

Pybullet Simulator Manual

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1. Installation

1) Anaconda

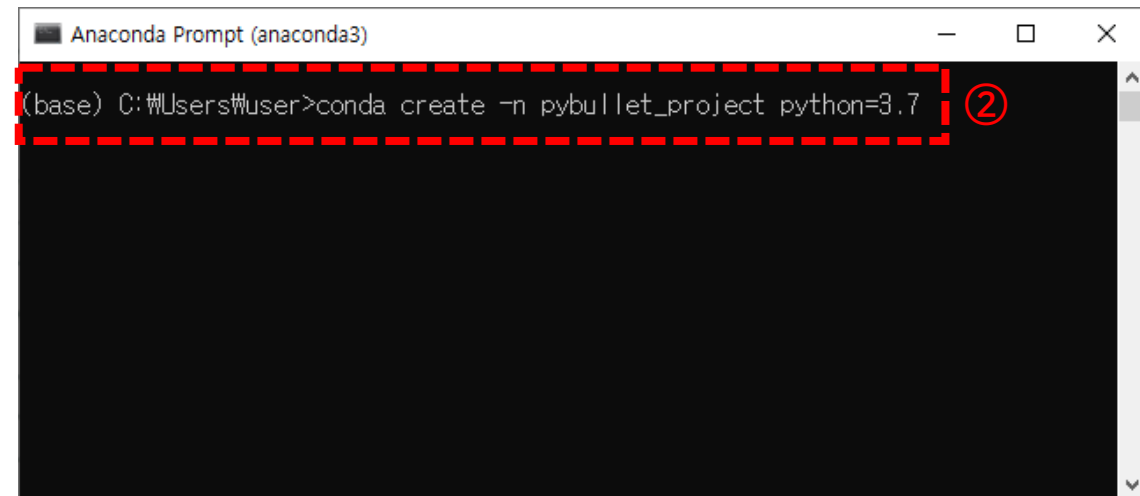
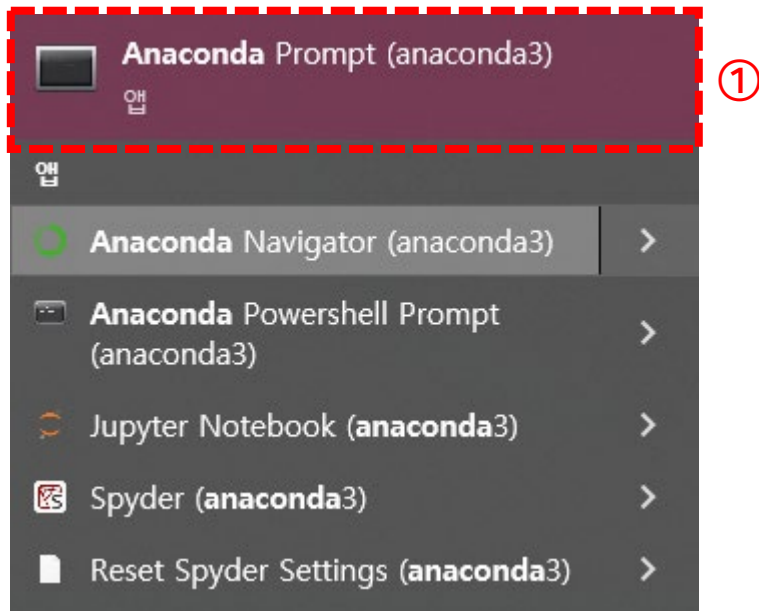
① Install anaconda from <https://www.anaconda.com/>



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

```
Anaconda Prompt (anaconda3)
#
# To deactivate an active environment, use
#
# $ conda deactivate
#
(base) C:\Users\User>conda activate pybullet_project_
```

①

>conda create activate [env name]

```
Anaconda Prompt (anaconda3)
#
# To deactivate an active environment, use
#
# $ conda deactivate
#
(base) C:\Users\User>conda activate pybullet_project
(pybullet_project) C:\Users\User>pip install numpy
```

