Hexy the Hexapod

Building an ArcBotics Hexy

PARTS:

- 1 ArcBotics Hexy Kit (1)

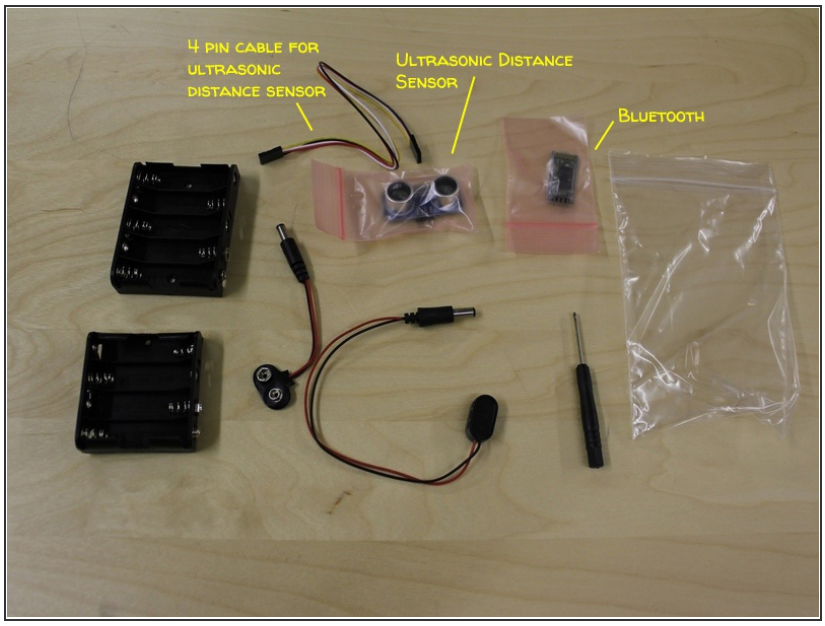
SUMMARY

We're going to build a hexapod!

Step 1 — Building an ArcBotics Hexy

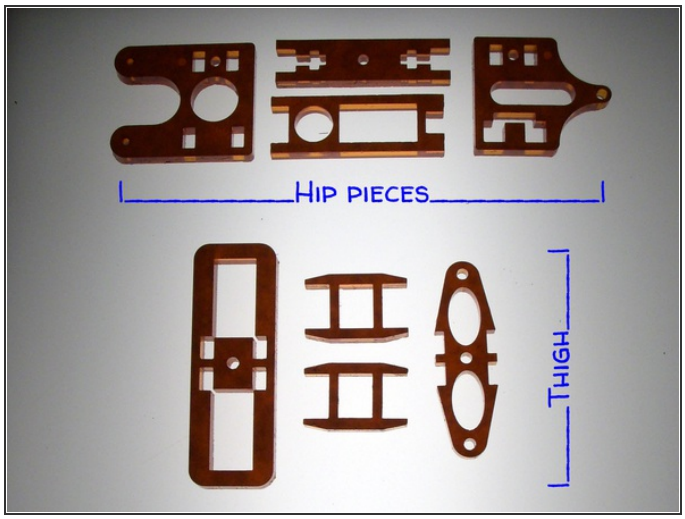
- Unpack your kit and make sure everything is there. There should be:
  - 1 Large bag of body pieces, 7 Small bags of leg pieces
  - 1 Bag of screws/bolts
  - 20 Bags of blue servos
  - 1 Bag containing a Servotor32 controller
  - 1 Bag of miscellaneous pieces
- Congrats, you have all the parts to build a sweet robot!
- For replacements and troubleshooting of any missing/defective servos, email: replacements@arcbotics.com

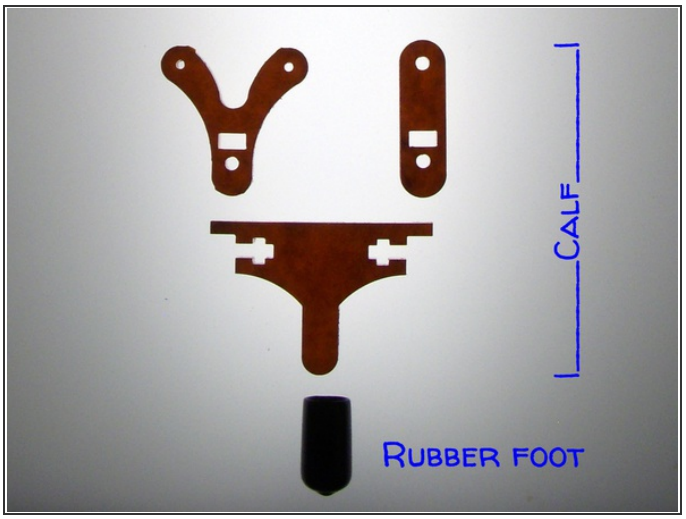
Step 2



- In the Miscellaneous Bag, there should be:
  - 1 4xAA battery holder, 1 5xAA battery holder
  - 1 ultrasonic distance sensor (robot's eyes)
  - 1 4pin cable for the ultrasonic distance sensor
  - 1 Bluetooth serial module
  - 1 small #2 Phillips screwdriver
  - 1 long 2.1mm to 9v clip
- You will need to use the Phillips screwdriver shortly. Put everything else to the side for now.

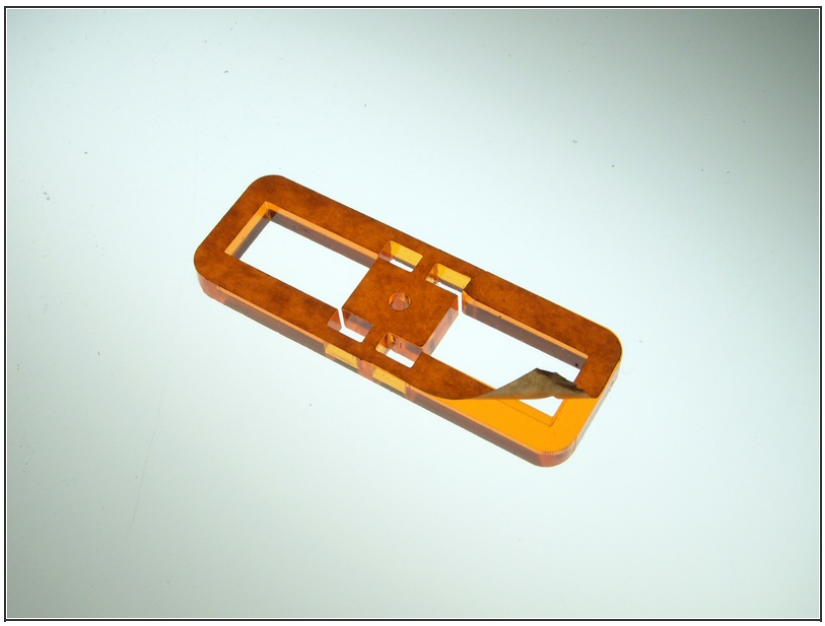
Step 3





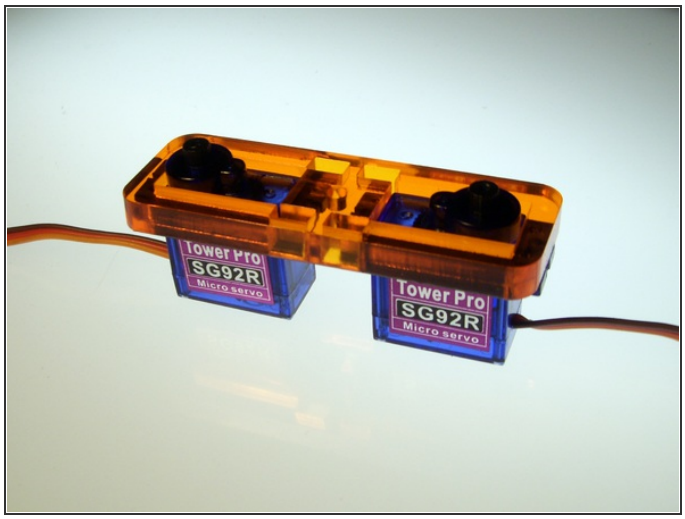
- Time to build the first leg!
- Check the bag of leg pieces to make sure all the parts are present. Please refer to the image:
  - 4 Hip pieces
  - 4 Thigh pieces
  - 3 Calf pieces
  - 1 Rubber foot

