**Initio Programming: If**

**AIM:** After completing this worksheet you should be able to use if statements in Python to create more complex programs.

**You Need:** To complete this worksheet you need to have an Initio that is connected to a keyboard, mouse and monitor (see WS1), to understand how to start and stop IDLE from the Linux Command Line (see WS2), and to be able to use files to store Programs (WS5). You also need to know the commands to operate the Initio motors and sensors, and the time.sleep command (WS3, WS4 and WS6).

We want programs to be more flexible than simply following a series of instructions. We want them to do different things in different circumstances. For instance, we might want our Initio rover to move backwards if there is an obstacle in front of it and forwards otherwise.

The following program will do this:

import robohat as initio, time

initio.init()

if (initio.getDistance() < 50):

print(initio.getDistance())

initio.reverse(10)

else:

initio.forward(10)

time.sleep(10)

initio.stop()

There are a few things to note here. Python uses spaces to tell when something is part of a block of code inside an if statement. This feature is unique to Python and is not used in many other programming languages. So in the program above Python knows that it should print out the value from the ultrasonic sensor and then execute initio.reverse(10) if there is an obstacle closer than 50 cm because both statements follow after the if and are *indented* - there is a space in front of the statement.

Similarly it knows that initio.reverse(10) should be executed if there is no obstacle because it follows after the else and is indented.

Note also that we have colons after the if and the else.

**Question 1:** Create a file containing this program and execute it. What happens?

**Exercise 1:** Describe how you would test your program to make sure it was working correctly both when there was an obstacle and when there wasn’t.

**Question 2:** Perform your tests. Is your program working correctly? YES/NO

**Exercise 2:** Write a program using an if statement that will turn left if there is an obstacle on the right and turn right if there is an obstacle on the left.

*Hint:* To do this you may want to use elif which means (else if) - e.g.

elif (initio.irLeft()):

instead of else:

**Question 3:** How many cases do you need to consider to test your program?

**Question 4:** Does the description of the exercise tell you what the program should do in all cases? YES/NO

**Exercise 3:** Modify the program so that the robot reverses for 10 seconds if there is an obstacle and then turns for 10 seconds. If there isn’t an obstacle the robot moves forward.

Write your program below

**Remember:** When you have finished working with the robot, type initio.cleanup()at the command line, quit IDLE, then select Shutdown from the Raspberry Pi menu item. Once the robot has shut down, switch it off.



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