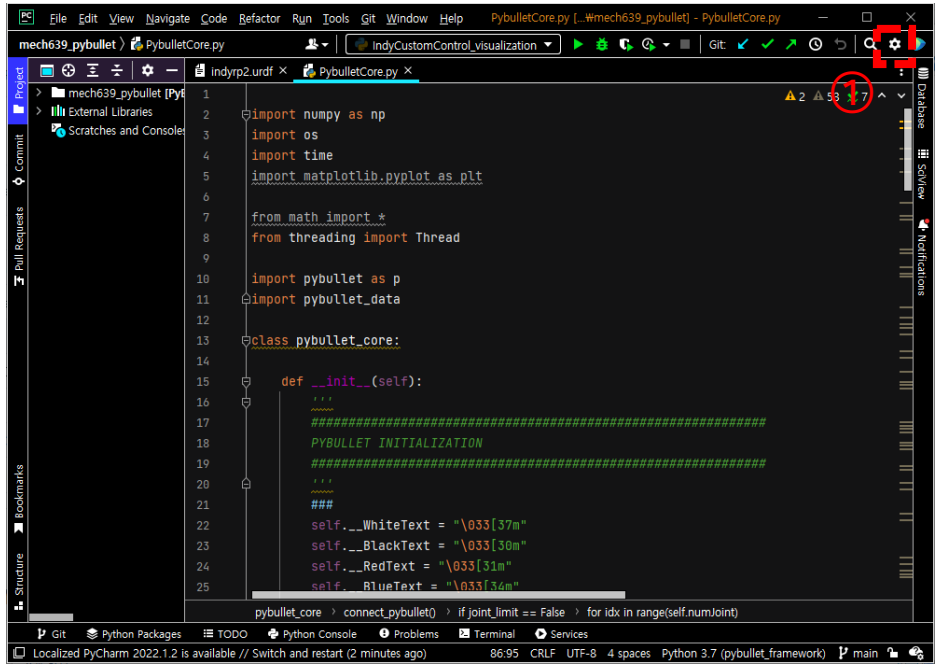


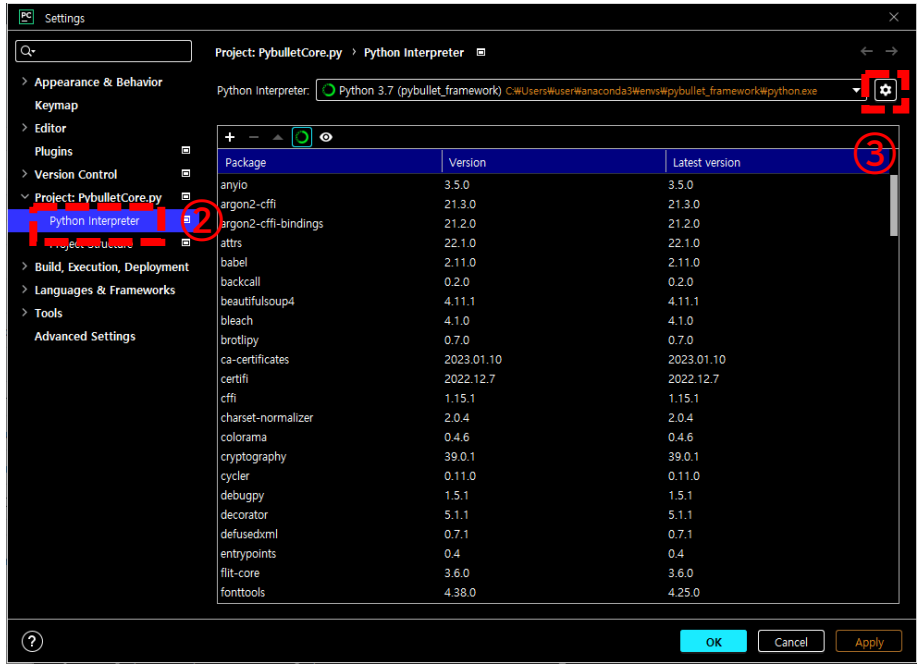
1. Installation

2) Pycharm

③ Open PybulletCore.py with Pycharm and set Python Interpreter







1. Installation

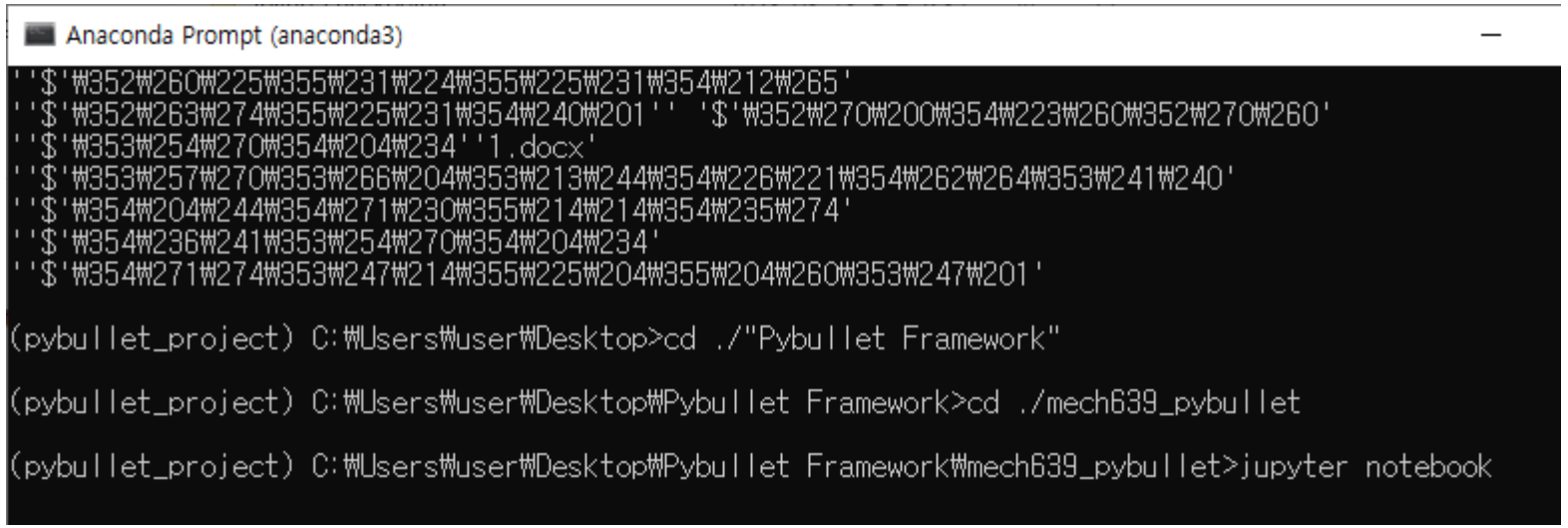
2) Pycharm

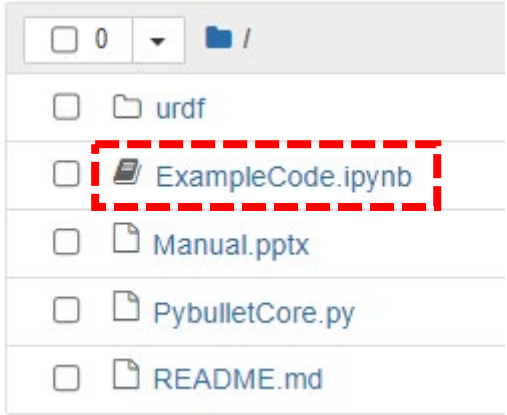
③ Open PybulletCore.py with Pycharm, and set Python Interpreter

2. Code Implementation

1) Jupyter notebook

① Open jupyter notebook in project directory, and open *ExampleCode.ipynb*





2. Code Implementation

1) Jupyter notebook

In [ ]:
```
import numpy as np
from PybulletCore import pybullet_core
%load_ext autoreload
%autoreload 2
```

Import libraries

1. Open Pybullet GUI

In [ ]:
```
pb = pybullet_core()