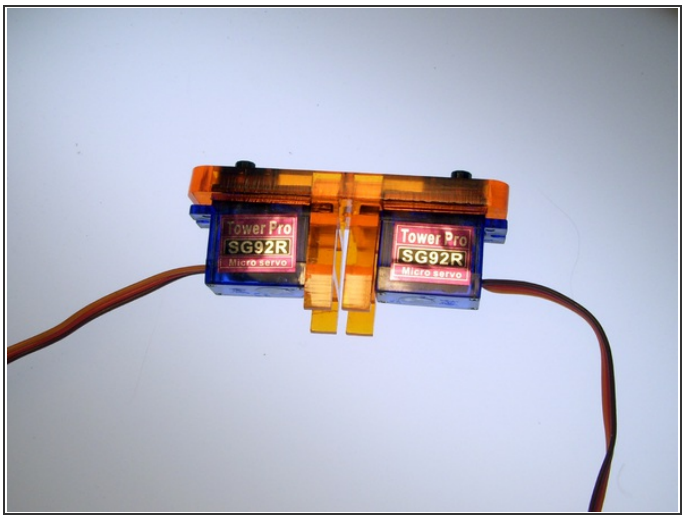
Step 4



- Each plastic piece comes with a protective paper coating on it to prevent scratching during shipping. This protective coating should be removed from all legs and body parts.
- Catch a corner of the paper and peel it off gently.
- Make sure to get both sides!

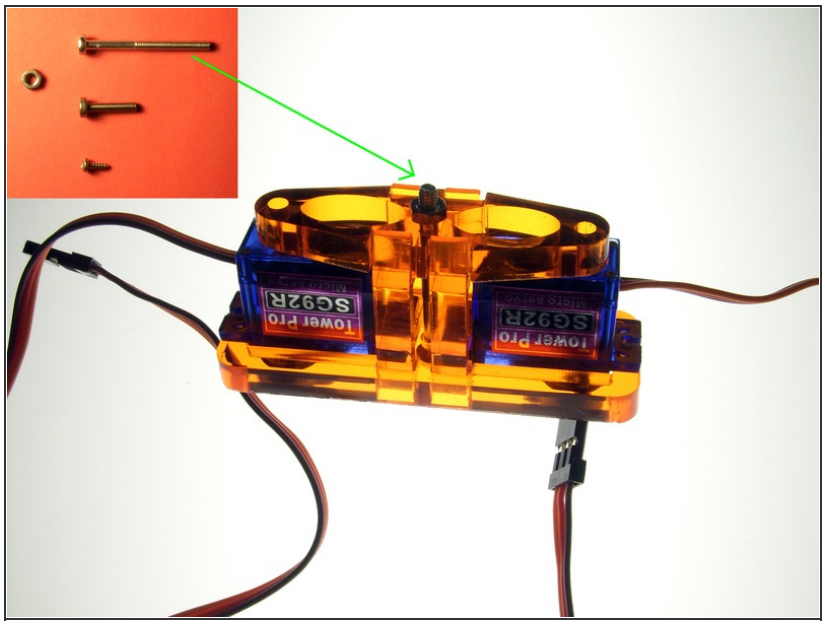
Step 5





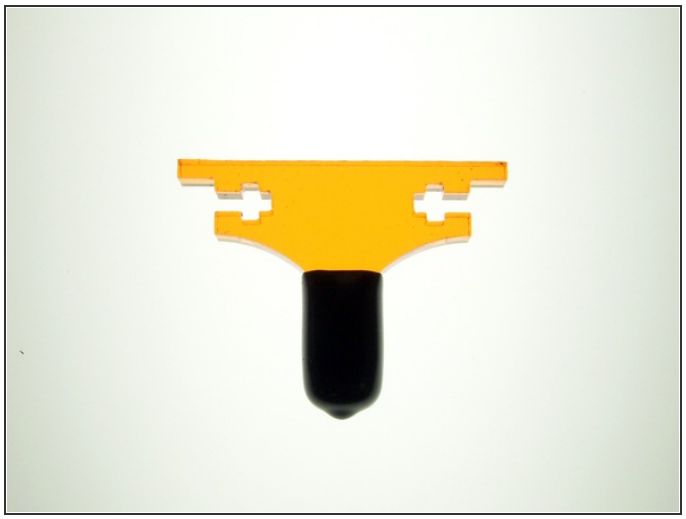
- Place the servos in the left thigh piece as shown. Take note of the orientation of the servos, which have their axles and cables pointing outwards.
- Place the two middle thigh pieces (shaped like ladders) in the slots between the servos.

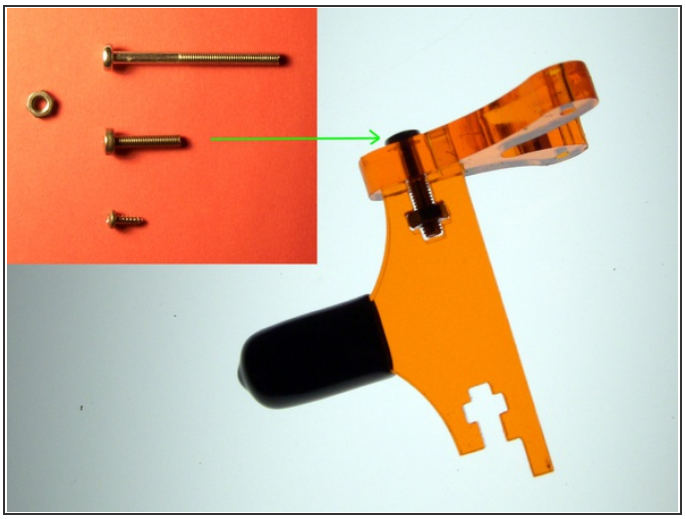
Step 6



- The middle thigh pieces should slip into the slots of the remaining thigh piece.
- Thread one 35mm screw (the longest one) through the hole in the center of the outer thigh pieces. Attach the nut and tighten with the screwdriver.

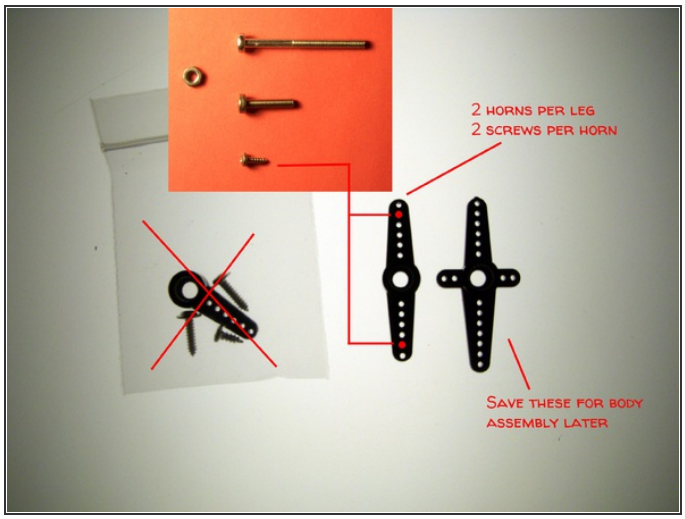
Step 7

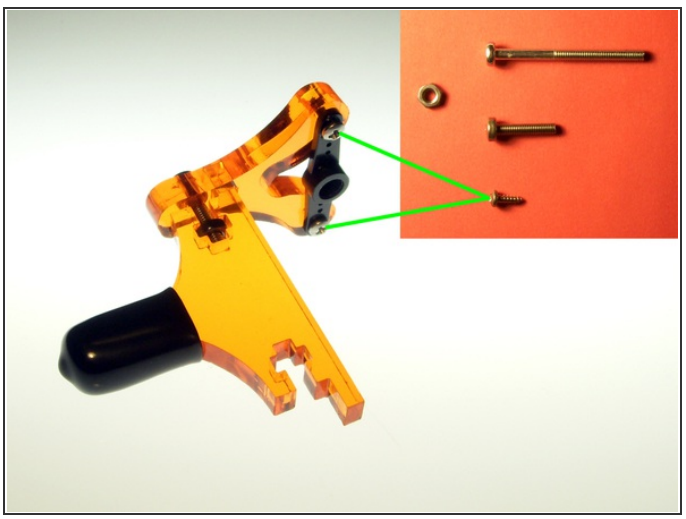




- We will now move on to assembling the lower leg.
- Put the rubber foot onto the lower calf piece (airplane/T shaped).
- Mount the left calf piece (wishbone/Y shaped) as shown, placing a nut and a 14mm screw (medium length) through the corresponding hole in the left calf. Tighten.

