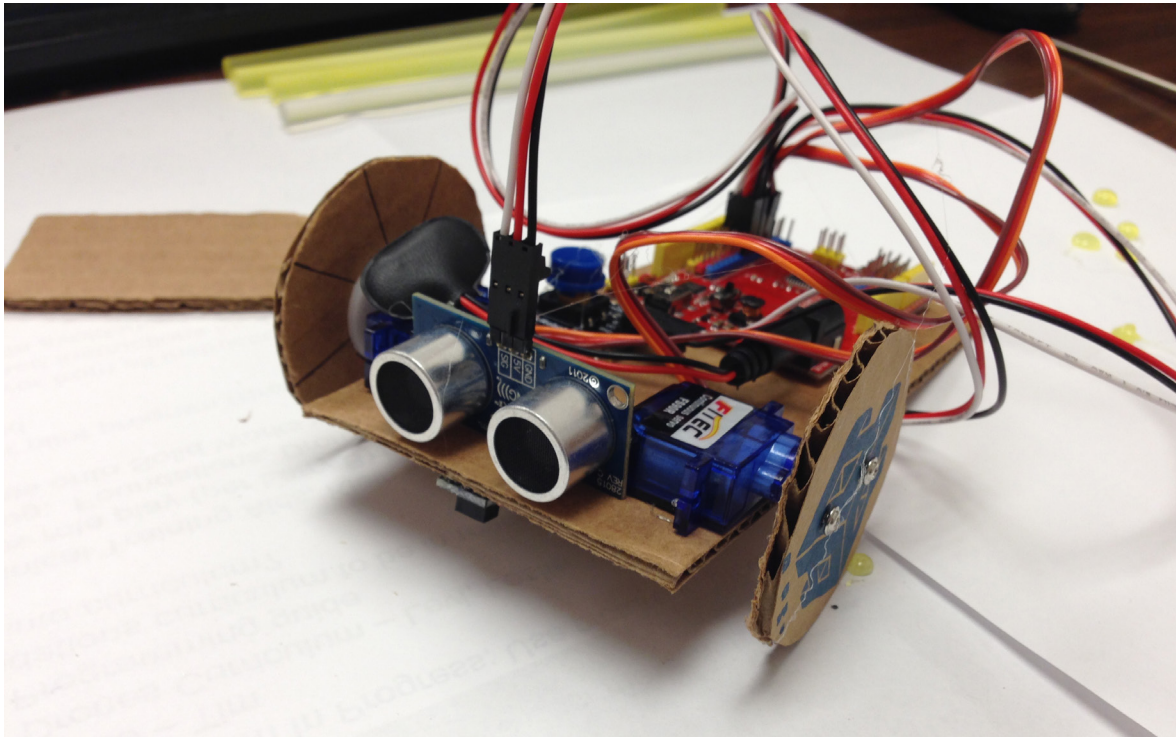# Robotics Merit Badge Kit

Tips and Tricks on
-how to -
BUILD YOUR ROBOT
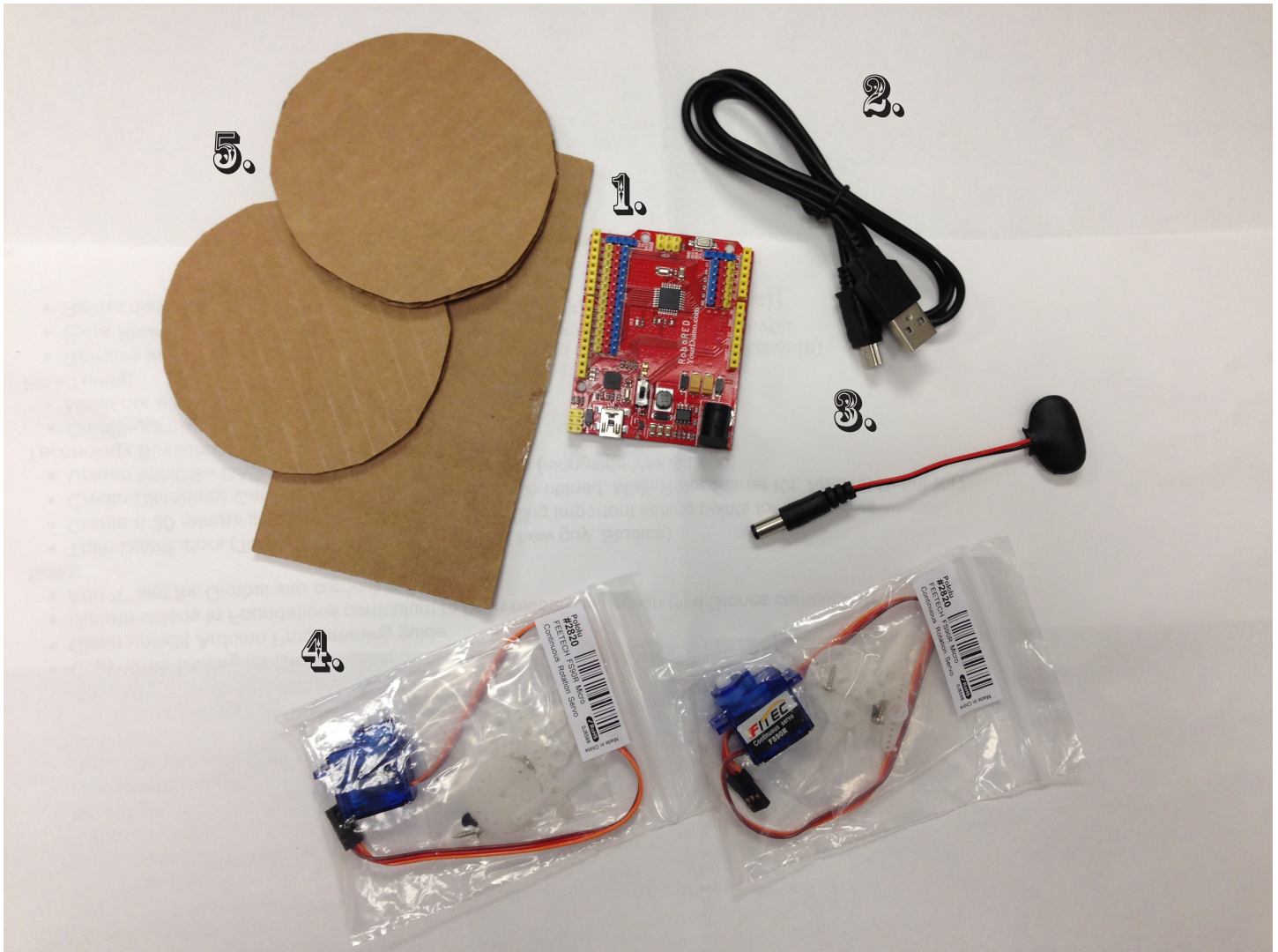
Brought to you by:

MINDS-i

What you'll need:

Before we begin make sure you have all the pieces:

1. Arduino micro controller
2. USB cable
3. Battery harness
4. Two servos and their hardware.
5. Cardboard or something to build the chassis and wheels

Choosing a Sensor:

For the merit badge we'll need least one sensor to get feedback from. Here are three choices, but you can use any sensor you want.

1. The Ping Ultrasound Sensor.

Parallax's PING)))™ ultrasonic sensor is an easy method of distance measurement and autonomous obstacle detection and avoidance. The Ping sensor measures distance using sonar; an ultrasonic (well above human hearing) pulse is transmitted from the unit and distance-to-target is determined by measuring the time required for the echo return.

2. The QTI Sensor

The QTI sensor is an infrared emitter/receiver that is able to differentiate between a dark surface (with low IR reflectivity) and a light surface (with high IR reflectivity). These sensors are used for line following, maze navigation, or sensing the outer rim of a SumoBot ring. We use them as an analog sensor to detect different shades of gray. A daylight filter is built into the sensor.