# pb.connect_pybullet(robot_name = "Indy7", joint_limit=False)
pb.connect_pybullet(robot_name = "IndyRP2", joint_limit=False)
```

Create pybullet instance and start simulation

2. Move robot

In [ ]:
```
pb.MoveRobot(2*(1-2*np.random.rand(7)), verbose=True)
```

Move robot with random joint states

3. Close Pybullet GUI

In [ ]:
```
pb.disconnect_pybullet()
```

Close pybullet

2. Code Implementation

2) Pycharm

Some base codes are defined in PybulletCore.py.

```
def connect_pybullet(self, robot_name = 'IndyRP2', joint_limit = True)
```

- Open pybullet GUI and load robot.
- Run simulation thread

```
def disconnect_pybullet(self)
```

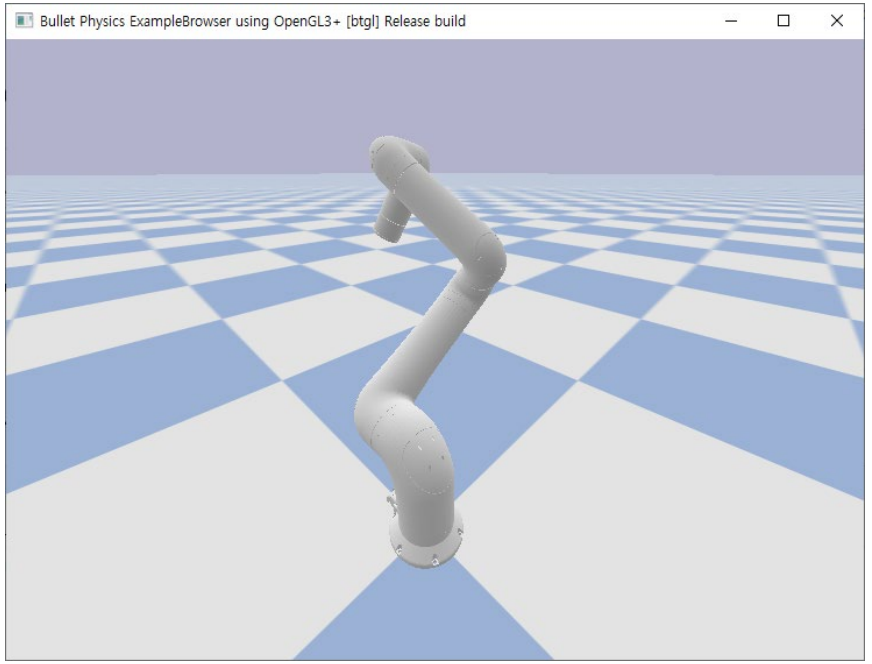
- Close pybullet GUI

```
def _SetRobotJoint(self)
```

