

Python Robots Cheat Sheet

I/O statements

Statement	Result
print (<i><text></i>)	<i><text></i> can be in quotes for literal text or can be a variable. Variables of types other than strings must be converted to strings before concatenation. <pre>toys = 10 print("You have " + str(toys) + " toys")</pre>
raw_input (<i><text></i>)	Prompts the user with <i><text></i> and returns what the user types in. <pre>toys = raw_input("How many toys do you have?")</pre>

Control Flow statements

Statement	Result
if <i><condition></i> : <i><statements></i> [elif <i><condition></i> : <i><statements></i>] [else: <i><statements></i>]	If/elif/else construct behaves just like in C or Java.
while <i><condition></i> : <i><statements></i>	While statement behaves just like in C or Java. Can be exited with <code>break</code> .
while timeRemaining (<i><time></i>) : <i><statements></i>	Repeats statements for a period of time.
for <i>element in sequence</i> : <i><statements></i>	Iterates over <i>sequence</i> , assigning each element to <i>element</i> . Use built-in <code>range</code> function to iterate a number of times. <pre># prints foo 10 times for i in range(10): print("foo")</pre>
return [<i>result</i>]	Exits from function (or method) and returns <i>result</i> . If no result given, then returns <code>None</code> .

Operators and their evaluation order

Operator	Description
$x^{**}y$	Power
$x*y$ x/y $x\%y$	mult, division, modulo
$x+y$ $x-y$	addition, subtraction
$x<y$ $x<=y$ $x>y$ $x>=y$ $x==y$ $x!=y$ $x<>y$ x is y x is not y x in s x not in s	Comparison identity membership
not x	boolean negation
x and y	boolean and
x or y	boolean or

Manual Drive

Statement	Result
joyStick(showSensors = 0)	Opens a joyStick window; click and drag to move robot. Pass a 1 to joystick() to see sensor values, too.
senses()	Opens a window to see the robot's sensor values.

Automatic Drive

Statement	Result
forward(amount, seconds)	move forward, stop any rotation, for number of seconds
backward(amount, seconds)	move backward, stop any rotation, for number of seconds
turnLeft(amount, seconds)	turn left, stop any forward movement, for number of seconds
turnRight(amount, seconds)	turn right, stop any forward movement, for number of seconds
stop()	Stop all movement
motors(left, right)	Control the left and right motors
wait(time)	Pause the program a given amount of time (seconds)

Sensors

getLight(0) getLight(1) getLight(2)	Read a light sensor -- 0 is left, 1 is middle, 2 is right (light sensors are the holes on the back)
getObstacle(0) getObstacle(1) getObstacle(2)	Read an IR sensor -- 0 is left, 1 is middle, 2 is right (IR sensor is the little black knob) ranges from 0 to 6400 where low is no obstacle

Output

beep(<time>, <frequency>)	Emits a tone at the given frequency for the given length of time (seconds).
setLEDFront(<value>)	Turn on front LED (0 off 1 on)
setLEDBack(<value>)	Turn on back LED (brightness 0 – 1)

Camera

<pict> = takePicture()	Takes and returns a picture.
showPicture(<pict>)	Displays the picture.

Things to try

Drawing a square

Can you make your robot draw a square? That's surprisingly difficult... remember that you can only tell your program how many seconds to move, not the distance it should go.

Dance

Create a dance routine for your robot!

Song

Make your robot sing a song using beep commands.

“Theremin”

Can you write a program that beeps at different pitches as you approach your hand to the robot? For example, you could add up the values given by the three light sensors and use those as the beep frequency. As you approach your hand to the robot, the pitch will get higher and higher! You can make it loop for as long as you want.

Cockroach

Your cockroach should flee light and go towards darker places. So, for example, if you start it near the edge of the shadow of a table, it should go under the table. There are a few ways to implement this, but here is a simple one:

1. read all three light sensor values
2. if the left light sensor gives a value less than both the middle and the right light sensor, move right (remember, a low value means a bright light)
3. if the right light sensor gives a value less than both the middle and the left light sensor, move left
4. otherwise, go forward

Creep Bot

Combine your knowledge of the joyStick() command with taking pictures to have your robot repeatedly take pictures as you drive it around. How well can you navigate without seeing your robot?