3. The Push Button.

Push Buttons allow physical interactions to be detected by a micro-controller. Most commonly they are used for human interactions and interfaces. They can also be used as limit switches to detect travel of an object.
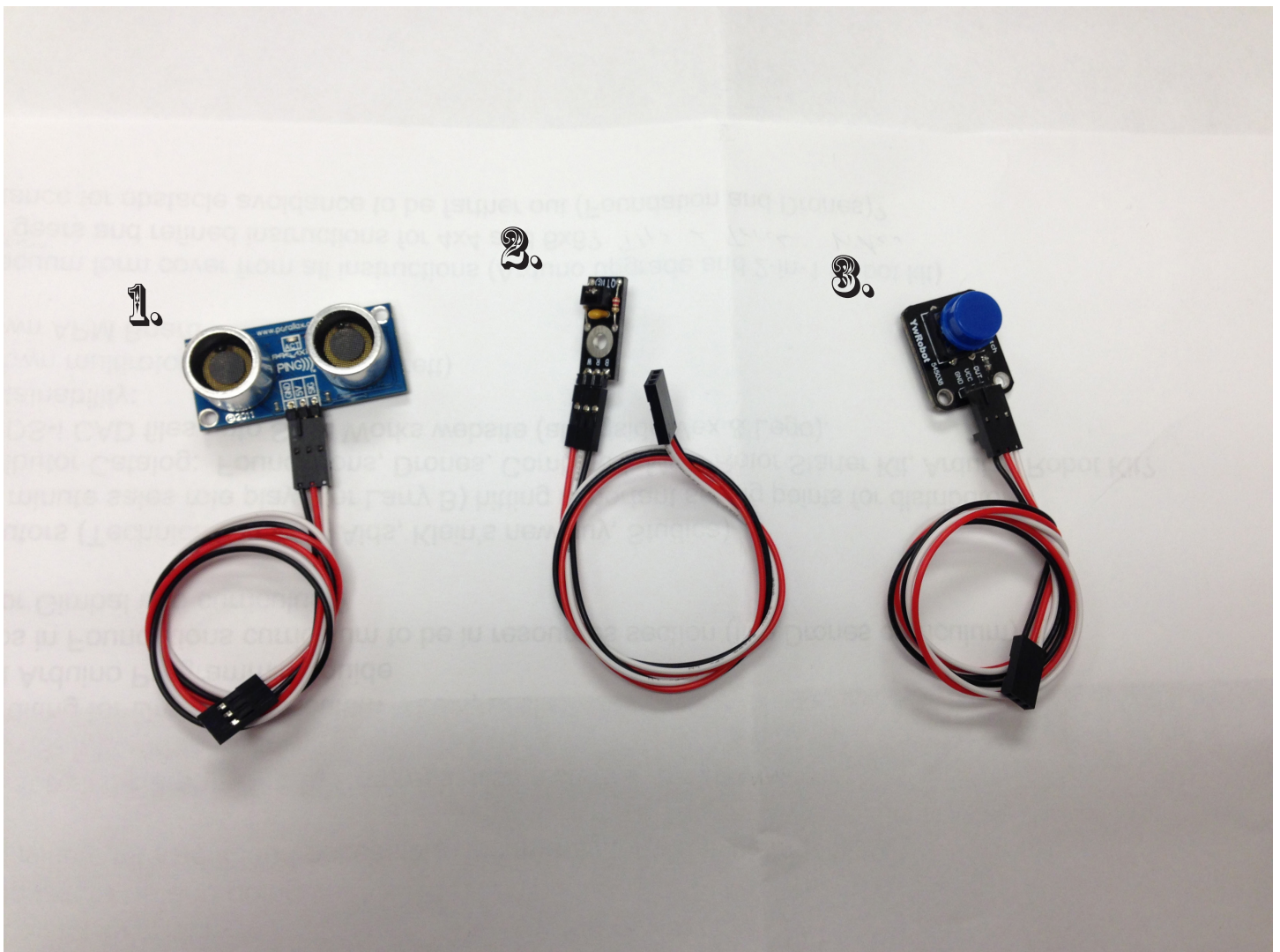
Ready Your Servo.