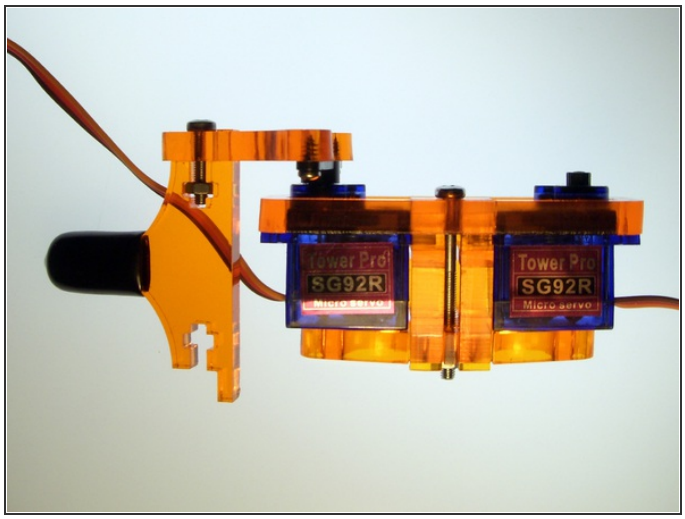
Step 8

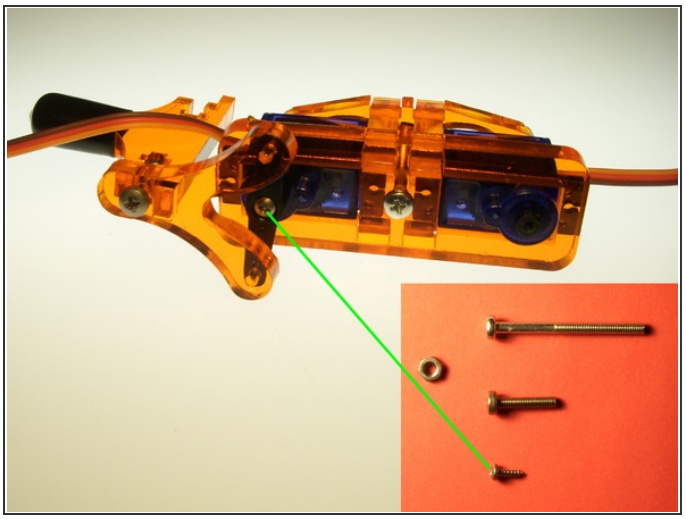




- Inside the bags of servos are 3 types of black plastic “servo horns” and an assortment of screws. Discard the half-sized horns as well as these screws. Instead, use the tiny screws from the main bag of screws and bolts.
- Affix one straight horn to the calf piece shaped like a wishbone, facing inwards. Make sure to screw through the holes indicated by red dots in the image.
- The servo horn may crack slightly, as the screws are overly large to provide a snug fit. Do not panic! This is normal.

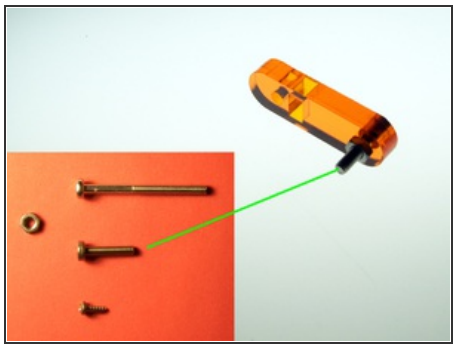
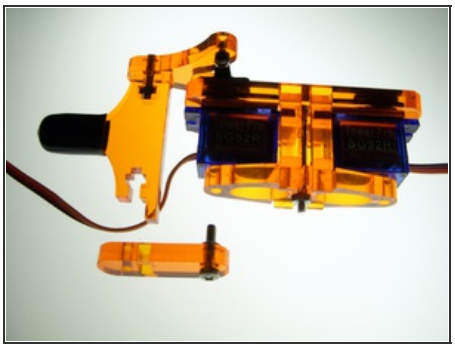
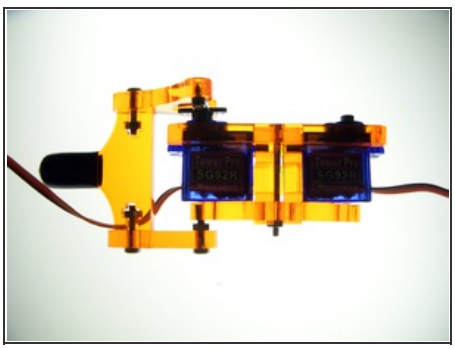
Step 9





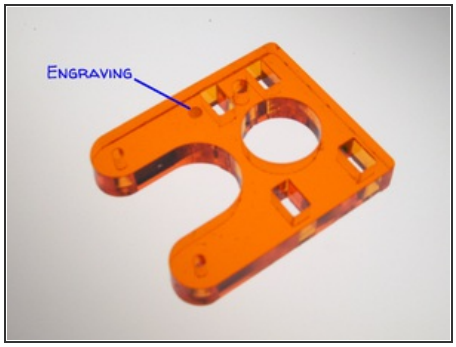
- Using either the short or long clip, connect a battery holder to the servo plug on the controller. Use either 4xAA Alkalines or 5xAA NiMH. 4xAA NiMH is also okay. 5xAA alkalines can fry servos. The controller should display a steady green light. A smaller red light should pulse dimly for a bit, flash brightly once, and then disappear.
- Alkalines batteries don't work as well as NiMH, as they supply less current. See here for more info.
- With batteries plugged into the servo plug on the controller, any servos plugged into ports 0,1,2 or 3 should automatically center (you will hear some brief whirring). If they don't, the firmware is probably out of date and may require an update. There is also one spare servo per kit.
- Plug a thigh servo into slots 0,1,2 or 3 in the controller. Make sure the brown wire is in the prong closest to the controller's edge.
- Align the calf and thigh sections to be as straight as possible. Push the thigh's servo axle into the calf's servo horn. It will be a snug fit but do not force or twist them. Use a small screw to fasten the calf's servo horn into the thigh's servo. Doing this while the servo is powered and centered will make sure the pieces are assembled centered.

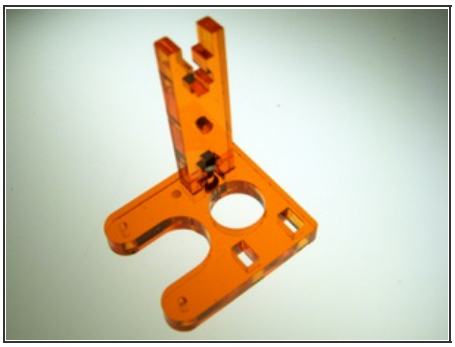
Step 10

- To finish securing the calf to the thigh, we will now attach the final calf piece (small rounded rectangle).
- Affix one medium screw and nut as shown in the image.
- Align the final calf piece with the rest of the calf and thigh. The last screw you just attached should fit into the thigh, and the airplane-shaped piece should fit into its slot. Attach the final calf piece with another medium screw and nut.
- The leg should pivot back and forth firmly but freely. Now onto the hip!

