COSC 4P78 – Lab 7

This lab will revisit the ultrasonic rangefinder, and combine it with a servo. That way, your robot will be able to 'look' from side to side, and make a suitable decision on the best course of action.

Task:

Your final goal is actually pretty simple: make a robot that will charge at a slim profile, but not run face-first into a wall.

Behaviour:

- Somehow find the next target (I'd suggest simply "go forwards", but you can use a spiral, if you prefer)
 You identify the 'target' by detecting something moderately close via the rangefinder
- Using the servo, check the perceived distance slightly to the left and right
 Since you need the echo to bounce back, I really do mean *slightly*
- If the readings from both sides are significantly far, then that means you've found a 'slim profile' (e.g. a human foot), and it's safe to advance forwards
 - Otherwise, it must be a wall, so you should turn to a different direction and start the process over

Servo:

There's a rectangular hole in the top of your robot, designed to hold a servo (and you have a bracket designed to attach to the servo's 'horn').

You can easily control a hobby servo with any PWM pin on your controller. The servo has three pins:

- Data connect this to said PWM pin
- Ground connect this to ground
- Vs this connects to your motor's power supply, *but with a huge disclaimer*

Your HS-311 is meant to run off of anywhere from 4.8V to 6.0V.

Your Hackduino can provide 5V, but it's very unlikely the 9V battery can supply enough current. Feel free to give it a try if you like. It'll probably just cause a voltage dip and keep resetting your controller (hardly the end of the world).

Instead, you'll likely need to use the motor power supply, except that provides *far* too much voltage. If you use the AAs to power the servo, you'll need to take one of them out (and then use a wire to act as a 'dummy cell' to fill in the gap it causes).

Alternatively, you could probably use the 7.5V motor power supply instead of the 9V battery to simply power the motors, servo, and controller.

Feel free to ask your lab supervisor for advice if you want to try getting 'creative'.

As for the actual control, you can read about it here: <u>https://www.arduino.cc/en/Reference/Servo</u>

but your Arduino IDE already has two Servo examples provided with it.

Caveat:

I actually don't care whether you make an 'attack-bot' or not, or if you use the rangefinder. I just wanted you to use a servo for something. If you want to use it for something else, feel free.