Grab your servo and attach the servo horn. Pick a servo horn, the kit comes with multiple, but I picked the big round one. Press it onto the servo making sure the teeth aline and then add the small black screw.
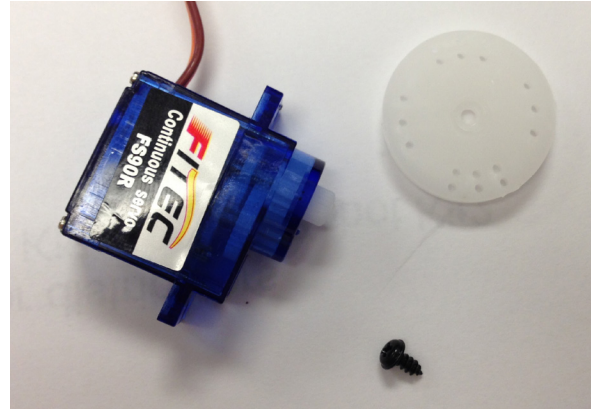
Make Your Wheels,

Use the cardboard box that came with the kit to make your wheels. I used my Flarp Noise Putty lid for a template. Then cut out the wheels.
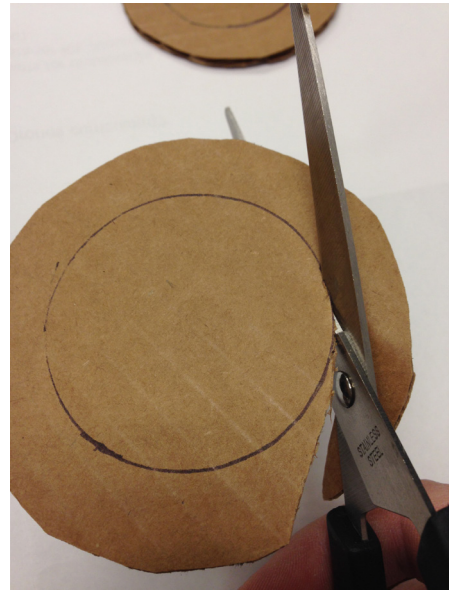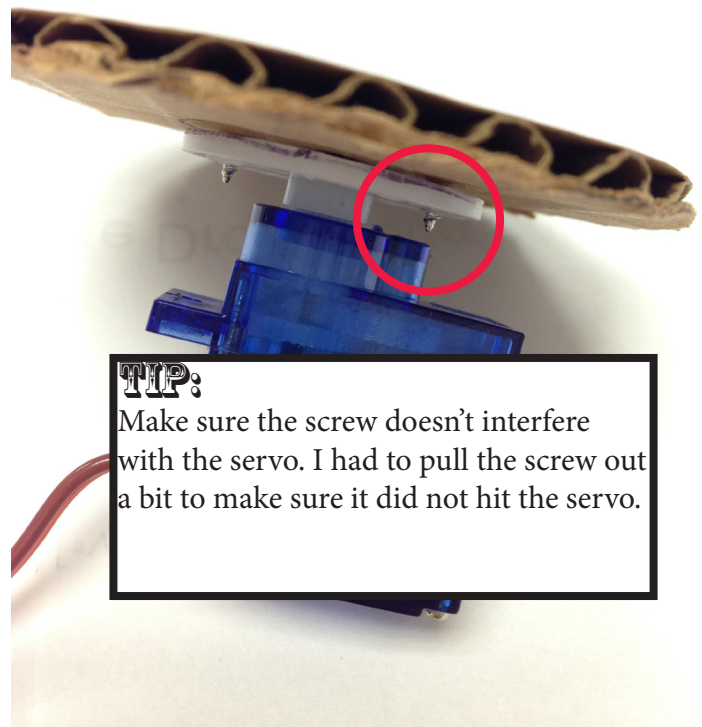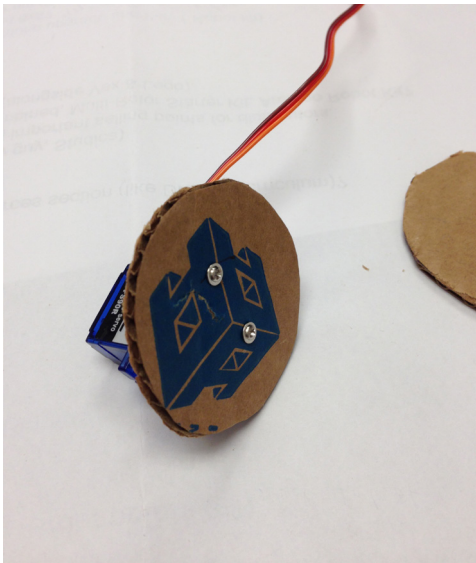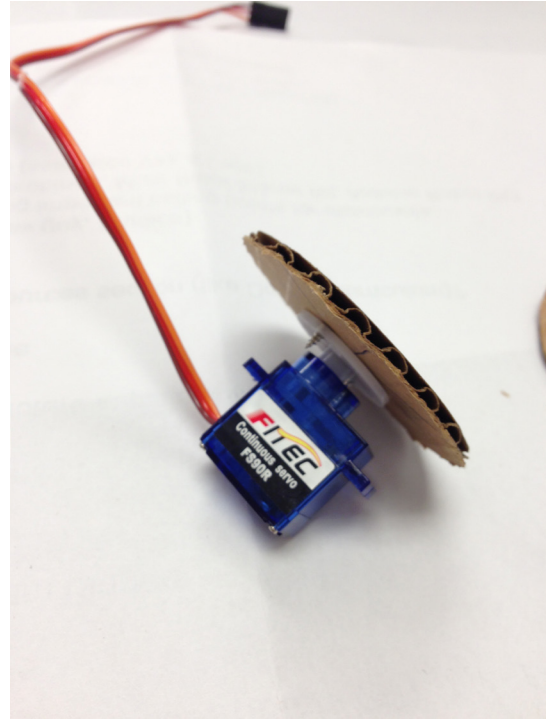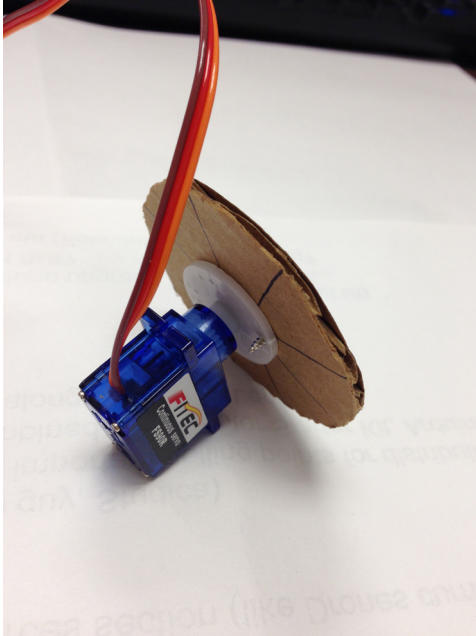