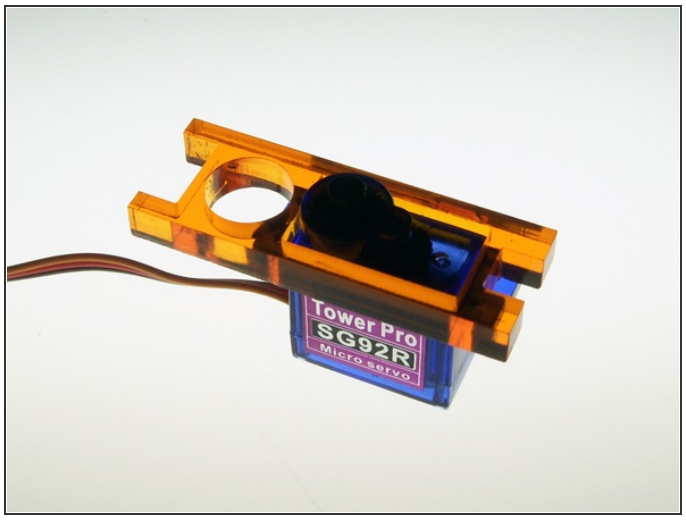
Step 11

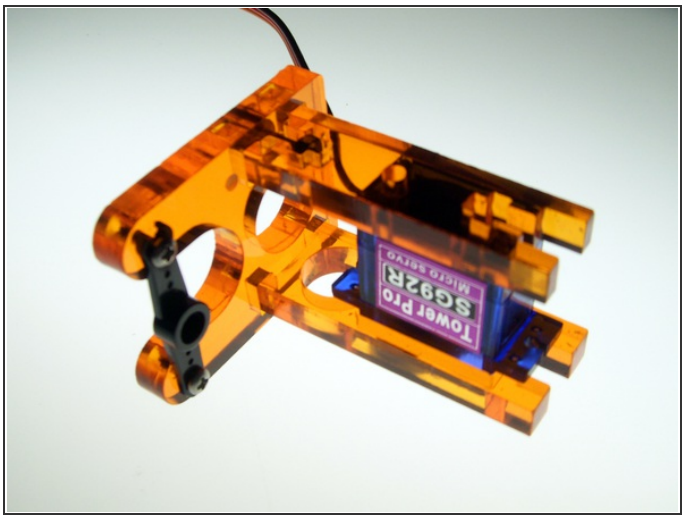





- Find the U-shaped piece. The engraved circle (see image) marks the inward direction of this piece.
- With this engraving facing inwards, insert the clothespin shaped piece to the U-shape. Mount with a medium screw and nut.
- Mount a straight servo horn onto the U-shape. This piece is mounted like the servo horn was in Step 8. Note that the servo horn is also facing inwards, on the same side as the engraving, with the center hold of the servo horn facing inward.

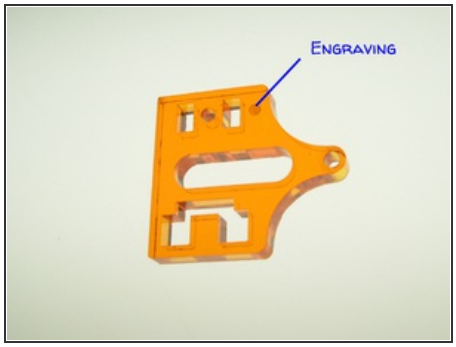
Step 12

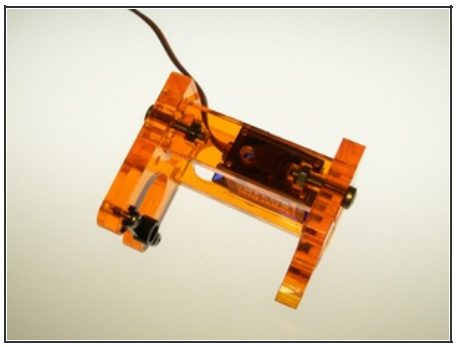


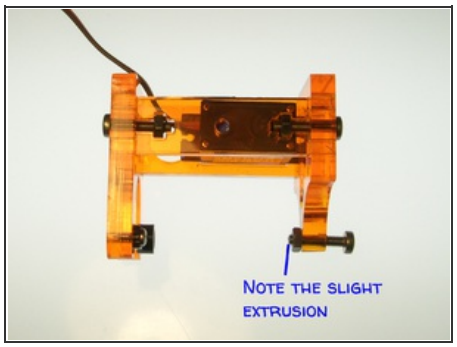


- On the hip piece with a circle and rectangle in it, insert a servo. Notice how when mounted, the servo shaft is precisely in the middle of the piece. This is crucial, as it is how the leg is able to pivot on the chassis.
- Insert this section into the U-shape as shown.

Step 13

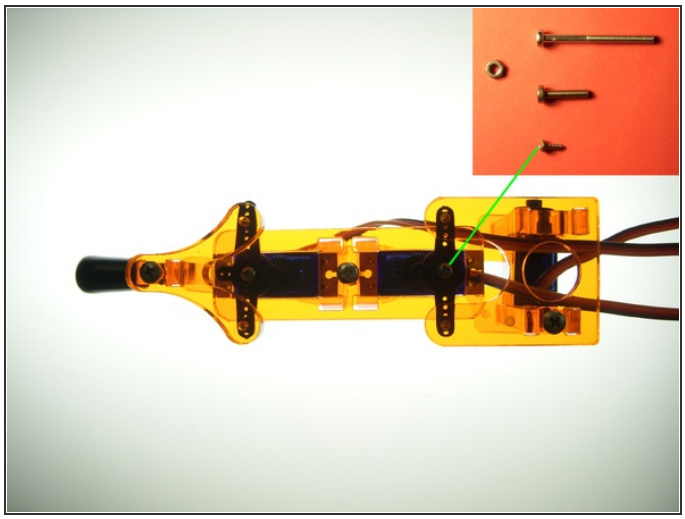


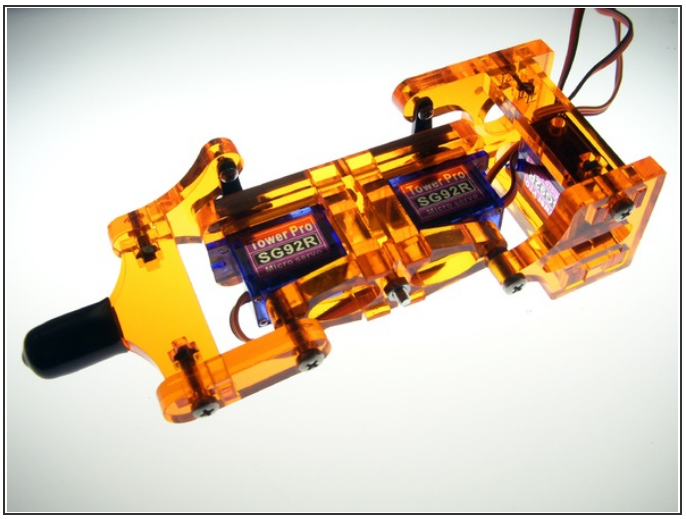




- With its engraving also facing inwards, the final hip piece should fit snugly with the rest of the hip. Mount a medium screw and nut along the top clothespin piece as shown in the image.
- Mount another medium screw and nut through the tip of the final piece you just attached to the hip. For now, only attach the nut partially so that the screw protrudes from it slightly.

