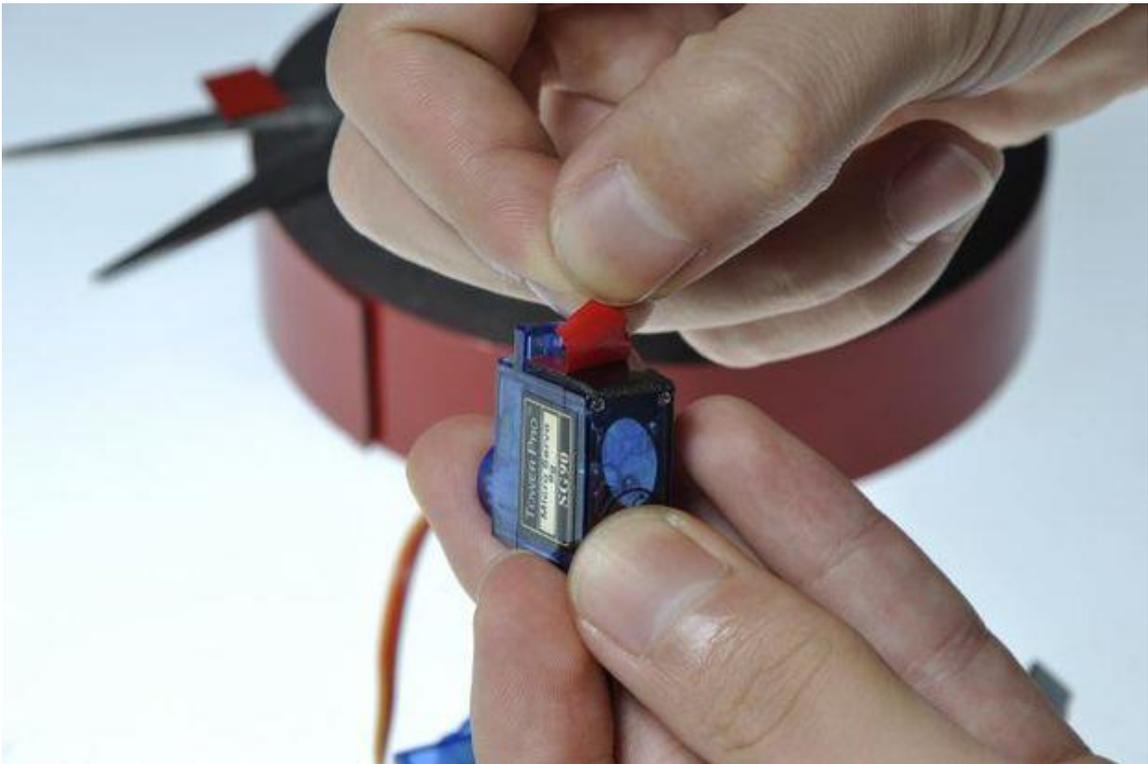
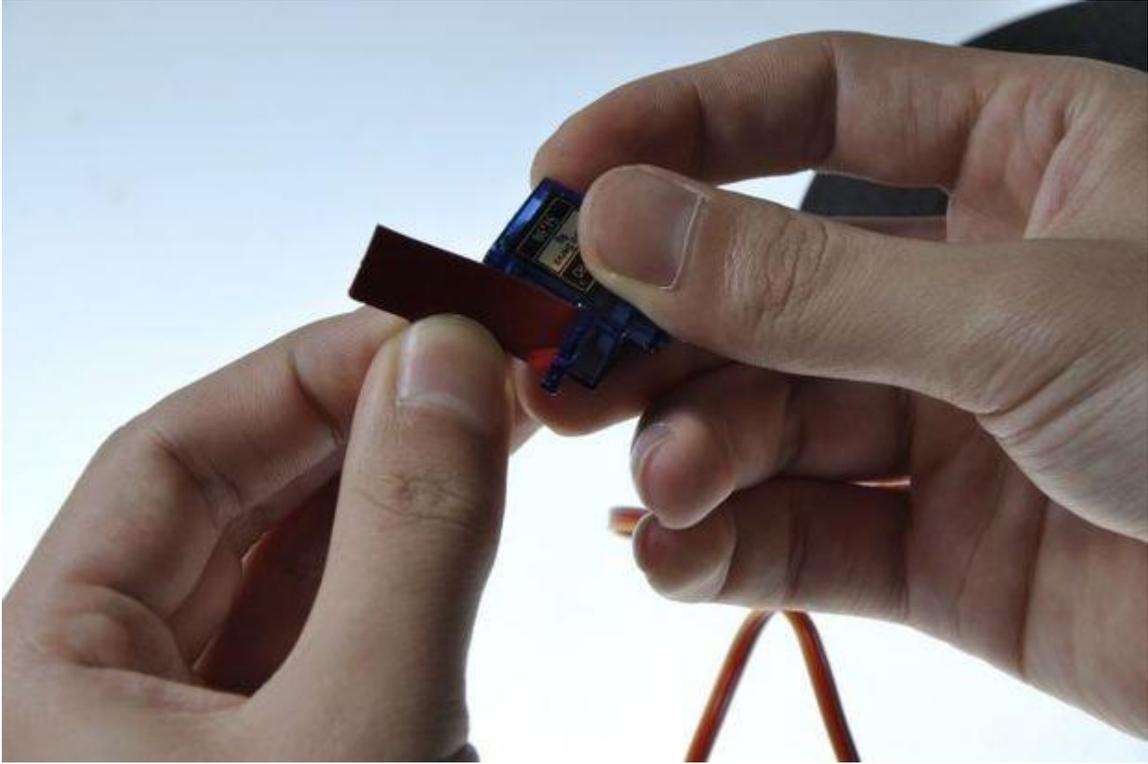
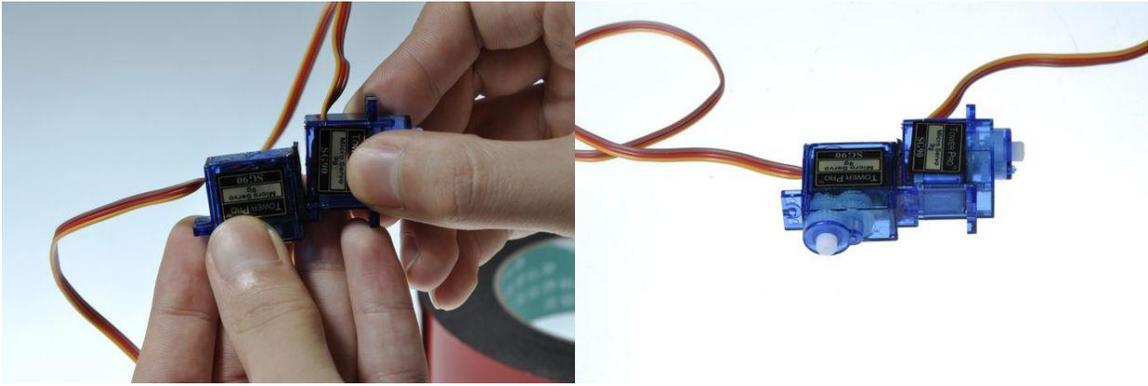