and chassis.

More my chassis or frame for the robot I just cut out a rectangle piece of cardboard. Trace out a rectangle and then cut it out.

Servo and Wheel.

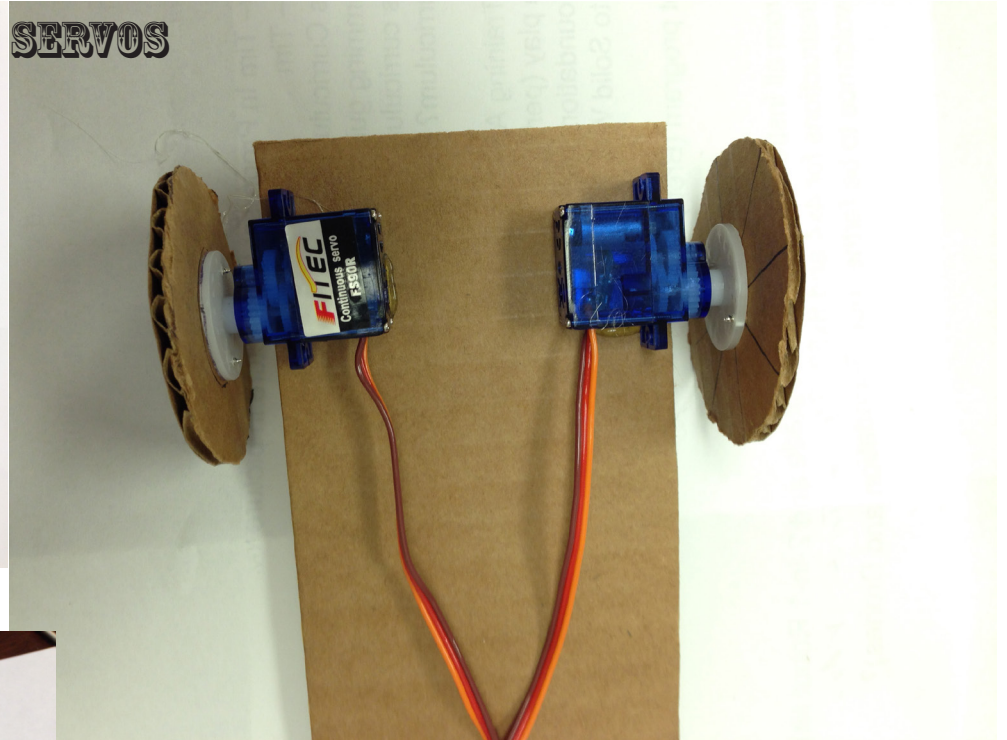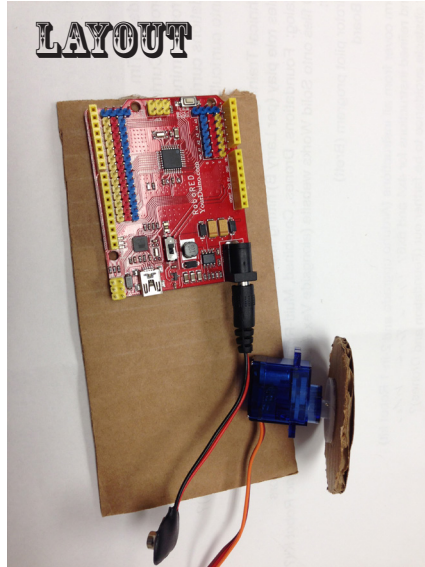Using the other silver screws attach your servo to the wheel.