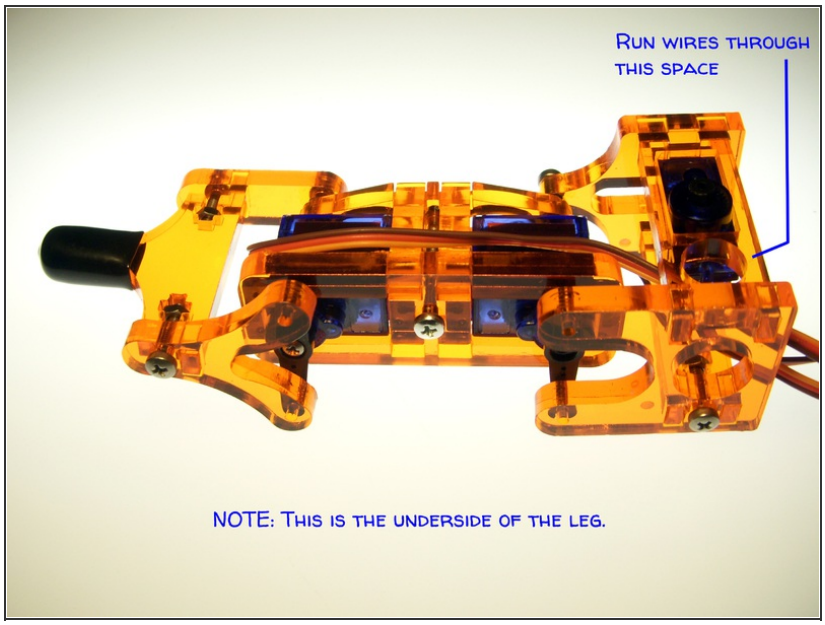
Step 14





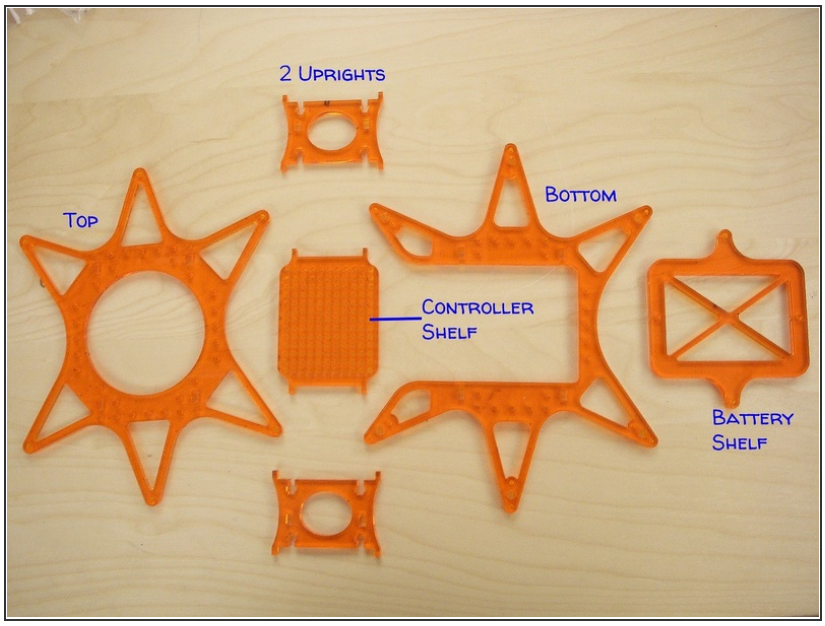
- As in Step 9, gently join the hip and thigh. Use one of the tiny screws to attach the hip's horn to the thigh's servo axle. Do so with the the two sections as straight as possible and the thigh servo powered and centered. This will make sure the pieces are assembled centered.
- Now you can tighten the screw that was protruding slightly in Step 13.

Step 15



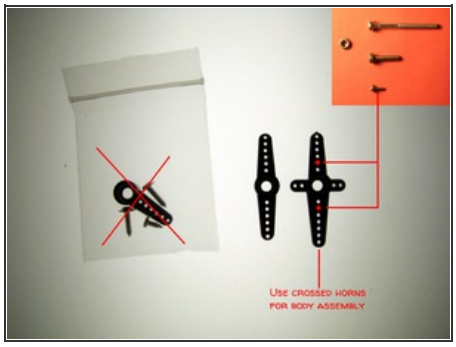
- Success! An assembled leg!
- Thread the servo wires between the hip servo and the U-shape for a cleaner look.
- Build five more legs and then proceed to the next step.

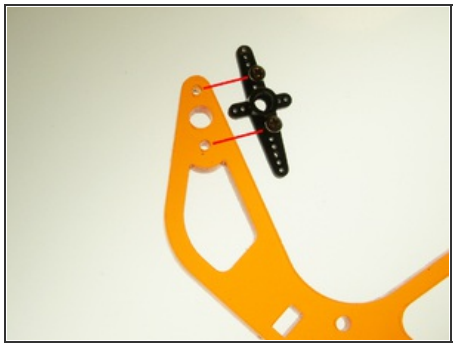
Step 16

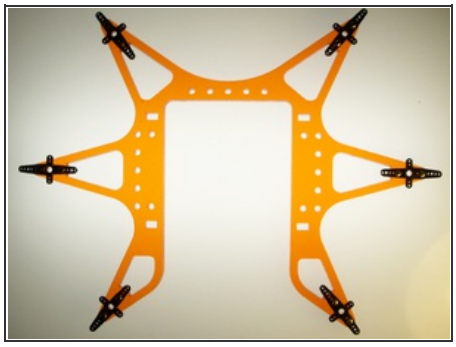


- Time to build the main body!
- Gather the body pieces laid out in the image. You will also need machine screws and nuts, the Phillips screwdriver that shipped with the Hexy kit, 6 servo horns for the body, and 1 servo horn for the head.
- Peel the paper from the body pieces.

Step 17

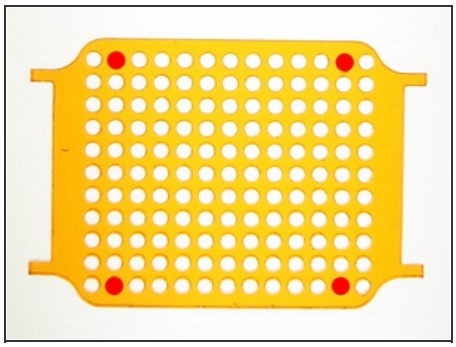
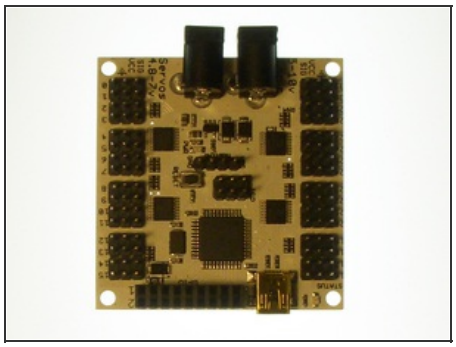
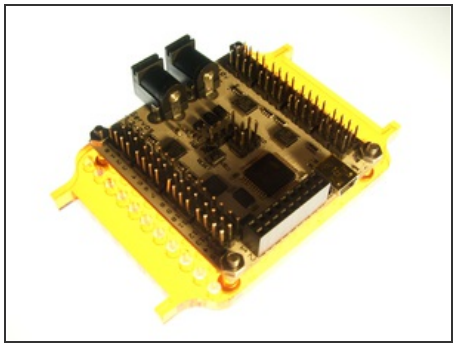






- Attach one crossed servo horn to each triangular point (6 in all) on the bottom body plate. Please note where to insert screws (the smallest) in the image.
- Set this aside. We will now work on the controller shelf.

