

CMSC 119: (De-)Coding the Drone  
**Assignment 7: Behavior-Based Robotics**  
Due November 14, 2013

This assignment asks you to turn the scribbler mobile robot<sup>1</sup> into an autonomous creature. The robot should react to the two IR obstacle sensors and the three light sensors. As opposed to the last assignment where the robot was controlled via teleoperation, this robot will be completely controlled by the program. You can either connect to a real robot or to a simulated robot<sup>2</sup> using the `init` function: `init("/dev/tty.scribbler")` or `init("sim")`.

Other useful Myro functions include `wait` and `setForwardness`  
e.g., `wait(.25)`, `setForwardness("scribbler-forward")`, `setForwardness("fluke-forward")`

### Sensors — Stimuli

Photoresistors	Obstacle Sensors	Fluke Obstacle
<code>getLight(pos)</code>	<code>getIR(pos)</code>	<code>getObstacle(pos)</code>
<code>getLight("left")</code>	<code>getIR("left")</code>	<code>getObstacle("left")</code>
<code>getLight("center")</code>	<code>getIR("right")</code>	<code>getObstacle("center")</code>
<code>getLight("right")</code>		<code>getObstacle("right")</code>

### Effectors — Responses

Motors	Move	Sound
<code>motors(left, right)</code>	<code>move(fwd, rot)</code>	<code>beep(time, freq1, freq2)</code>
<code>motors(1, 1)</code>	<code>move(1, 0)</code>	<code>beep(1, 440)</code>
<code>motors(-0.75, -0.75)</code>	<code>move(-0.75, 0)</code>	<code>beep(.5, 440, 880)</code>
<code>motors(-1, 1)</code>	<code>move(0, 1)</code>	<code>beep(3, 440, 441)</code>

### Driving Autonomously — Behaviors

Build a version of Grey Walter's Tortoise: a robotic creature that moves around randomly searching for bright light, avoiding obstacles and playing random music as it moves. Complete as many levels of competence as you can:

1. The robot should move forward.
2. The robot should move randomly, but biased to move forward.  
`random.uniform(-1, 1)` in the `random` module is useful here.
3. Using the IR obstacle sensors, the robot should not run into obstacles.
4. Using the IR obstacle sensors, the robot should avoid obstacles by moving around them.
5. The robot beeps a song (perhaps, randomly generated) as it moves.
6. The robot moves randomly, but biased toward the brightest direction.

### Deliverable

Submit a copy of your program on moodle: `robots2_LASTNAME.py`

<sup>1</sup><http://wiki.roboteducation.org>

<sup>2</sup>[http://wiki.roboteducation.org/Calico\\_Simulator](http://wiki.roboteducation.org/Calico_Simulator)

```
from Myro import *

init("/dev/tty.scribbler")

def behave():
    while True:
        l = getIR("left")
        r = getIR("right")
        if l == 0 and r == 1:
            beep(.1, 698)
        if l == 1 and r == 0:
            beep(.1, 523)
        if l == 0 and r == 0:
            beep(.1, 698, 523)

behave()
```