e-Yantra Robotics Competition (eYRC-2016)
Task 2 – Model a Terrain

Introduction to Blender Game Engine using Python

Blender can be extended in real-time via Python, which is an impressive high level and open source language. The Blender Game Engine runs a game loop, which processes logic, sound, physics and rendering simulations in sequential order.
(Refer to: https://www.blender.org/manual/game_engine/introduction.html)

We have worked on Blender interface using different Blender Python commands in Task 1 on how to add, modify and do the basic transformation with the objects.

Similarly, Blender Engine provides the feature to work in Game Engine using Python scripting. This tutorial will teach you the basics of Python scripting for the Game Engine.

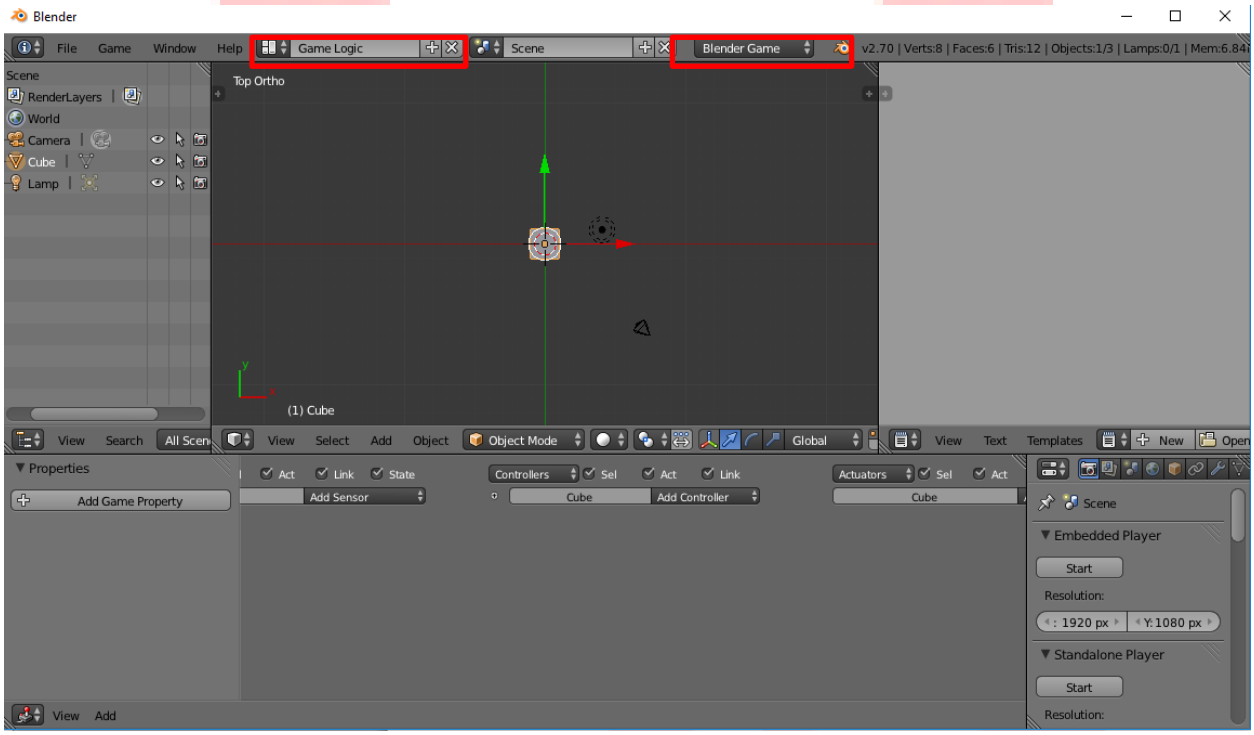

Figure 1: Game Engine Interface

Let us start with our first program: 'print hello world'.

1. Open Blender and go to Game logic and select Blender Game Engine. Make sure that you have selected both as shown in Figure 1 (Boxes marked in red).
2. Go to Text Editor, click on New button and write: print ("Hello World")
3. Press ALT+P or click on Run Script button.
4. Open System Console where all the script data and script errors are shown.
5. In the System Console, **Hello World** will be printed.

BGE Commands:
Just like "import bpy", here in the first line we will write the header

```
import bge
```

This imports all the functions of BGE.

You can check the different modules under BGE by writing

```
print(dir(bge))
```

shown in Figure 2.
Press P and check in the System Console. **Nothing will be printed.** For the script to actually run, we have to use **logic bricks (**Refer to Blender Game Engine Modules tutorial**)** to run it. Select the object and in the Game Logic window, add an *Always sensor* and a *Python controller*. Connect these two and select your script i.e. the Python filename shown in dropdown list. The console will print out all the functions in the BGE module.