Step 18

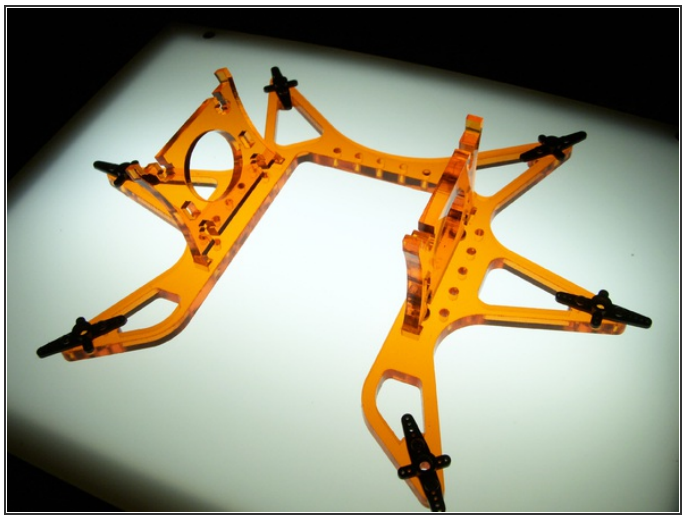




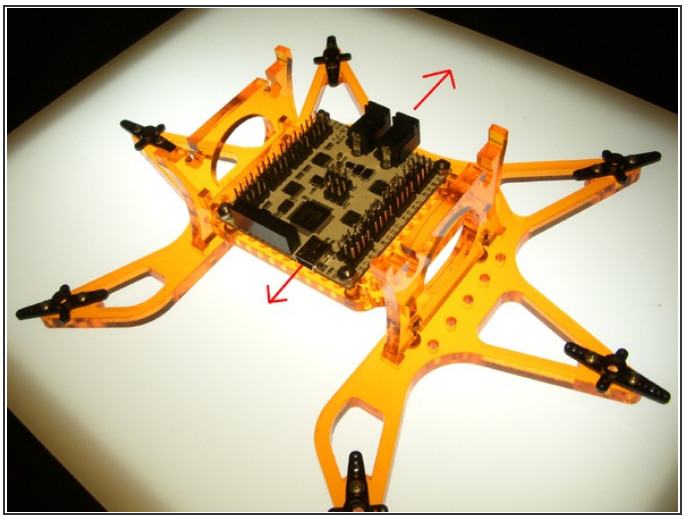
- Insert 4 medium screws into the controller shelf as indicated by the red dots in the image.
- Insert the screws upwards through the shelf and controller corners. Make sure the nuts are attached from above so that they are on the side of the controller. Do not over-tighten them as it may warp or damage the controller.
- Set this aside and return to the bottom body plate from Step 17.

Step 19

- Place an upright piece into the rectangular slots on the bottom body panel. Take note that the rectangular slots on the upright piece are off center. Make sure these slots are closer to the bottom panel.
- Attach the upright piece with 2 sets of medium screws and nuts as shown.

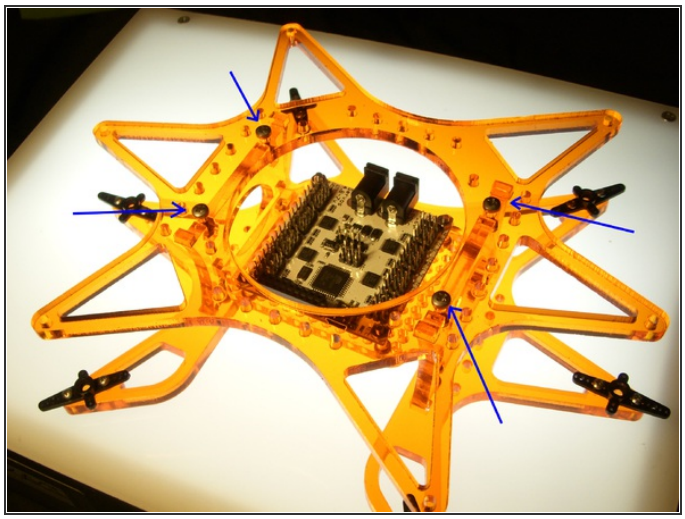
Step 20

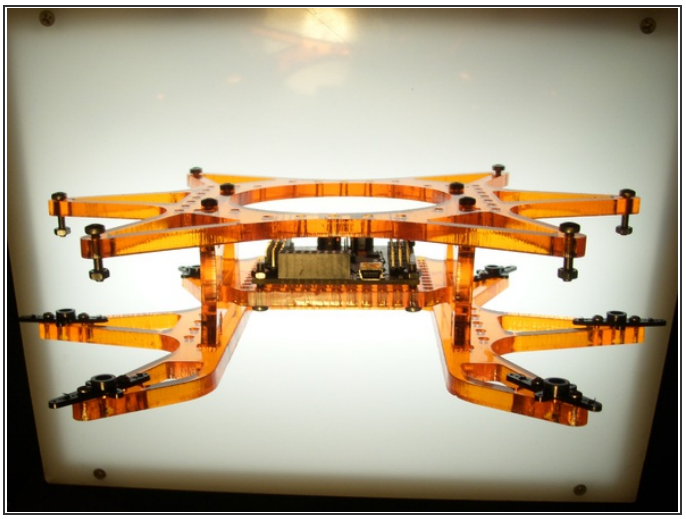




- Insert the second upright piece into the bottom body panel. Make sure the off-center slots are facing downwards as indicated in Step 19. However, do not screw the second upright in just yet. You will need the wiggle room to insert the controller and shelf from Step 18.
- Slide the controller and its shelf between the two uprights so that it fits into their slots. Make sure the USB connector of the controller is facing the back of the robot (open end of the bottom body plate).
- You can now insert 2 sets of medium screws and nuts into the second upright to secure these pieces.

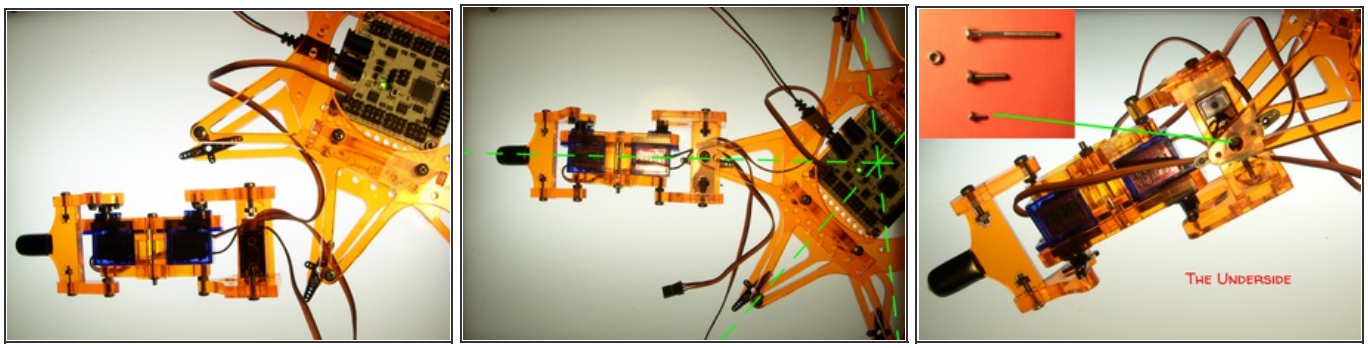
Step 21





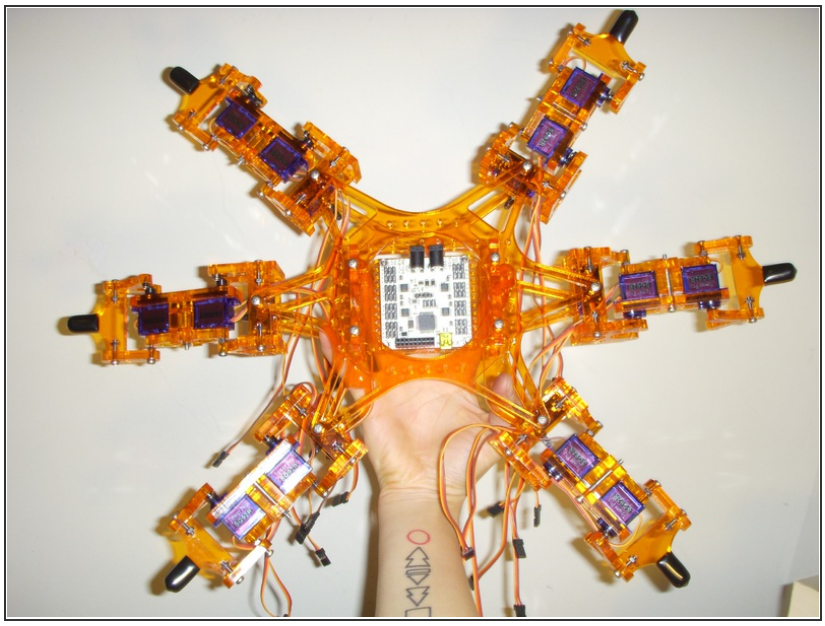
- The top body panel should fit snugly on top of what you've assembled thus far.
- Attach with 4 sets of medium screws as indicated in the image.
- On each of the triangular points of the top body panel, you will now insert a medium screw, facing downwards, and a partially tightened nut so that only the tip of the screw protrudes beyond it. Refer to image.