②

>pip install numpy matplotlib jupyter pybullet

1. Installation

2) Pycharm (or any python IDE)

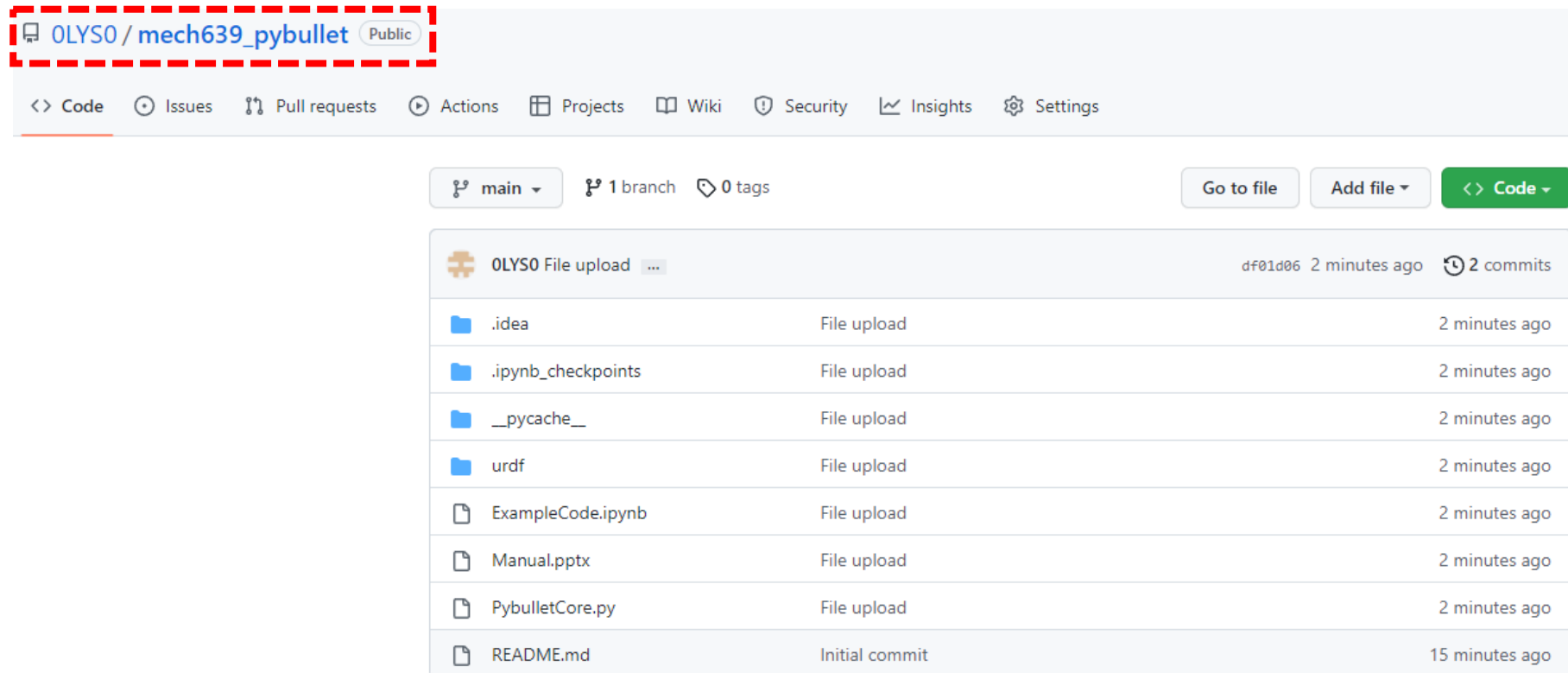
① Install pycharm from <https://www.jetbrains.com/ko-kr/pycharm/>



