PyBullet Installation

The installation of PyBullet is as simple as,

```
>> pip install PyBullet
```

Alternate option : Clone the latest version of the exercise repository. Navigate to the location of your repository in the terminal and execute the following,

```
>> pip install -r requirements.txt
```

IMPORTANT : For either of the above methods make sure you are using the appropriate pip(or pip3) command pointing to correct version of python that is being used for the course. If you are using virtual environments then forget to activate the environment before installing pybullet.

NOTE : If you are unclear about the basics steps then refer back to Lab 0 documentation here cmc-installation-help

PyBullet Documentation

PyBullet documentation is simple and straight forward. You can find the official online documentation on a google doc by clicking here.

The documentation covers all the aspects of PyBullet API. It is not necessary for solving the exercises to use the pybullet commands but if you need to look up anything related to pybullet then this is a good place to start.

PyBullet Examples

We have provided three examples from the pybullet library to get you accustomed to pybullet graphical interface.

List of examples,

- dominoes.py
- snake.py
- human_manual_control.py

All the examples are available under Lab7/Python/pybullet_examples/

Running the simulation

To run any of the above examples, navigate to the pybullet_examples folder in a terminal. Make sure you are using the right python environment and run,

```
>> python dominoes.py
```

Replace dominoes.py in the above command with the other two example files to run them respectively.

Graphical User Interface Interaction

When you run one of the example files a Graphical User Interface(GUI) should launch, like the one shown in figure 1

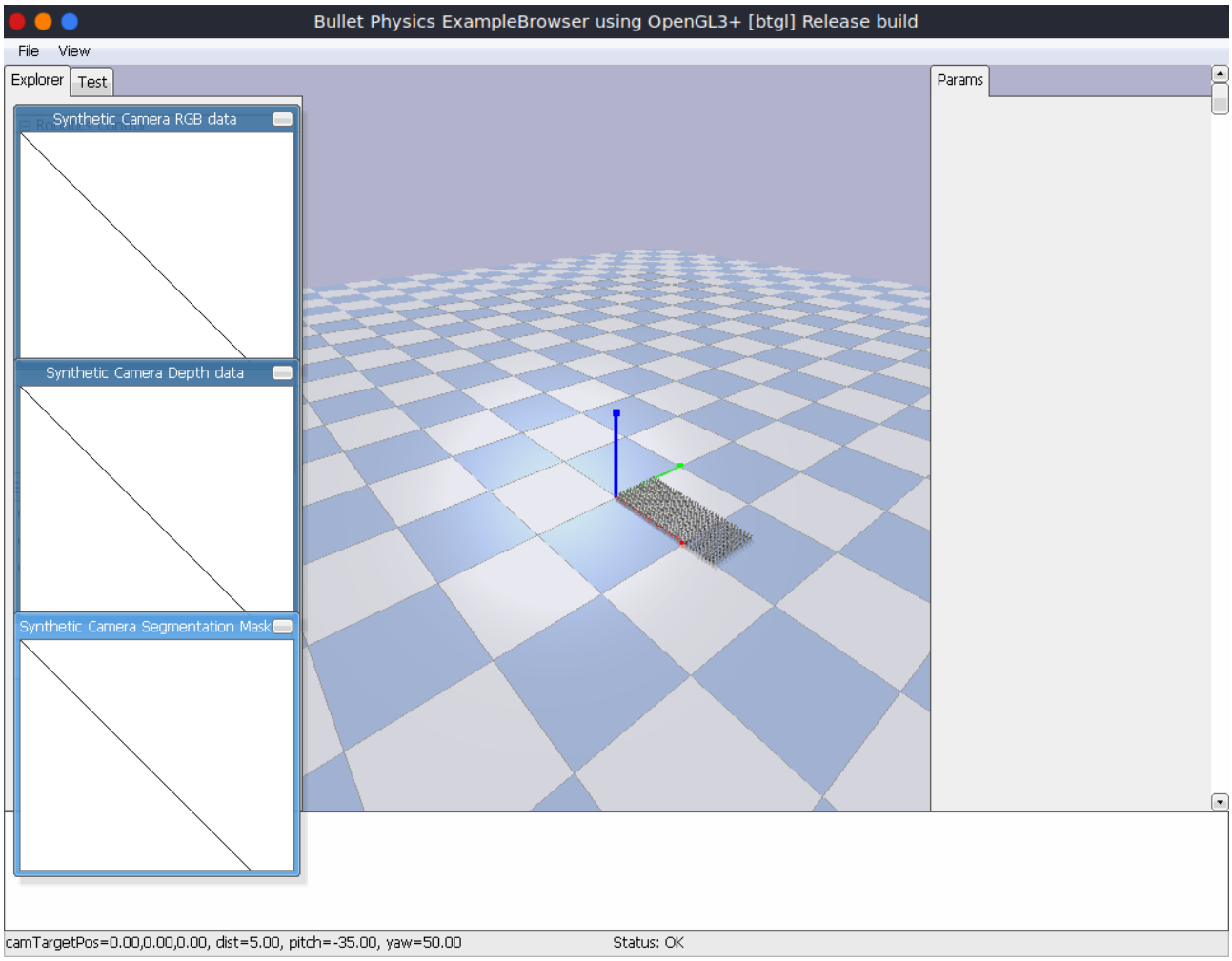

Figure 1: PyBullet Graphical User Interface

- You can use left mouse click to interact and grab objects in the scene. When holding the ALT or CONTROL key, you have Maya style camera mouse controls.
  - ALT/CONTROL + Left Mouse Button -> Rotate
  - ALT/CONTROL + Right Mouse Button -> Zoom
  - ALT/CONTROL + Center/Scroll Mouse Button -> Pan

  NOTE : The above controls might not be the same if you are using a trackpad on a laptop. Depending on if your trackpad has three button mouse click emulation or not, you may have to try with either SHIFT or COMMAND/OPTION((on Mac os only!).
- Press w to toggle wireframe and gui mode
- Press g to toggle sidebars
- In wireframe mode, Press l to toggle joint axis
- In wireframe mode, Press j to toggle inertial frames
- In wireframe mode, Press c to toggle contacts

- In wireframe mode, Press a to toggle collision detection margins
- Press ESCAPE key to exit the GUI app.

Important things to explore with the examples :

- Changing the view of the scene using the controls above
- Interaction with the objects in the scene. For example, when you run **dominoes.py** try to grab a dominoe and throw it to start a dominoe effect
- Slider parameters in the params bar. For example, when you run **human_manual_control.py** the params sidebar will now have slider controls to directly control the human model joint positions.
- Keyboard inputs are also possible in PyBullet. For example, when you run **snake.py** you can steer the snake's heading direction with your left and right arrow keys.