Step 22



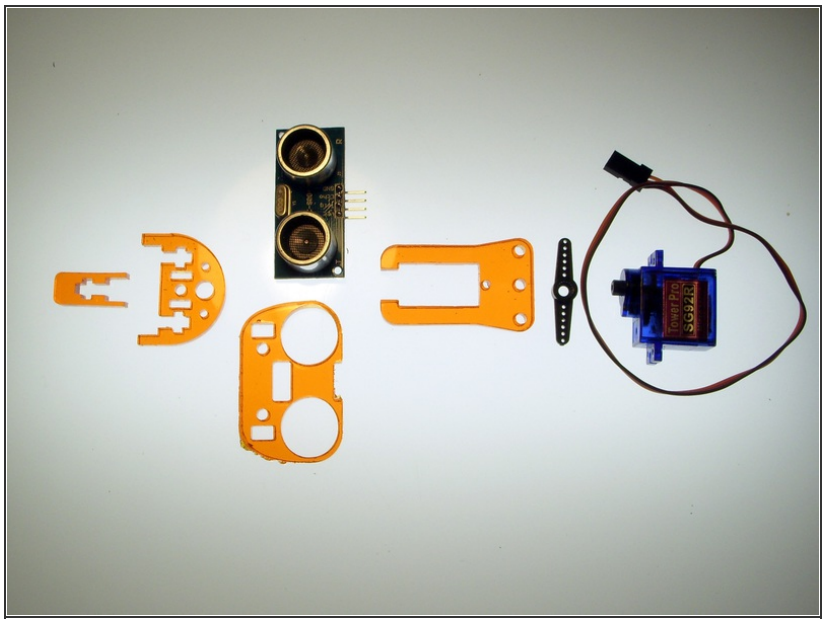
- Now it is time to attach the legs to the body!
- Just as you did to center the leg joints, power up the controller by plugging in the battery pack. Plug the hip servo into ports 0, 1, 2, or 3 on the controller. Make sure the brown wire faces outwards towards the controller's edge. You should hear a light whirring as the servo centers.
- With the hip servo powered and centered, make sure its axle is facing downwards to fit into the servo horn on the bottom body plate. The partially tightened screw in the top body plate should be aligned with the hole in the center of the clothespin shape of the hip. Tighten this screw.
- The leg should extend straight out from the body (see dotted lines in image). Push the servo axle into the servo horn. It will be a snug fit but do not force or twist it!
- Flip everything over to secure the leg to the body with a small screw on the underside of the leg.
- Unplug the servo from the controller for now.

Step 23



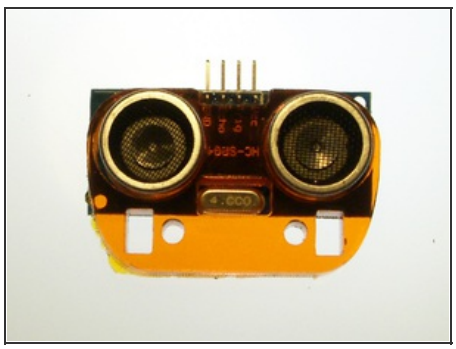
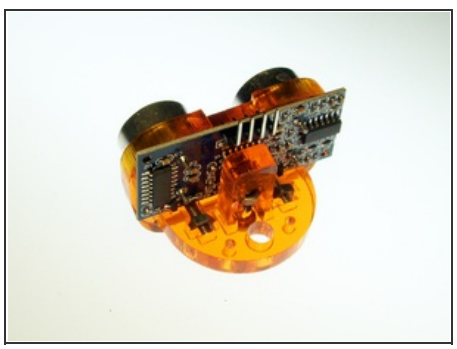
- Almost done! Repeat Step 22 for the rest of the legs.
- Put aside to assemble the head next.

Step 24



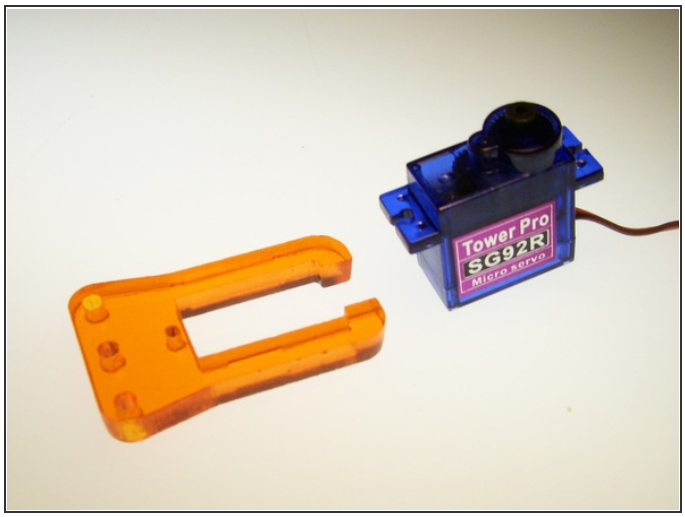
- Time to build the head!
- You will need 1 servo, 1 servo horn, the ultrasonic distance sensor (from the miscellaneous bag), and 4 pieces from the body bag (refer to image) in order to complete the head.
- Peel off the protective paper.

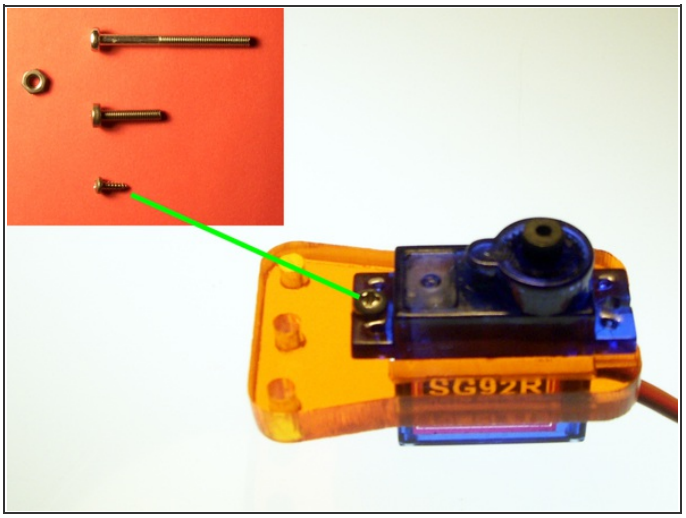
Step 25

- Take the smallest piece and insert it into the slots of the semicircular piece, as shown in the image. Fasten with a medium screw and nut.
- Next, take the face piece and insert the ultrasonic distance sensor (eyes) with the pins pointing upwards.
- Insert the semicircular piece into the face piece slots, from behind, such that the smallest piece clamps the distance sensor in place. Fasten with two sets of screws and nuts.

