Handout 1: Getting to Know Your Robot's Hardware

1 Robot Care

Your robot is packed in a carefully engineered travel containment unit. Inside, the robot is wrapped in pink anti-static bubblewrap. It is important to use only anti-static material. If you lose the pink bubblewrap, ask a TA or instructor for replacement bubblewrap. Do not wrap your robot in any other material. The robots are fragile. Treat them as any other small electronic - do not: get it wet, drop it, or manhandle it.

2 Your Robot

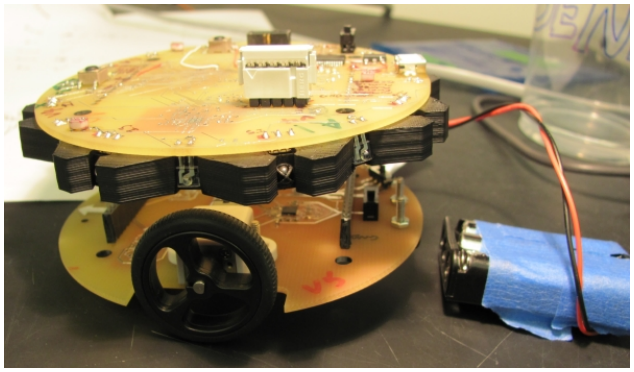


Figure 1: Your Robot

The Swarmbot comes with the following features:

1. light sensors (3)
2. IR transmitters (8)
3. IR receivers (8)
4. Radio (1)
5. motors and gearboxes (2)
6. quadrature encoders (2)
7. accelerometer (1)
8. gyro (1)
9. LEDS (15; 5 red, 5 green, 5 blue)
10. LED Buttons (3; 1 red, 1 green, 1 blue)

3 Light Sensors

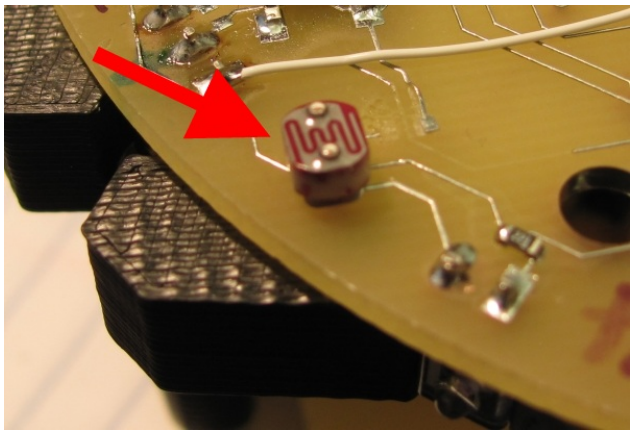


Figure 2: Light Sensor

Your robot comes equipped with three light sensors - two in the front, and one in the back. You can find these sensors on the top board. They are labeled "'fr"' (front right), "'fl"' (front left), and "'r"' (rear). They are small, silver, ovals with a red squiggle in the middle. These sensors measure the intensity of light from 0 (low) to 1023 (high).

4 IR Transmitters Receivers

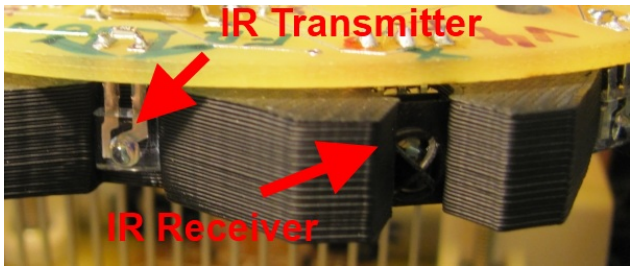


Figure 3: IR transmitter on left, IR receiver on right

Right under the top board is an infrared ring with alternating transmitters and receivers. Your robot comes equipped with eight of each. The IR transmitters are light pink, whereas the IR receivers are black with an "'X"' in the middle. The IR communication can send and receive short messages to nearby robots.