1. Installation

2) Pycharm

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



OLYSO / mech639_pybullet Public

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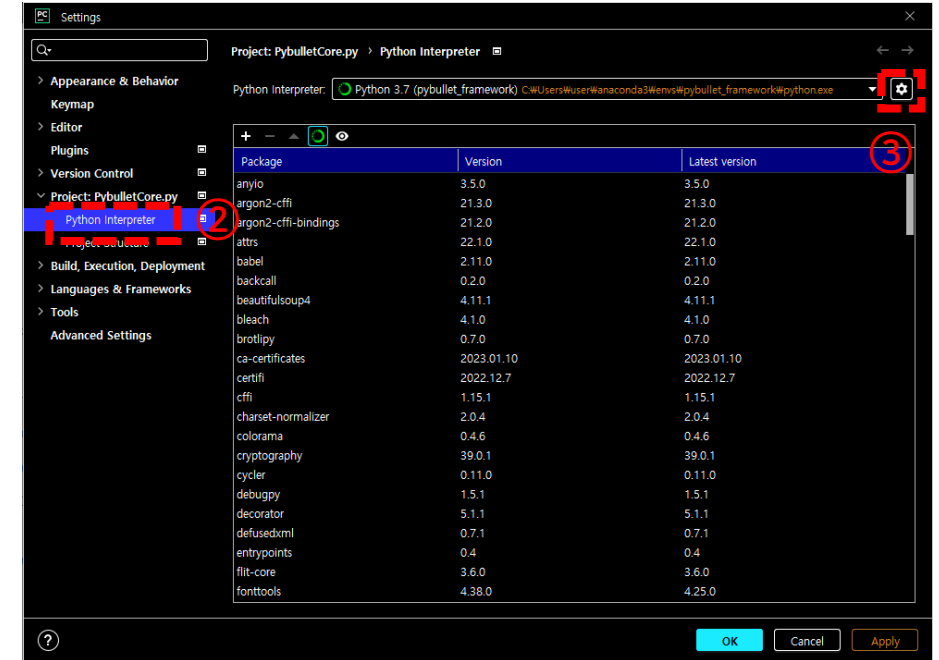
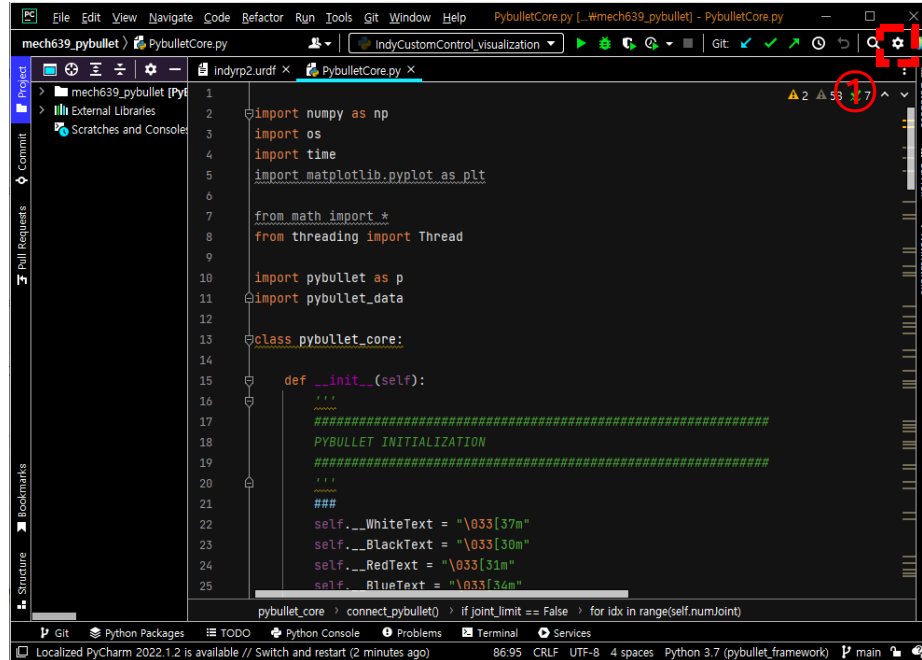
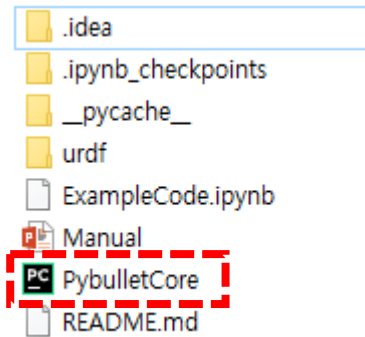
OLYSO File upload ... df01d06 2 minutes ago 2 commits