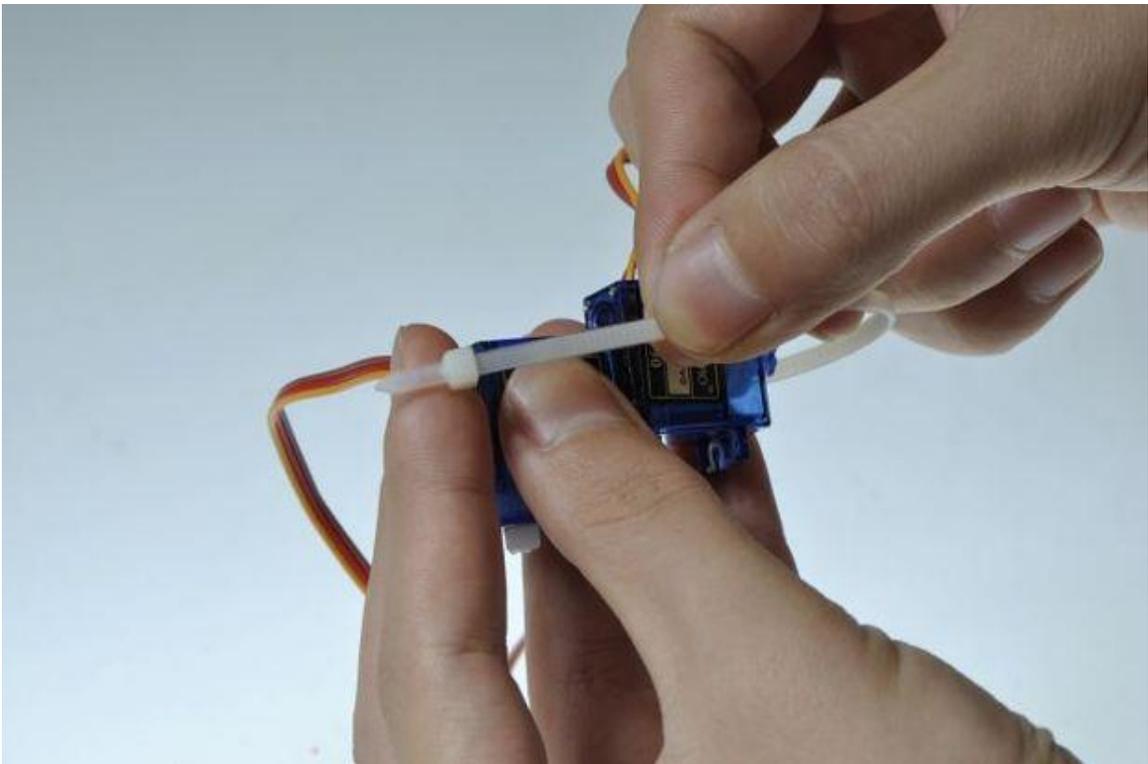
Step 1: Servos Building the Body

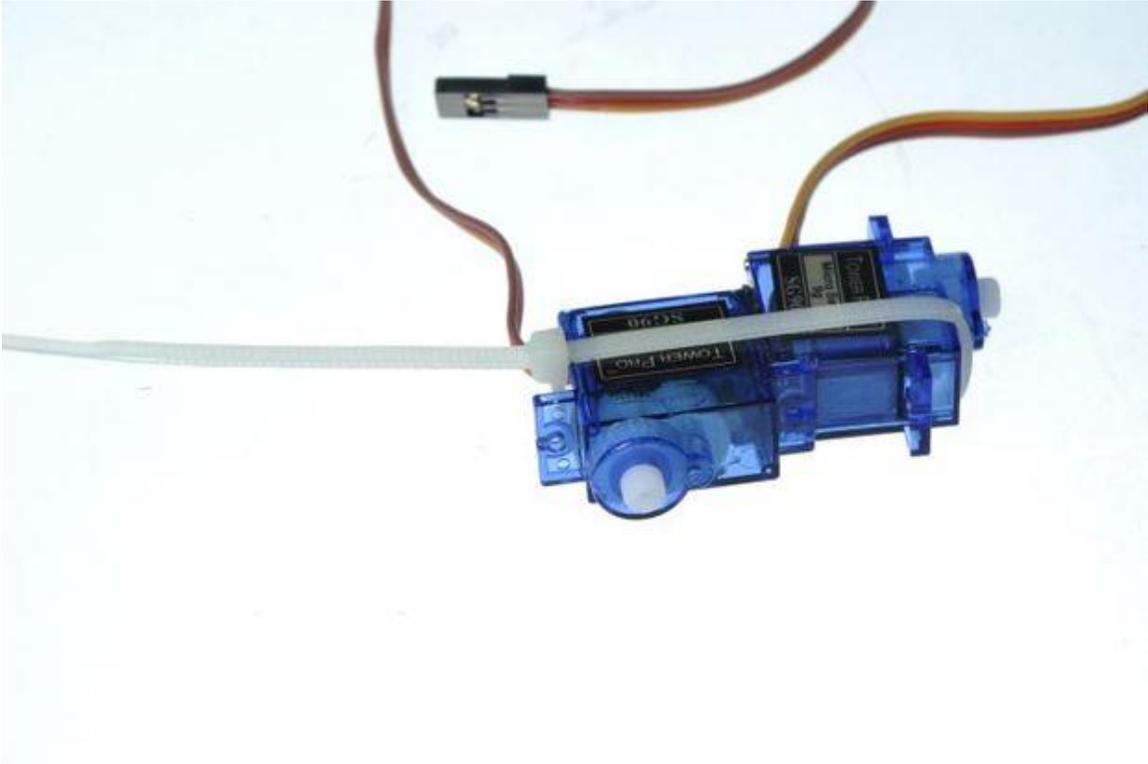




Stick both servos together by using double-sided foam tape. Front servo shaft in top and rear servo shaft on the backside. Make sure you align them properly so that they make a nice body for the robot.

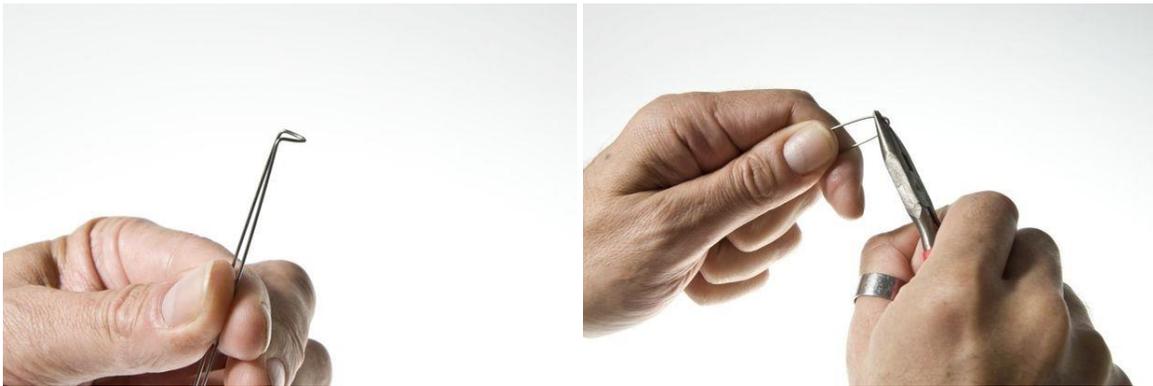
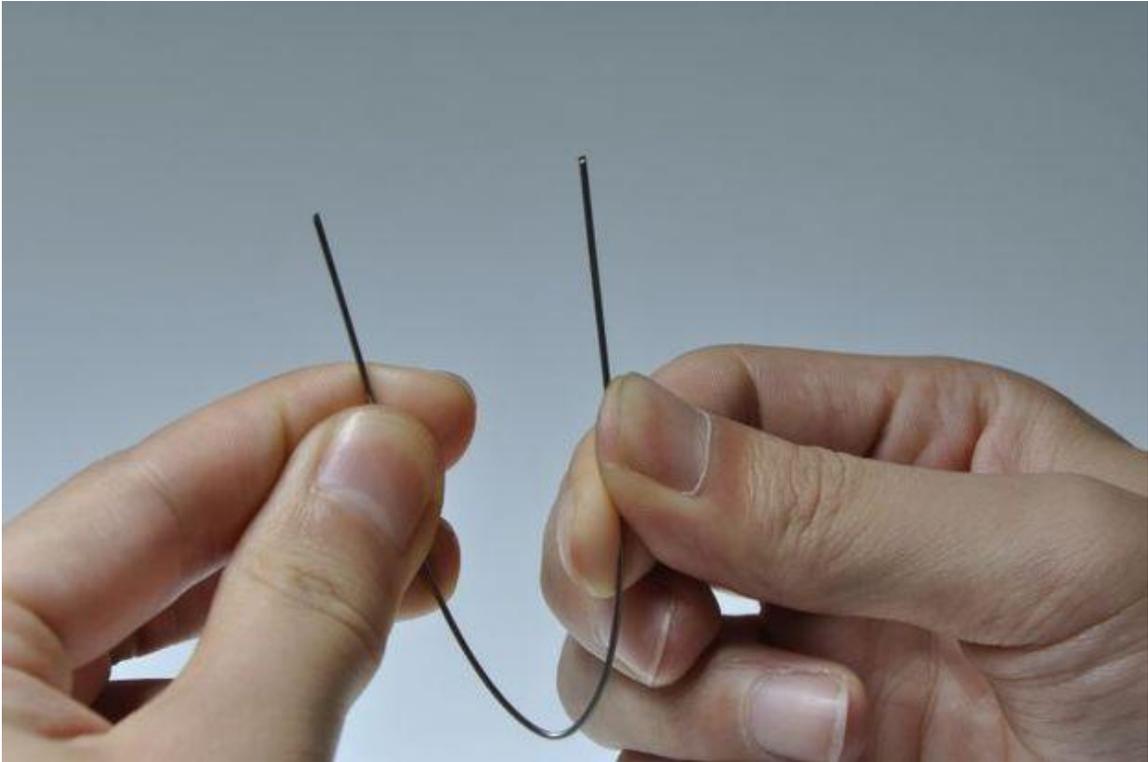
Step 2: Servos Wrapped