TIP:
Make sure the screw doesn't interfere with the servo. I had to pull the screw out a bit to make sure it did not hit the servo.
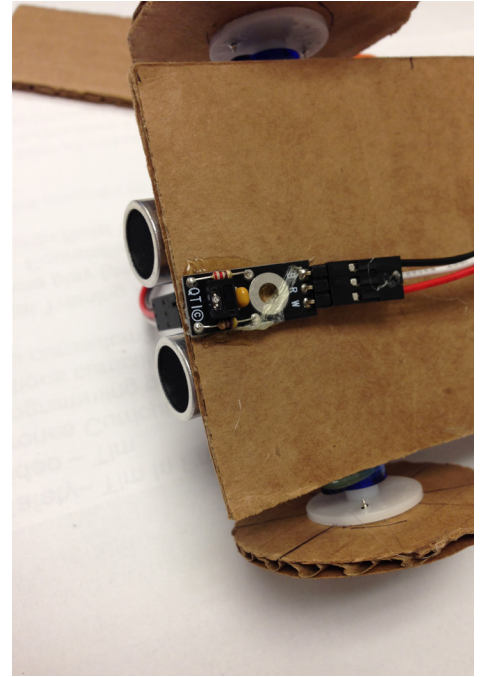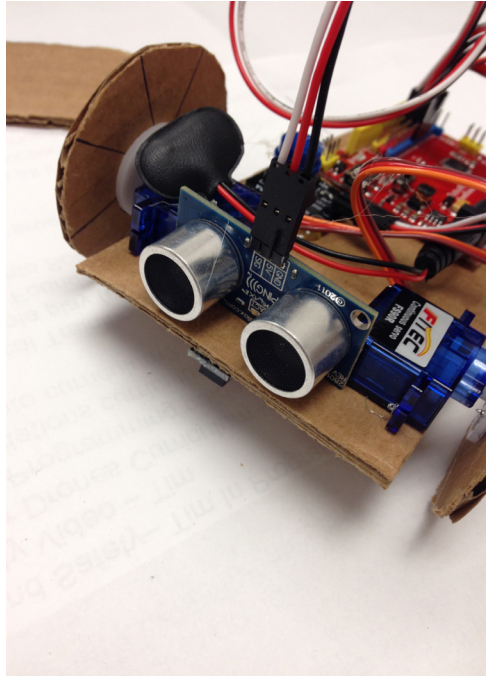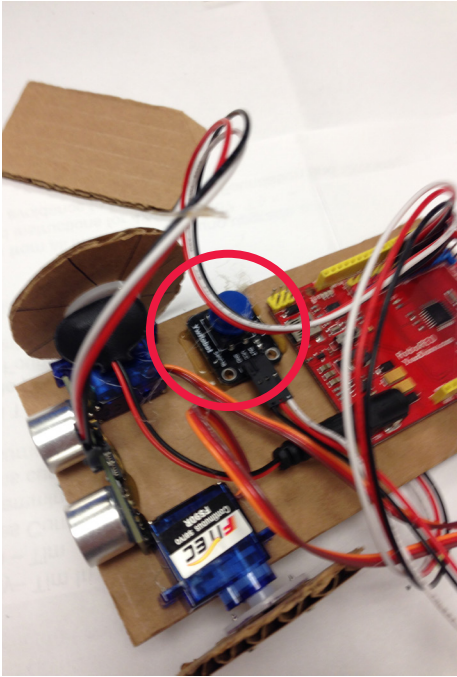
Glue it together.