.idea	File upload	2 minutes ago
.ipynb_checkpoints	File upload	2 minutes ago
__pycache__	File upload	2 minutes ago
urdf	File upload	2 minutes ago
ExampleCode.ipynb	File upload	2 minutes ago
Manual.pptx	File upload	2 minutes ago
PybulletCore.py	File upload	2 minutes ago
README.md	Initial commit	15 minutes ago

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

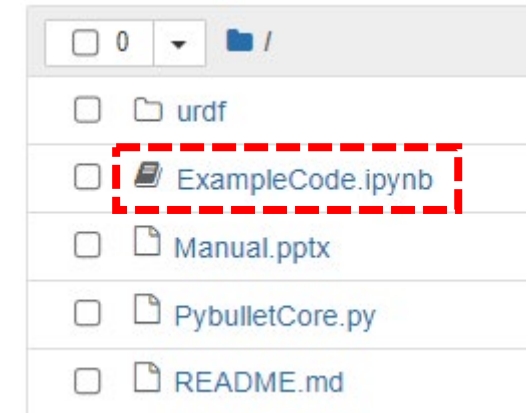
1) Jupyter notebook

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

```
Anaconda Prompt (anaconda3)

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'$'W352W263W274W355W225W231W354W240W201' '$'W352W270W200W354W223W260W352W270W260'
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'$'W354W236W241W353W254W270W354W204W234'
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(pybullet_project) C:\Users\User\Desktop>cd ./"Pybullet Framework"
(pybullet_project) C:\Users\User\Desktop\Pybullet Framework>cd ./mech639_pybullet
(pybullet_project) C:\Users\User\Desktop\Pybullet Framework\mech639_pybullet>jupyter notebook
```



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)
```

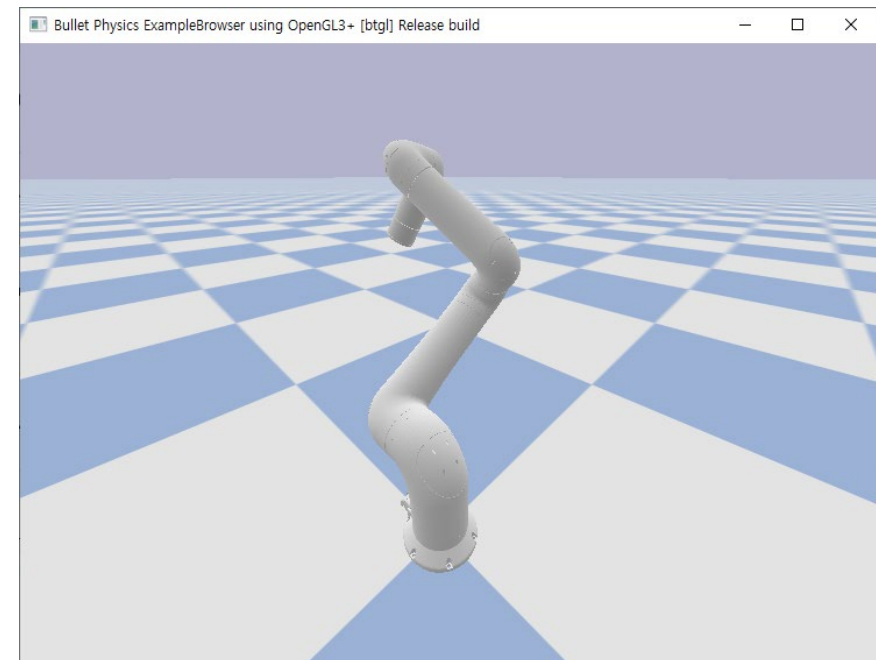
- Close pybullet GUI

```
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.