Wrap a big cable tie (4x200mm) around the two servos to secure them. Pull the cable tie very tight to strap the servos together. You may use pliers to give it the final pull.

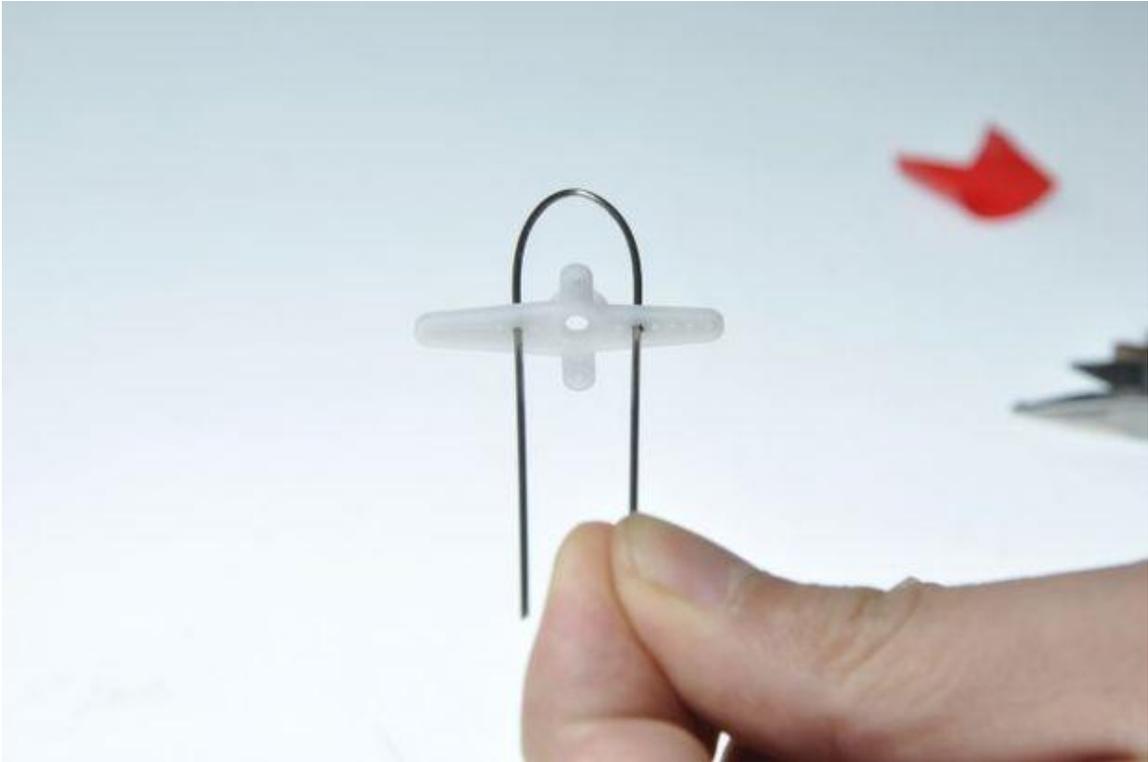
Step 3: Bending the Legs



Bend the wire in a V shape as shown in the images above. The tips of both wire ends should be 100mm apart. Don't worry about precision yet, you will have to bend them later in the right shape anyway.