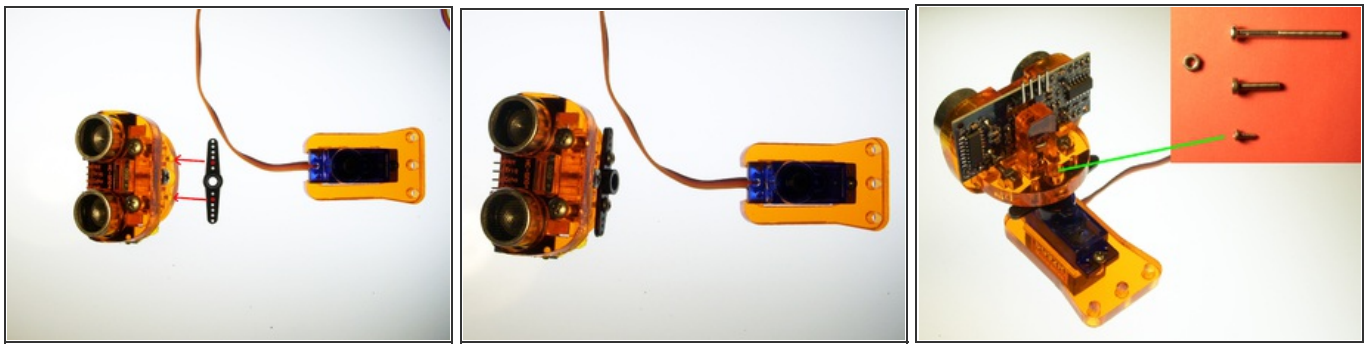
Step 26





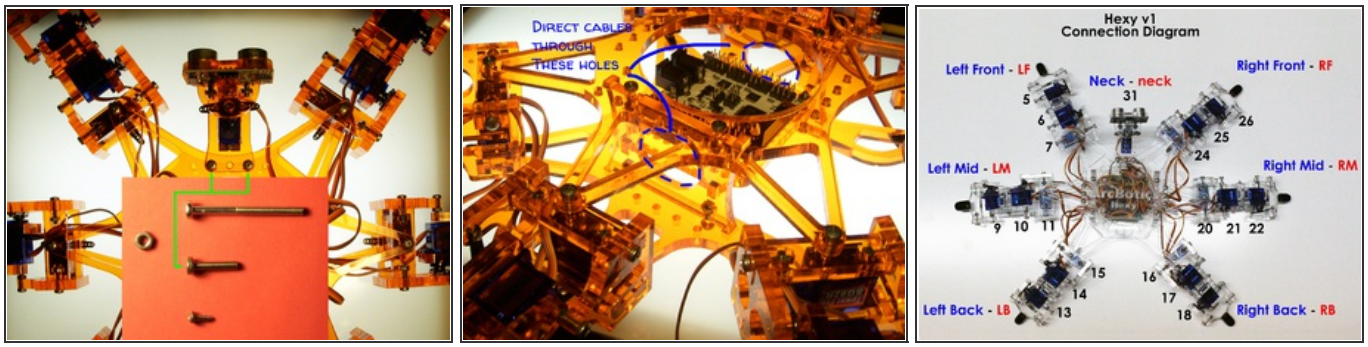
- Take the servo and insert it into the C-shaped piece, from above. Make sure that the cable points outwards in the direction of the C-shape's opening, and the servo tabs should be resting on top of the C-shape.
- Affix a small screw through the servo's inner tab into the C-shape below.

Step 27



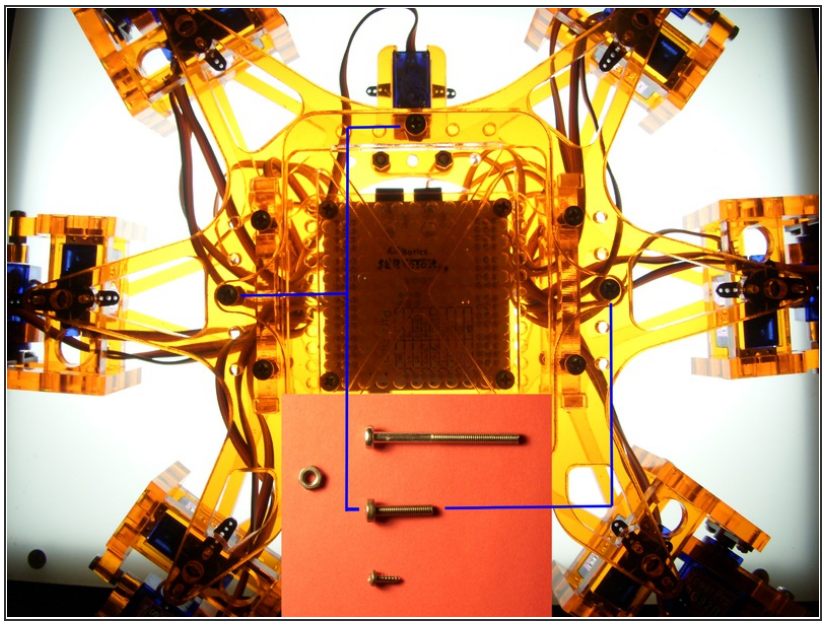
- Affix a straight servo horn to the underside of the semicircular piece through the holes indicated by the red dots in the image.
- Power and center the head servo as you have been doing with the others. Gently push the servo's axle into the horn. Tighten with a small screw.

Step 28



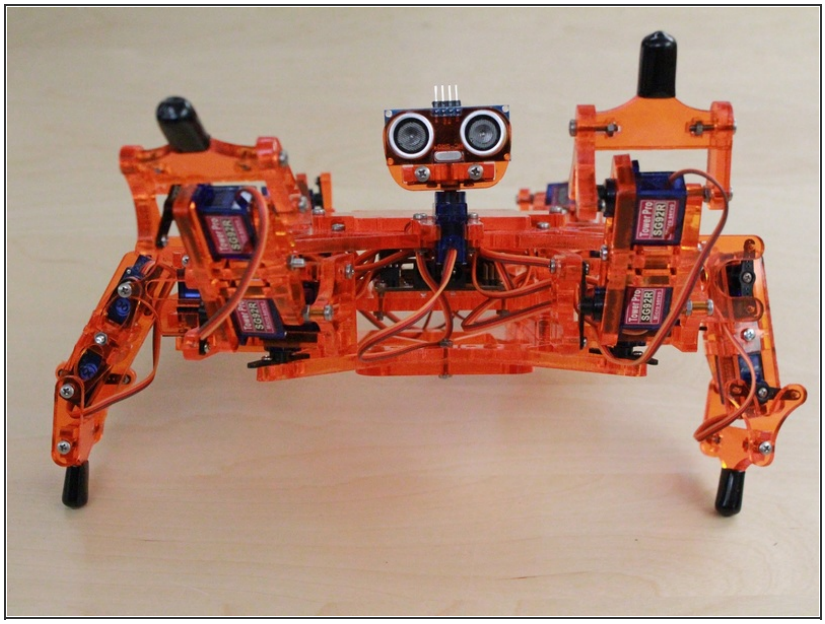
- The head segment attaches to the top of the body framework, above the battery plug on the controller. Insert and secure two medium screws through the C-shaped neck piece and front of the body.
- Thread all the servo cables through the round holes in the upright body pieces. This will give your bot a cleaner look and allow for the legs to pivot without obstruction.
- Make sure to connect the wires to the right ports. This is important so that the software will know which joint each port is on. If wired incorrectly, it could result in very funky movements.

Step 29



- Lastly, use 3 pairs of medium screws and nuts to secure the battery shelf (X-shaped plate) to the underside of your robot.

Step 30



- That's it! You have a Hexy!
- Get it connected and running by following the setups here: http://arcbotics.com/products/hexy/start...
- More information is available on the wiki: https://github.com/ArcBotics/Hexy/wiki
- Support is available on the forums: http://forum.arcbotics.com/
- For replacements and troubleshooting of any missing/defective servos, email: replacements@arcbotics.com

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