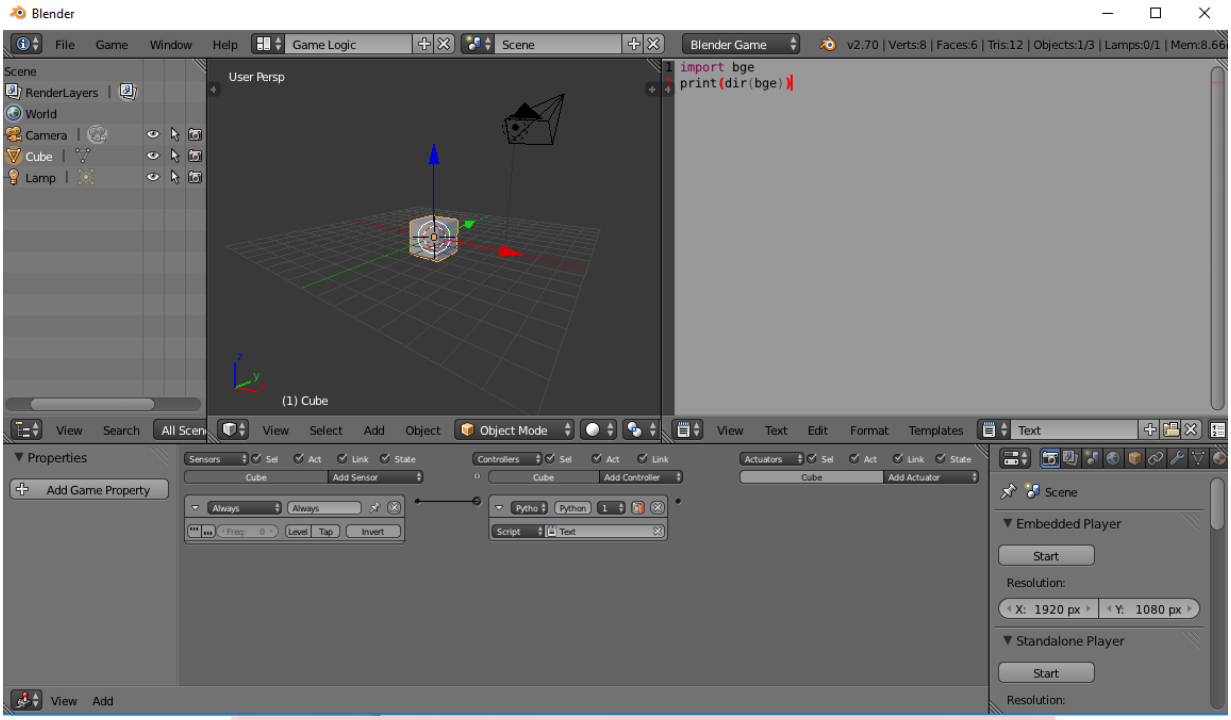

Figure 2: BGE dir Command

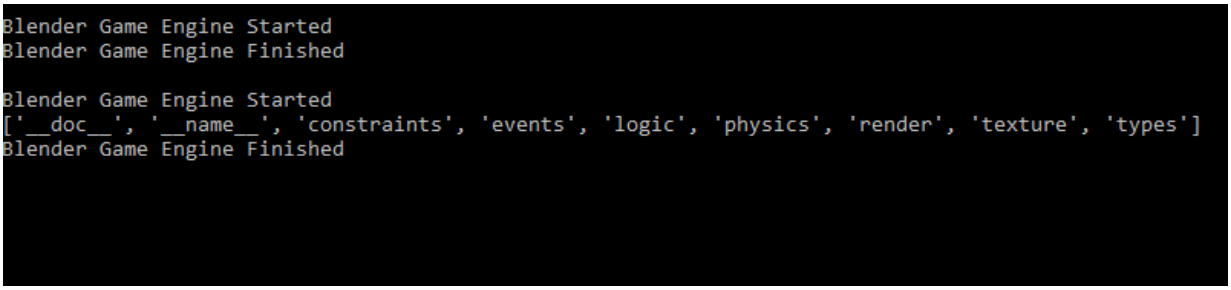

Figure 3: System Console

Note: Make sure that you keep the cursor on 3D window and press P. If you hover over the script window and press P, P will be written somewhere in the script and it will cause an error.

bge.logic Command

To check the properties of logic, which contains the functions we can use to access our logic bricks and object properties, you may use:

```
print (dir(bge.logic))
```

In the directory of bge.logic, you will find **getCurrentController()** function. This is an important function which accesses the logic brick controller that runs the script. Once we access the controller we can access all of the sensors and actuators connected to it and the information about the object that owns the controller.

The most common first three lines of Python script in Game Engine are as follows:

```
import bge
cont = bge.logic.getCurrentController()
own = cont.owner
```

We just added a line that accesses the controller and assigns that information to the variable `cont`. The variable name can be anything you like, but it is typically written as `cont`. Make sure you put the set of parenthesis at the end as it is a function call.

In the third line, **own = cont.owner**, we access the **owner** of the **controller** and assign that information to a variable. Now we have access to the object that owns the Python controller that runs the script; in this case the default cube. This gives us access to information about the object, its game properties.

Example 1: Move the object in z axis using keyboard controller.

Solution:

1. Write the code below in Text Editor of Blender Game Engine:
   ```
   cont = bge.logic.getCurrentController()
   obj = cont.owner
   obj.worldPosition.z += 1
   ```
2. Go to User Perspective view in 3D window. Select the default Cube.
3. Add Keyboard sensor and press **Up arrow** key to move the object.
4. Add Python controller and select the **Python file**.
5. Press P and use Up arrow key to move the object in z-axis.

There are a lot of tutorials and documentation available for Blender Game Engine (BGE).

We recommend that you go through the video lectures of BGE and refer to the online documentation of it.

1. Watch the video tutorials and follow the instructions given in the below YouTube playlist: https://www.youtube.com/watch?v=wnN2GskMtoE&list=PL6F4A5BAADFFADA2E

2. Refer to the below link for BGE Documentation: https://www.blender.org/api/blender_python_api_current/bge.types.html

You can also refer to the following links:

3. Channel Link (Arsenal RSL): https://www.youtube.com/watch?v=tpYVuJd2VPU&list=PLv9tyGDTQb3I38x8e2jbFnThIa_3-8Z68