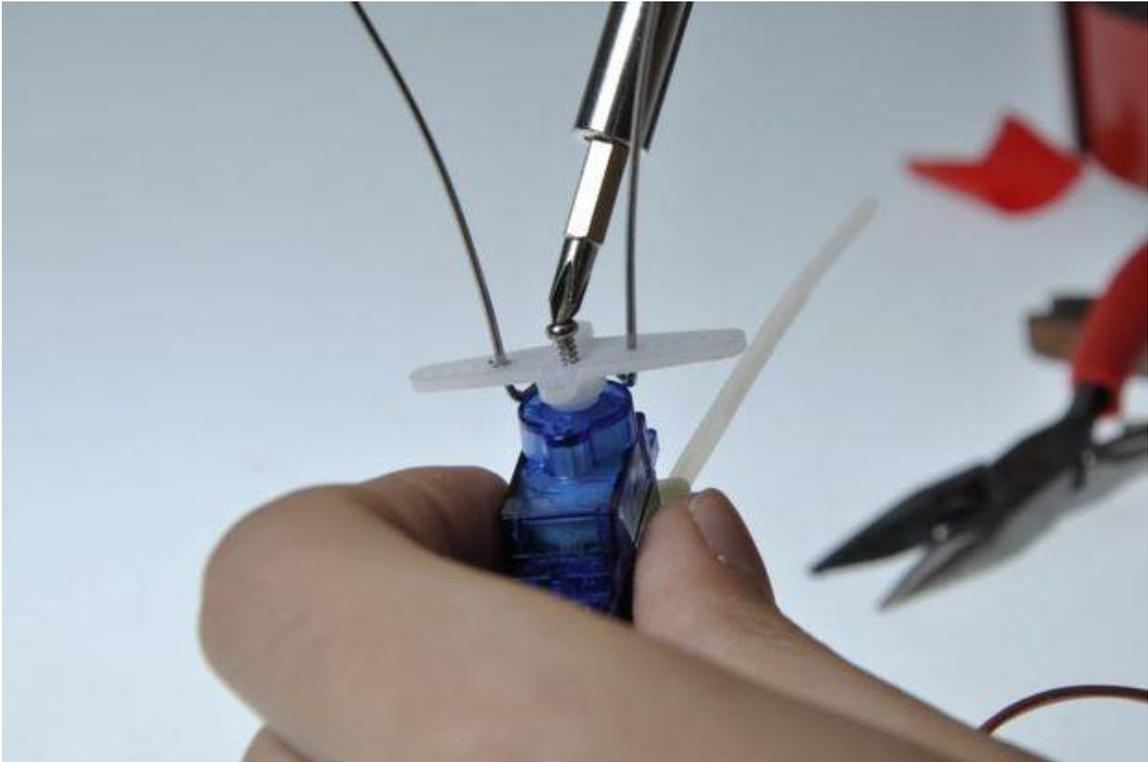
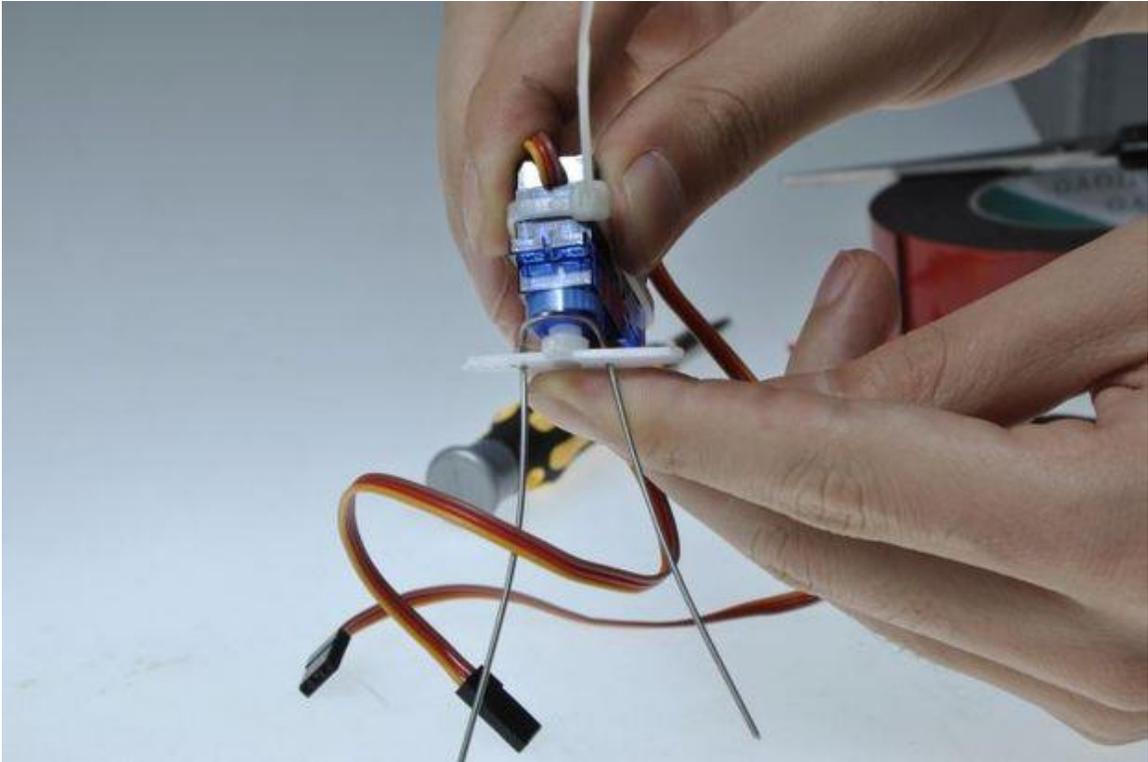
Bend about 10mm of the round end to 90°. The bending quality depends on the wire you are using. Try using stainless steel 304 with 1mm diameter. That sort of wire you can still bend with your fingers and it will stay in the shape you give it. However, the 90° bend needs to be quite sharp to fit, so please bend it as close to the pliers edge as possible.

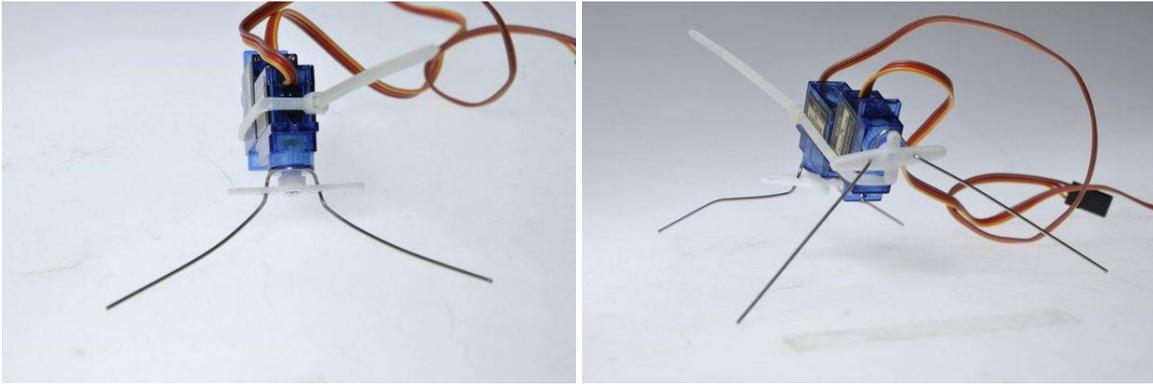
Step 4: Attaching Legs to the Servo Horn



Put the two ends of the wire leg through the second hole from the center and then bend the two legs apart, as seen in the images above. Hold the wire leg and the servo horn with pliers and bend the wire down close to the servo horn.

Step 5: Attaching the Legs to the Servos

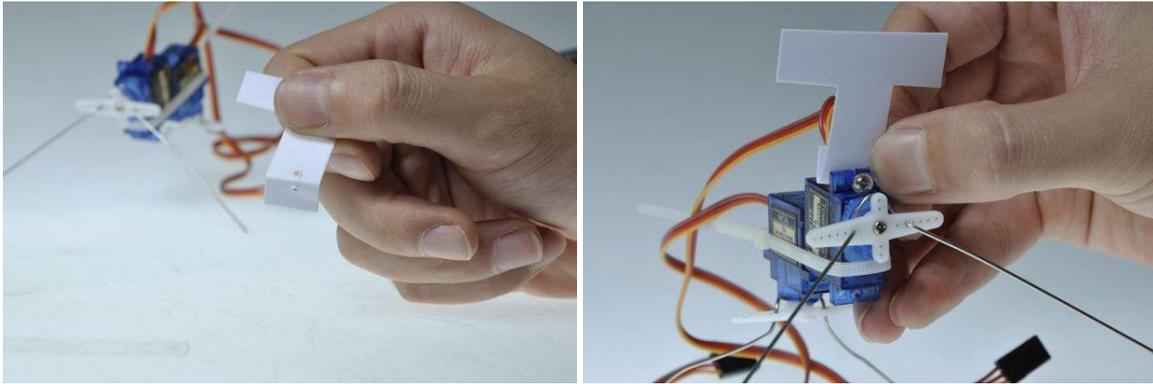




Attach the servo horns with the wire legs to the servo by fixing them with the small screw. For that step you should be familiar with Arduino and how to center a servo. Please center your servos first. If your servos are not centered, you can fix it later after switching the robot on for the first time. Bend the legs into a shape so that the robot is standing nice and stable.