5 Radio

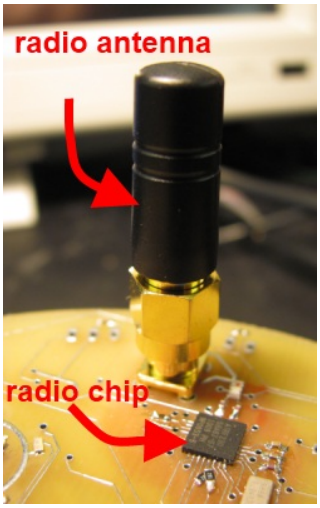
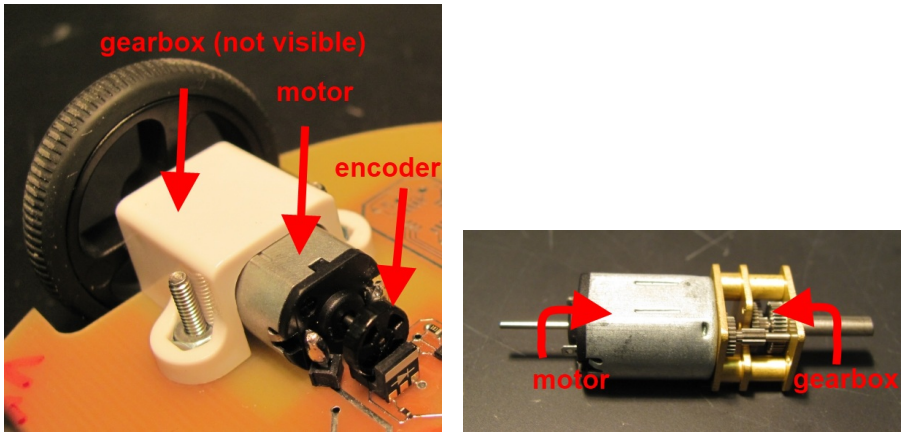


Figure 4: IR transmitter on left, IR receiver on right

The robot comes with a radio chip and antenna mounted on the left side of the top board. The radio can send a longer message and is much faster than the IR transmitters.

6 Quadrature Encoders



(a) Quadrature Encoder (b) Motor and Gearbox

Figure 5: Quadrature encoder, motor, and gearbox

The robot has 2 quadrature encoders, one for each wheel. They are the small disk placed behind the motor. The quadrature encoder spins a certain amount of times per wheel rotation. The gearbox attached to the motor slows down the motor speed and provides more torque to the wheel.

7 Accelerometer

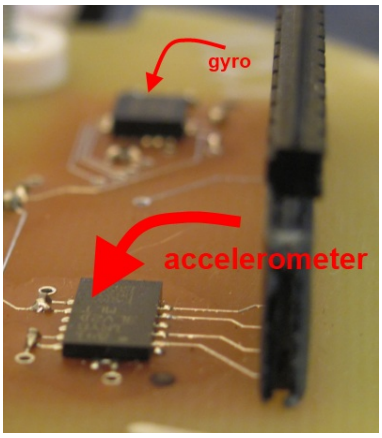


Figure 6: Accelerometer (Gyro visible in back)

The accelerometer is located on the bottom board in front of the right wheel. The accelerometer returns the x, y, and z components of the robot's acceleration vector.

8 Gyro

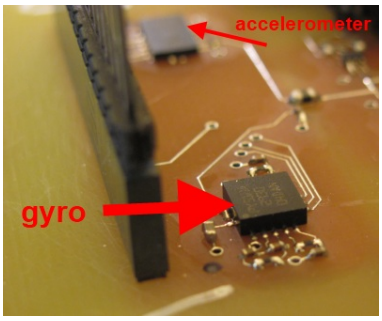
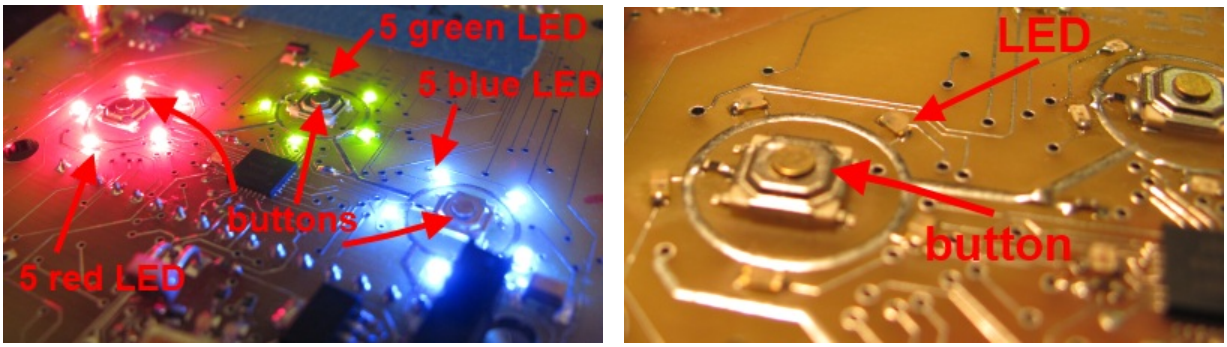


Figure 7: Gyro (Accelerometer visible in back)

The gyro is located on the bottom board in front of the left wheel. It returns the angular velocity of the robot around the z axis.

9 LEDs



(a) Lit LEDs (b) LED Buttons

Figure 8: LEDs

The robot comes with 15 LEDS- 5 red, 5 green, and 5 blue. There is a button in the center of each LED ring.