CPS 607 – Autonomous Mobile Robotics
## Lab 4 – Object Following

The Environment and Concepts:

There exists a flat world of irregular shape. The world is surrounded by lines. Lines have high contrast compared to the surface (dark coloured lines on a light surface or vice versa). The lines represent the boundary of where the robot can and cannot go, or imaginary "edges." In the example figure below, black shows the line, green is the area that the robot can be on and red represents areas where the robot cannot go. This is only an example and the test environment can be different. On this environment, there may be objects moving around. The objects can be any shapes, but they are at least as tall as the ultrasonic sensor on your robotics kit. The robot should follow any objects it encounters but avoid colliding into them.

Required:

- Working individually (unless have special permission), you are to program your Elegoo Smart Robot Car v3 (AMR) so that it is capable of surviving in the world while in (near) continuous motion for a period of no less than 2 minutes without falling off the "edge."
- The robot is deemed to fall of the edge if all 3 line sensors cross over the line or any both of the back wheels cross over the line.
- The formal definition of near continuous motion is that the robot should always be moving, and the robot can stop moving for no longer than 1 second.
- The robot must also avoid collision with any objects (as described above) on the surface
- When the robot encounters an object within a certain range the robot should follow that object. Object following behaviour should be similar to the demo video included in this lab. NOTE: the video only demoes the object following behaviour.
- While following the object, the robot should still avoid falling off the edge.
- It is permissible for the robot to stop following the object if it avoids falling off the edge.
- You must make a short video (less than 2 minutes) of your robot on the specified environment.
- You must create a writeup (1 page maximum) describing of your algorithm/strategy and the answer to this question: What strategies did you use to prioritize staying in the environment over tracking an object and what was your algorithm for object following?
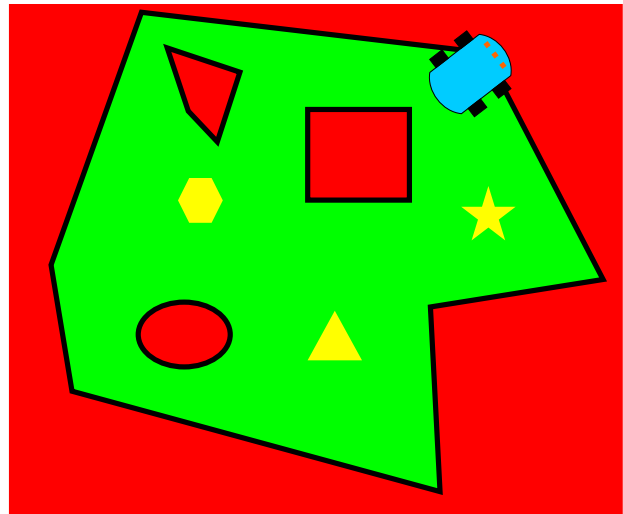
Submissions:

Students must submit the following to D2L by November23rd 23:59.
- Codes for your robot (*.ino file(s))
- Video demo
- 1-page writeup (NOTE: writeups are not accepted if the robot is not demoed)

Student must also be ready to demo their robot during Lab period on November 25th.

Late submission is 3^n % where 'n' is the number of days late so (1 day -3%, 2 days 9%, 3 days 27%).

Rubrics:

The lab will be marked out of 10. 5 marks for demos and 5 marks for writeup.