Step 6: Sensor Holder

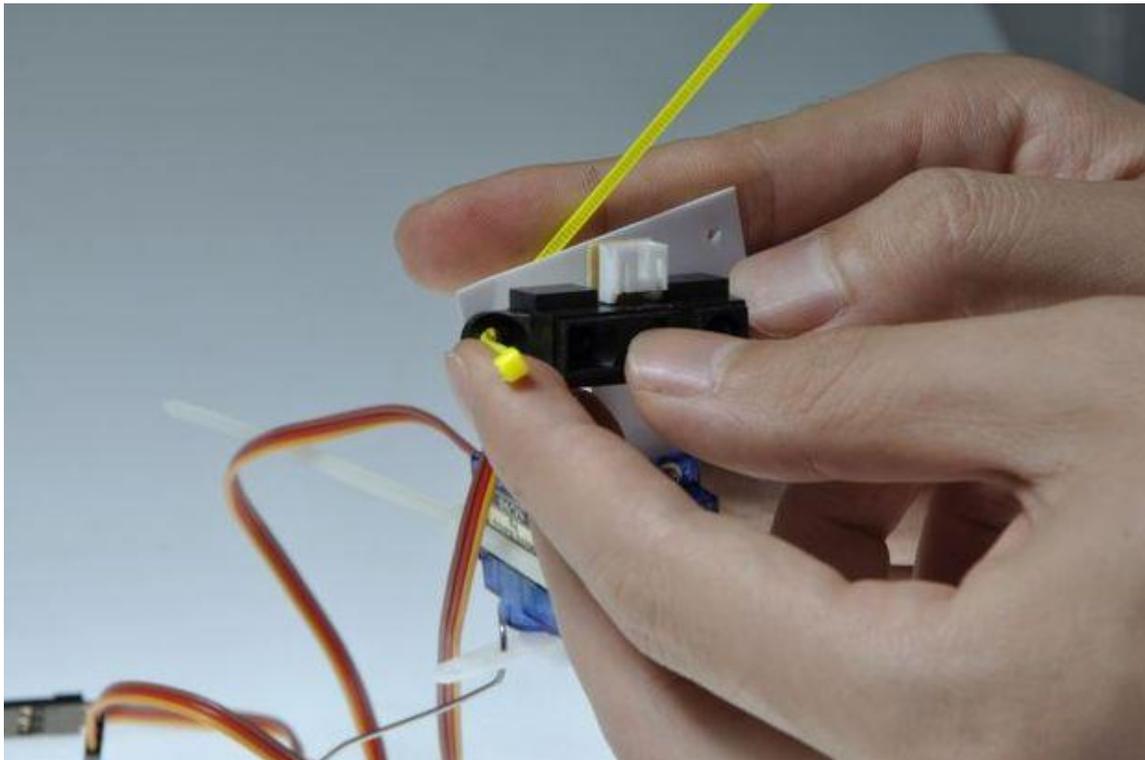


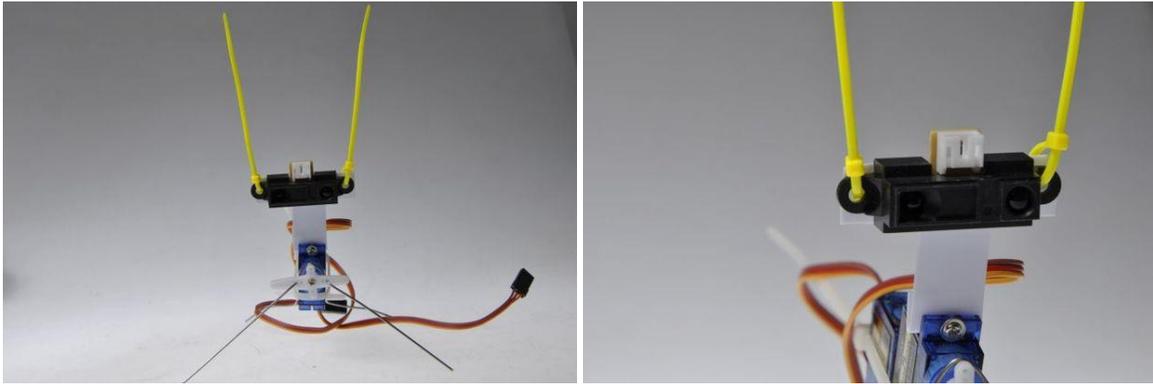


Use scissors to cut the sensor holder out of a plastic sheet, cardboard, or aluminum. You can even use a Dremel tool and cut it out of an old CD or DVD. Make sure the upper part is a minimum of 45mm wide to attach the infrared sensor. The base needs to be 10mm wide to attach the holder on the servo.

Optional: Bend the end about 5mm to double the material thickness, if you are using thin plastic in order to have more grip for the screw. Punch or drill a tiny hole in the bottom. These holes should not be bigger than the diameter of the screw to guarantee that the screw holds it in place. Attach the sensor holder with a screw from the servo accessory at the top of the front servo.

Step 7: Attaching the Sensor to the Sensor Holder

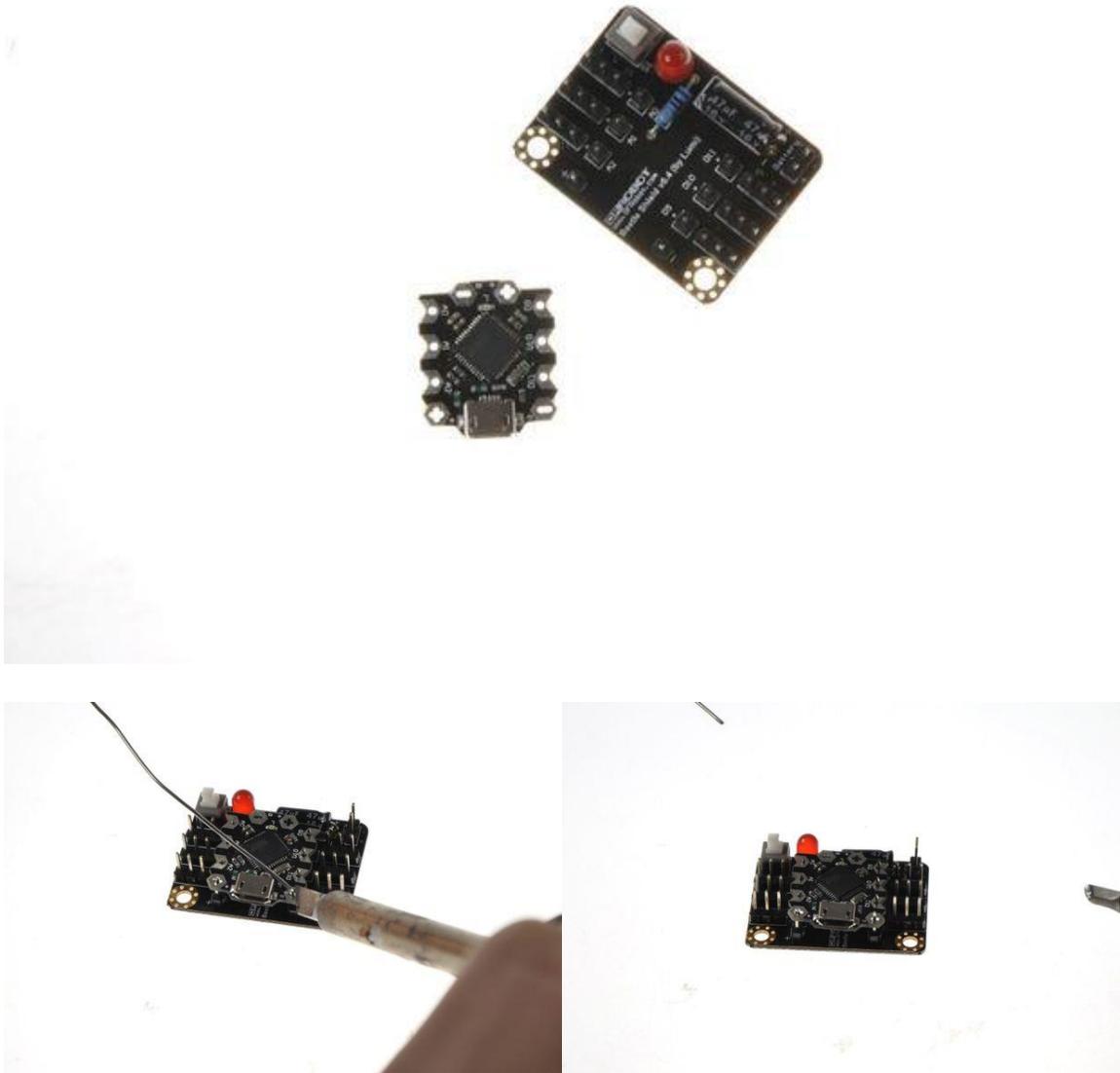




Make two holes for the infrared sensor by placing the sensor on the holder and mark the holes. Then make holes with with a 2mm diameter using scissors or another suitable tool. Fix the sensor with the white connector facing up on the holder by using two small cable ties. You may cut the cable ties but they are good to use as antennas or feelers. The sensor can also be attached using suitable bolts and nuts.