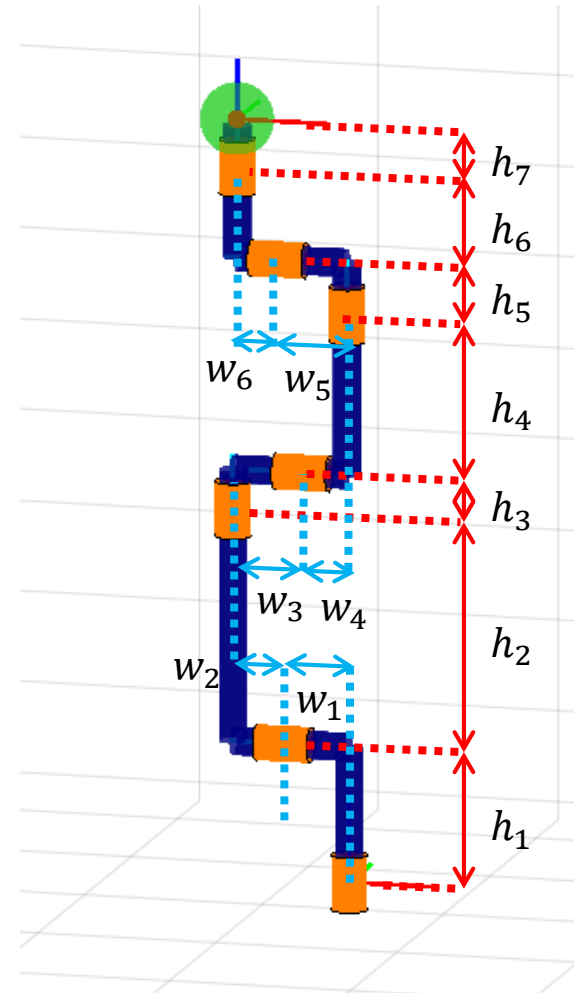
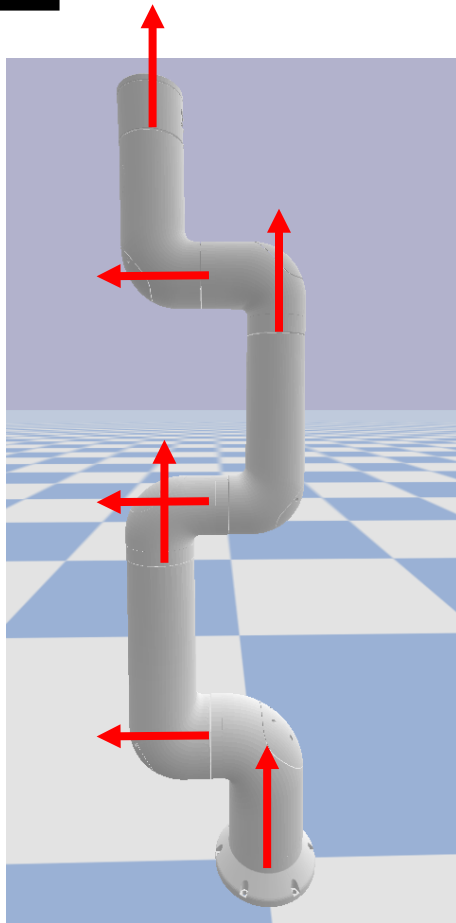
<https://github.com/NxRLab/ModernRobotics>

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 be obtained using `p.getLinkStates()` function.