Lay out all the pieces where you want them and then glue them down. I used the hot glue gun.

LAYOUT

SERVOS

ARDUINO
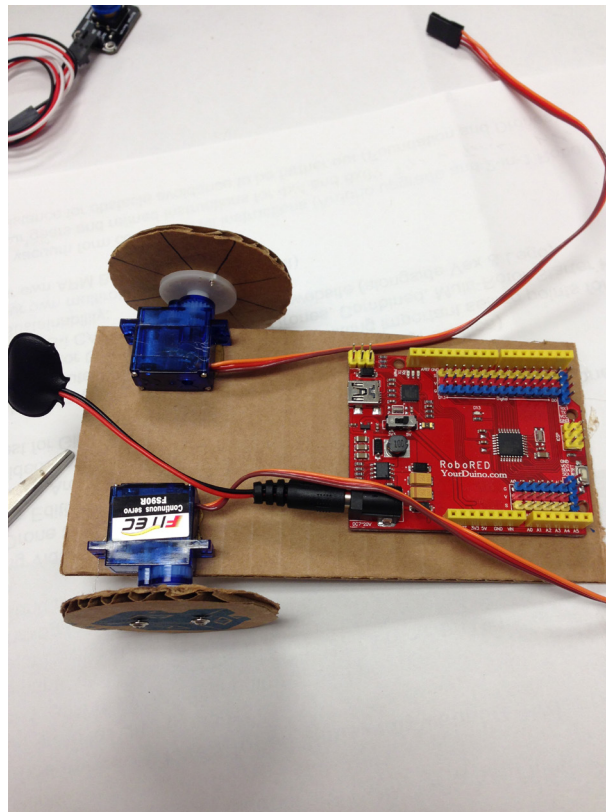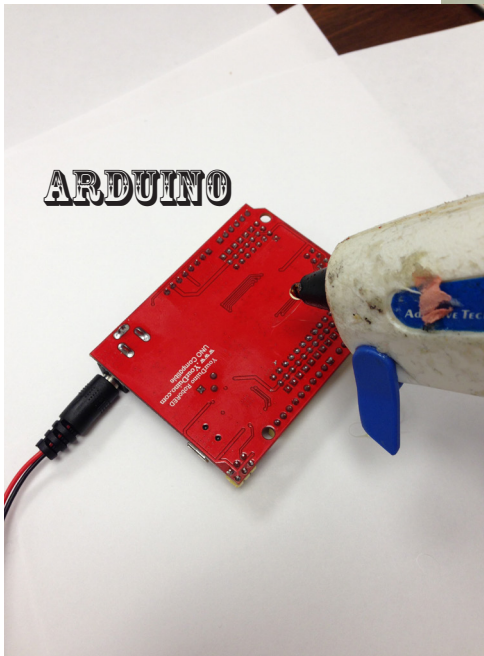
Glue on sensors.

Glue on your sensors too, pay special attention on how each sensor gets feedback.

Push Button:
The push buttons work just by the touch of the button. Make sure it is easy to get to get to. or there enough weight behind it to fully depress the button.

Ping Sensor:
The Ping Sensor using ultrasound waves to detect objects. Make sure there are no wires or other parts of the robot that interfere with the sensor. Make sure it is not pointing at the ground, because then the ground may trigger the sensor.

