**Virtual Initio Programming: Random**

**AIM:** After completing this worksheet you should be able to use Python’s random module to create random behaviour in a program.

**You Need:** To complete this worksheet you need to have a virtual Initio simulator (see WS1), understand how to control the robot’s motors (WS3), be able to use files to store Programs (WS5), work with strings (WS13), control structures (WS7-10) and lists (WS19)

**If the simulator isn’t already running: Start the Simulator, Select the Initio Simulation and default\_world.xml, then start IDLE (open a *new IDLE window* if you have used IDLE to start the simulator).**

Python has a special module random that can be used to create *pseudo-random* behaviour. It is difficult to create genuinely random behaviour using a computer, but we can generate behaviour that seems random using statistical methods. Pseudo-random number generators always produce the same sequence of results given the same starting *seed* value, but the sequence seems random to the observer. Normally programming languages, like Python, use the current time as the starting seed value so that the behaviour of the program changes depending upon when it is executed.

Like the time module and the simclient.simrobot module you can load the random module into a program using the command

import random

The random module contains the following functions that you can use:

* random.randint(a, b) – returns a random integer, N, such that a <= N <= b.
* random.choice(list) – returns a random element from the list.
* random.random() – returns a random float (decimal number) between 0 and 1 (including 0, but not including 1)
* random.seed(n) – sets the starting seed value for pseudo-random number generation to n.

**Exercise 1:** Write a program that will execute a random action from the list for a random amount of time between 1 and 5 seconds:

actions = ['forward', 'backward', 'left', 'right', 'stop']

**Hint:** You may want to use a program from Worksheet 19 as a starting point.



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