Step 8: Solder the Beetle on the Beetle Shield





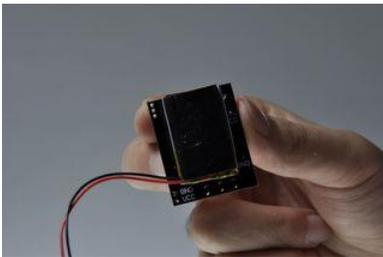
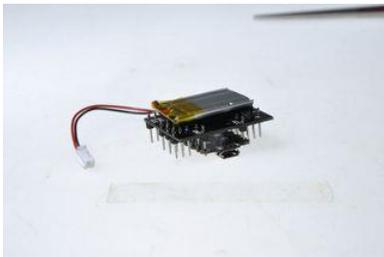
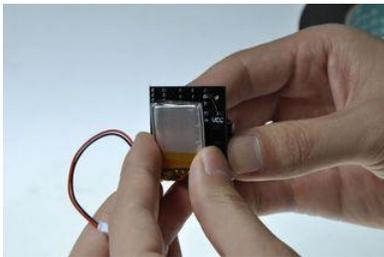
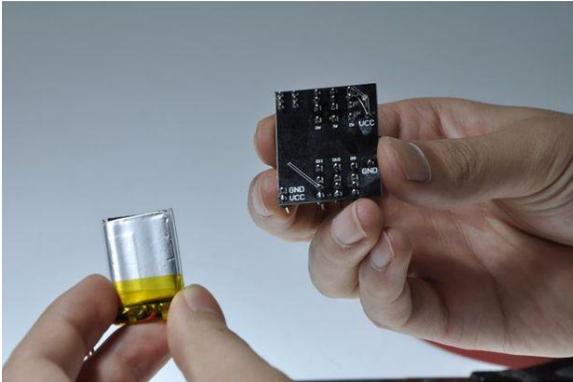
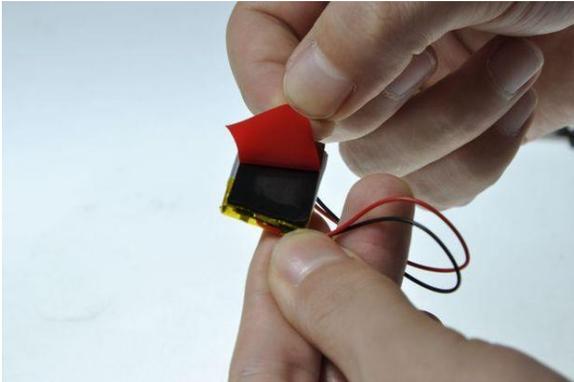
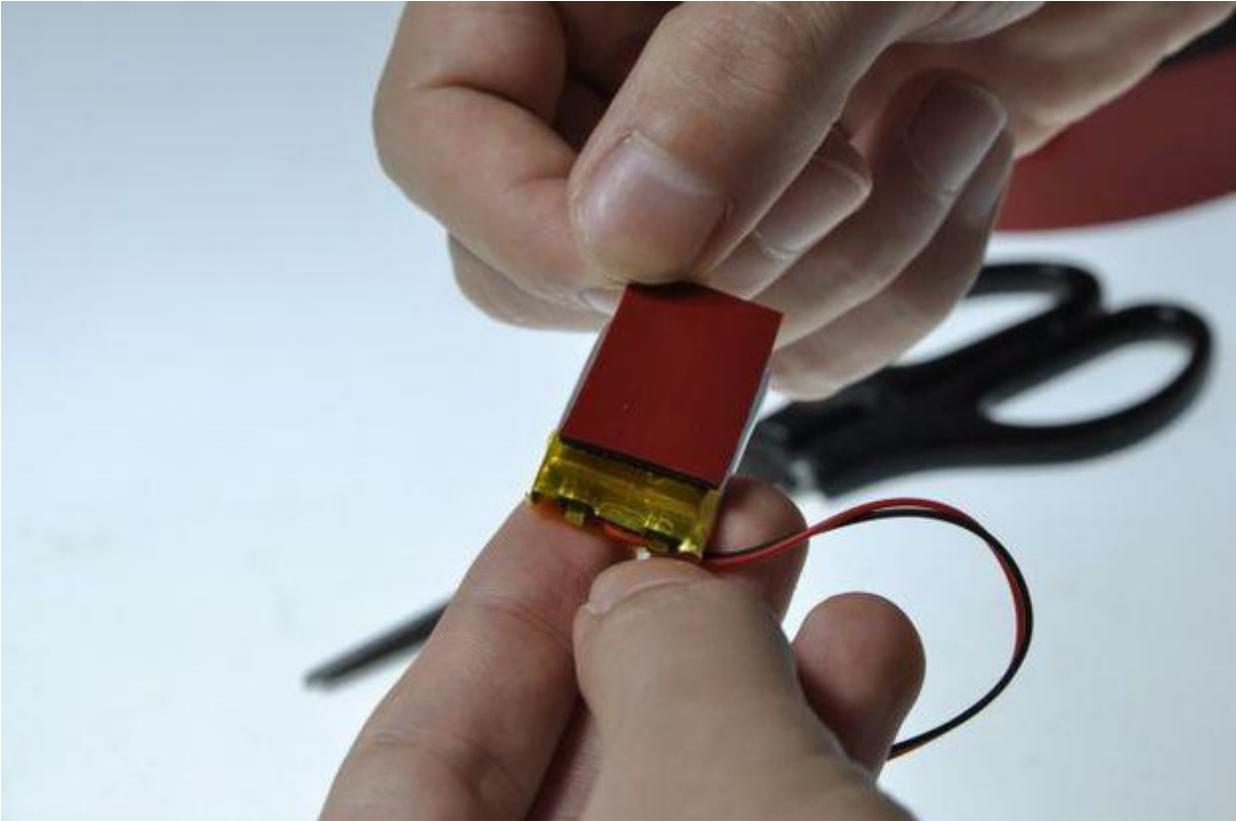
Now it's time to solder the Beetle controller onto the Beetle shield. First you have to put the beetle on the pins by paying attention to the right direction. The USB socket needs to face to the left side of the shield, the side where these two mounting holes are located.