QTI Sensor:
The QTI sensor will look for the black line. It will need to be on the bottom side of the robot so the Sensor is close enough.

The Robot is built!
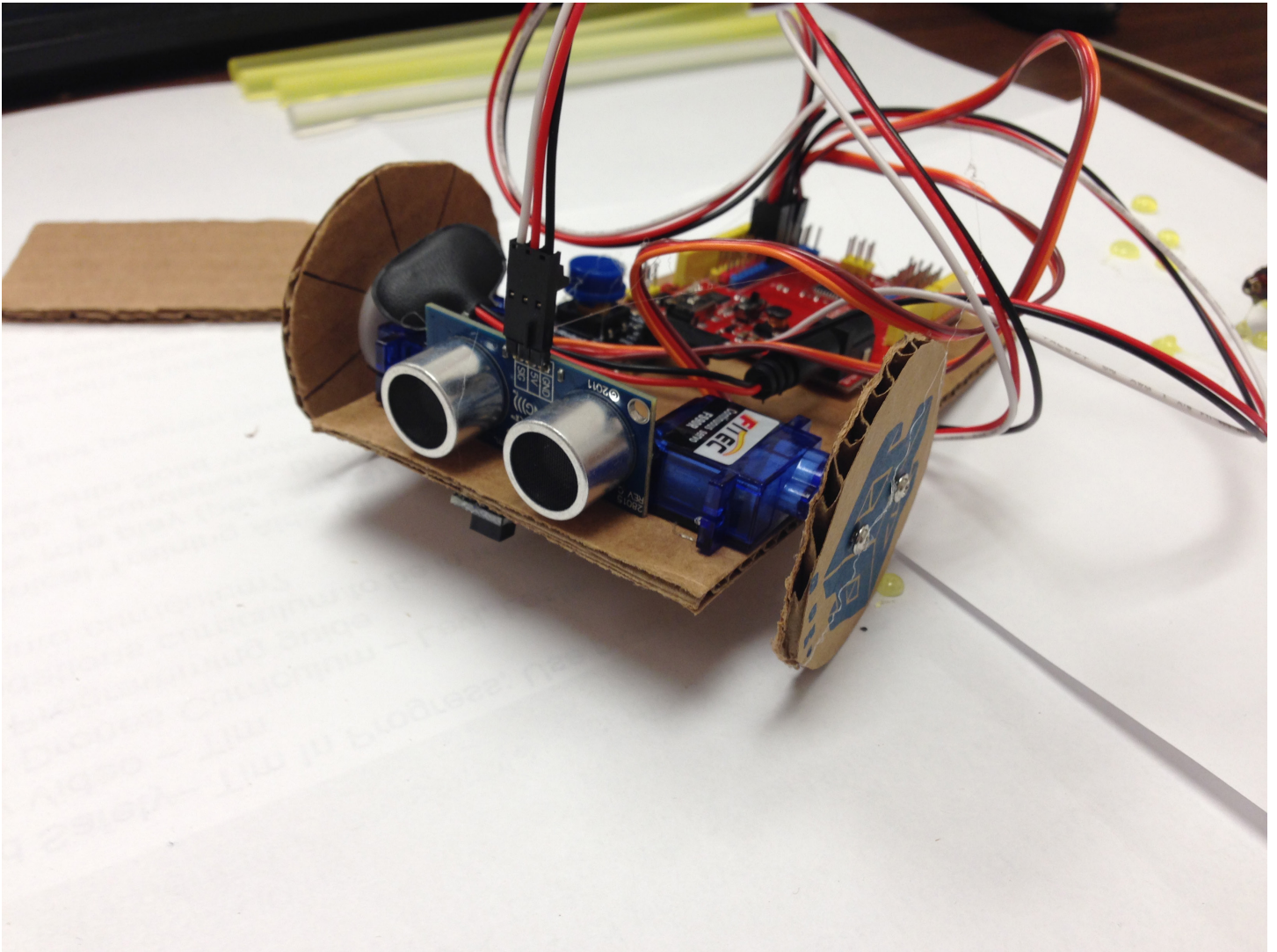
Ready to Program.

Your Robot is ready to program. Go to mindsirobotics.com/programming-resources to download arduino.

Also download a free copy of the Arduino Resource Guide, that will help you install and program your robot.