- This function is run in thread.
- The position controller makes the robot the desired joint angle.

```
def MoveRobot(self, angle, verbose=False)
```

- Change the desired joint angle.



2. Code Implementation

3) To do list

For a term project, you need to implement a basic robotics tools such as [Adjoint], [Jacobian], [Forward Kinematics] and etc.

Maybe this material will help you to implement them.

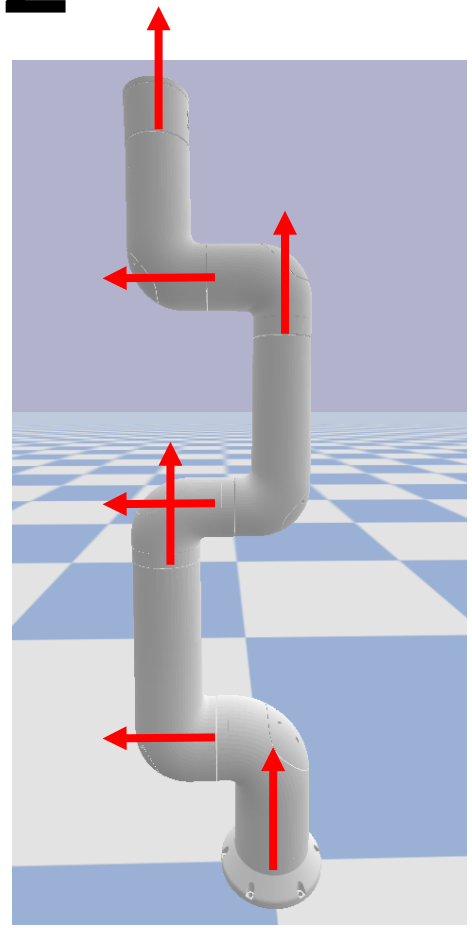
https://github.com/NxRLab/ModernRobotics

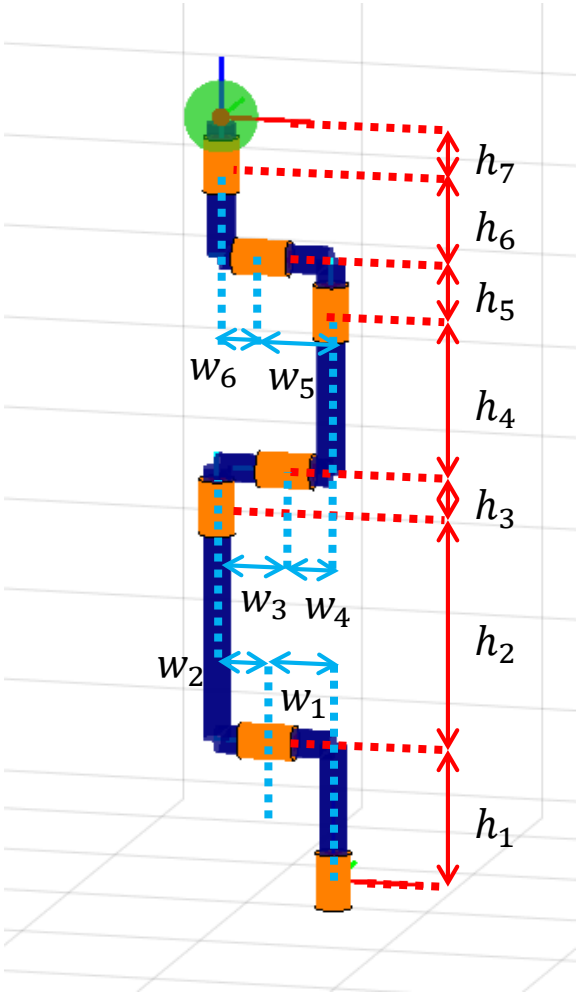
Additionally, the following manual provides example code and functions for simulating Pybullet.

https://docs.google.com/document/d/10sXEhzFRSnvFcl3XxNGhnD4N2SedqwdAvK3dsihxVUA/edit#

https://github.com/bulletphysics/bullet3/tree/master/examples/pybullet/examples

3. IndyRP2





To define screw of each joints, the robot's parameters are needed.

This information can obtain using p.getLinkStates() function.