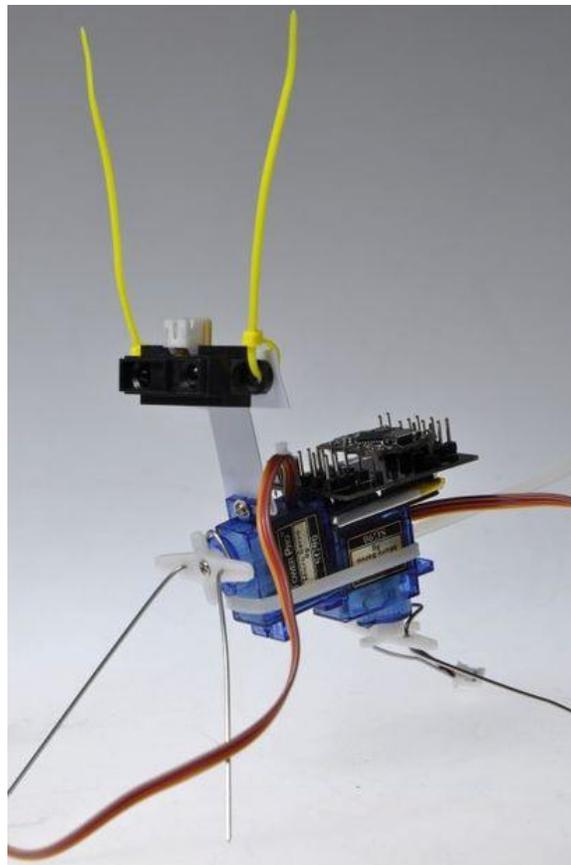
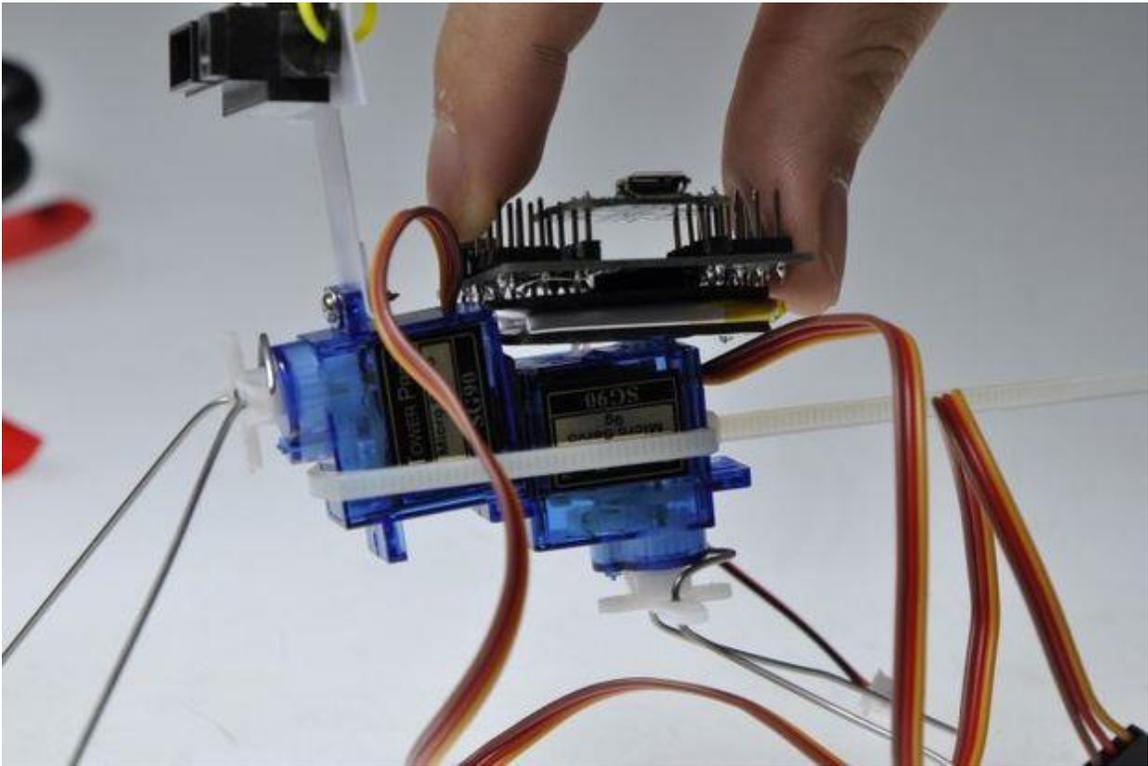
You need to solder the pins for "D9", "D10", "D11", "A0", "A1" and "A2" as well the two power pins labeled with "+" and "-".

Note: The Beetle is DFRobots tiny Arduino compatible MCU board with 3x digital I/O and 3x analog I/O as well solder pads for RX/TX and four I/O's on the backside of the board. The Beetle Shield is for now only available in the Insect Bot mini kit

Optional: You may use any other MCU which fits but so far the Beetle or the previous version the Cheapduino is small enough.

Step 9: Assembling the Battery, Board Backpack



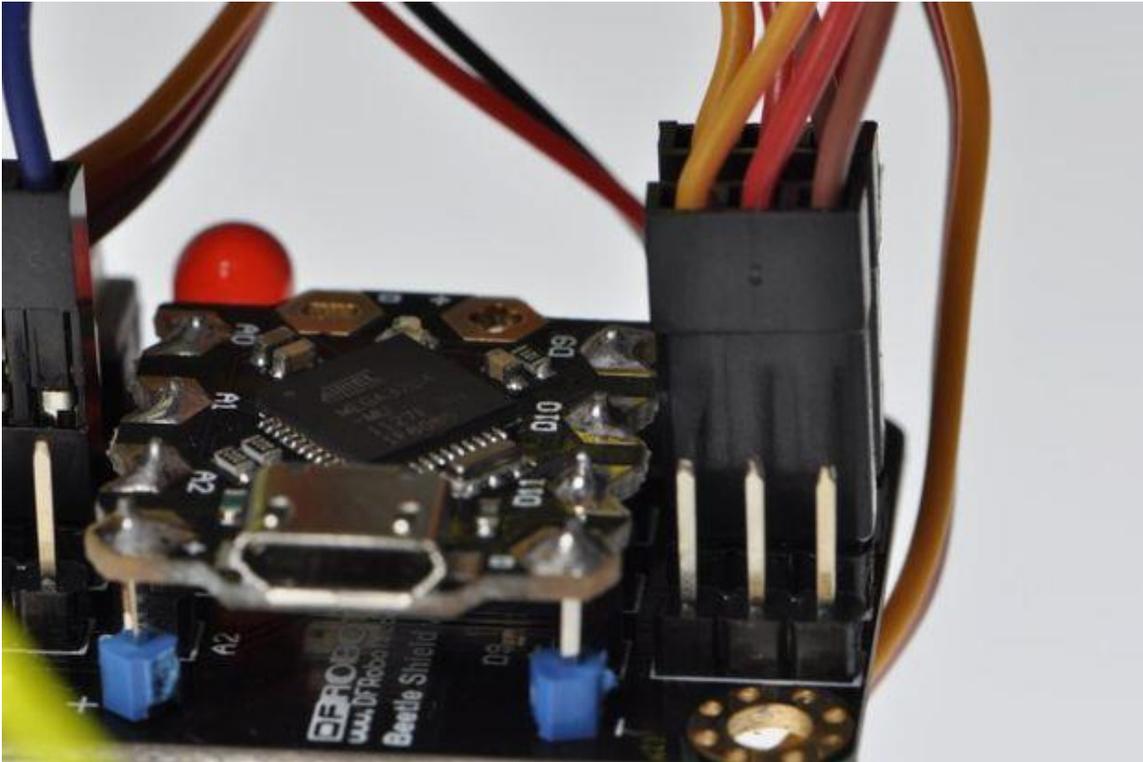


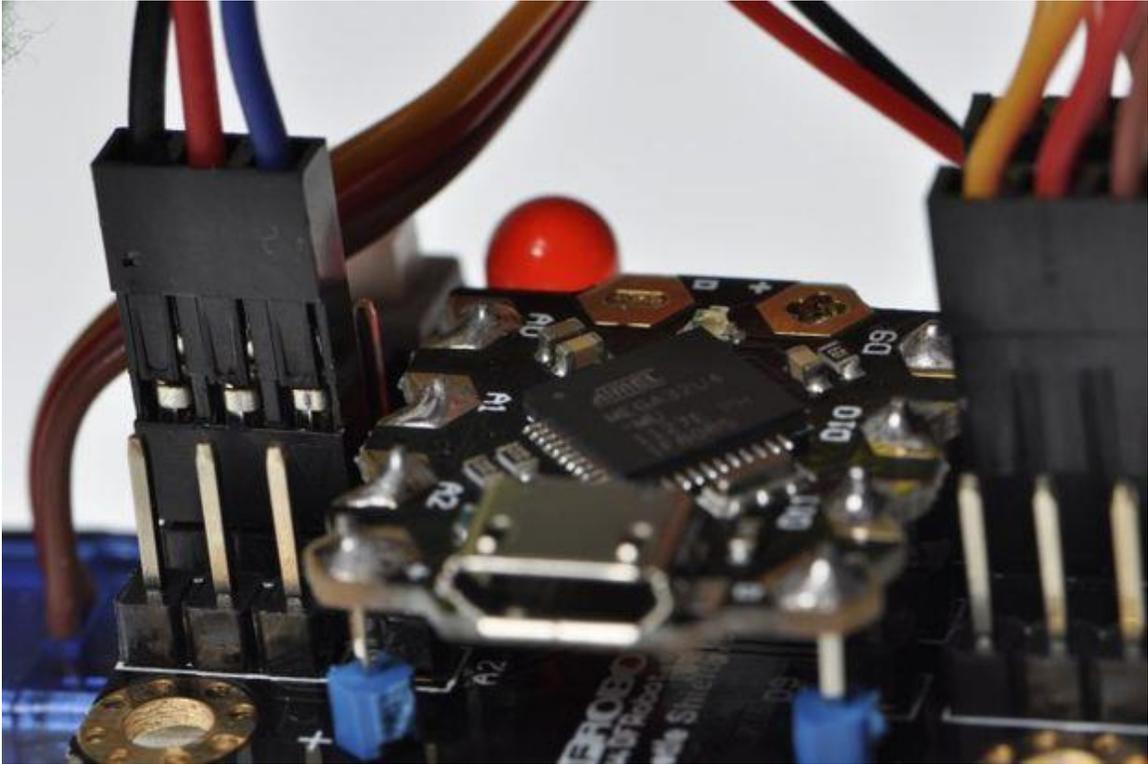
Use two sticky pads on each side of the battery. Then stick the battery on the bottom of the PCB and make sure it's aligned to the front. Remove the protective layer of the bottom side of the battery and stick the whole battery-board-assembly on the rear servo.

Make sure the battery wire is facing to the right to connect it with the power connector on the Beetle shield.

Warning! Make sure that you not puncture the LiPo battery with the leads on the bottom side of the Beetle Shield. Use double sided foam tape with minimum 3mm thickness to prevent that from happening.

Step 10: Wiring up





If you are using the provided code, then you need to connect the servos and the sensor as followed.

Connect the front servo cable with D9 on the PCB and the rear servo with D10.

Make sure that the yellow wire is facing inwards to the Beetle board in the middle of the PCB.

Connect the white plug of the sensor cable with the socket on the infrared sensor and the black plug with connector A1 on the PCB. This cable needs to be connected with the blue wire facing inwards to the Beetle on the PCB.

To make sure that you've got the right cable please check the Wiki at:

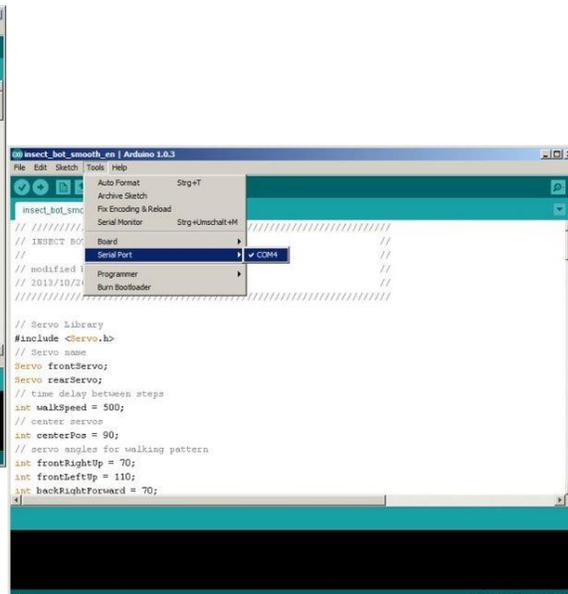
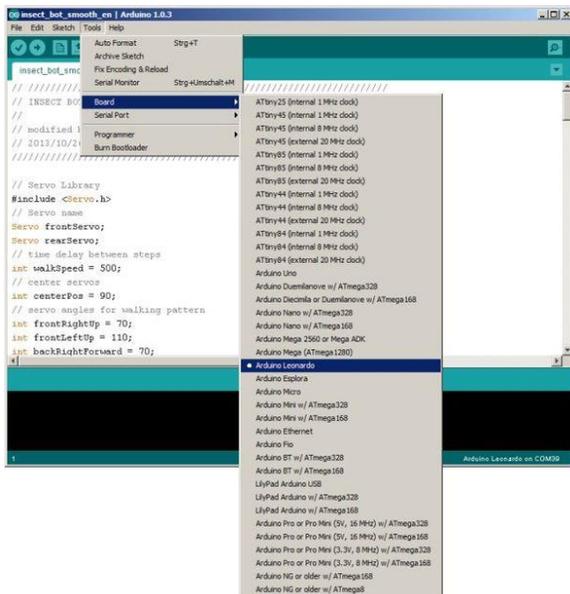
http://www.dfrobot.com/wiki/index.php/Insect_bot_mini

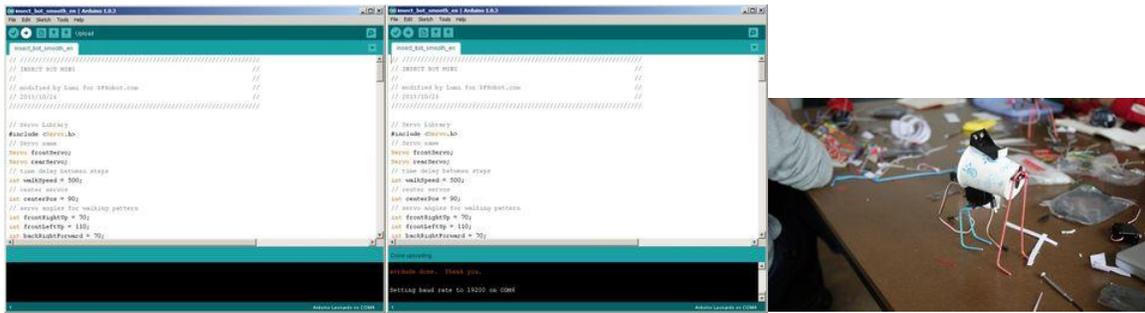
The last task is to connect the battery with the battery pins on the PCB. Make sure the red wire is connected with VCC and the black wire is connected with GND. After pressing the switch to power up the robot, the LED on the PCB should light up.

Step 11: Programming the Insect Bot Mini

```
insect_bot_smooth_en
// ////////////////////////////////////////
// INSECT BOT MINI
//
// modified by Lumi for DFRobot.com
// 2013/10/26
// ////////////////////////////////////////

// Servo Library
#include <Servo.h>
// Servo name
Servo frontServo;
Servo rearServo;
// time delay between steps
int walkSpeed = 500;
// center servos
int centerPos = 90;
// servo angles for walking pattern
int frontRightUp = 70;
int frontLeftUp = 110;
int backRightForward = 70;
```





To program the robot you need to have a computer with the Arduino IDE installed.

The connected Beetle will show up as a Leonardo. Please choose this and select the proper COM port.

Open the previously downloaded file **insect_bot_smooth_en.ino** and upload it to the Beetle.

Once it's done without errors, the Insect Bot mini is ready to take his first steps.

The complete Insect Bot mini kit is available from Monoprice and comes with all the parts plus rechargeable LiPo battery with USB charger.