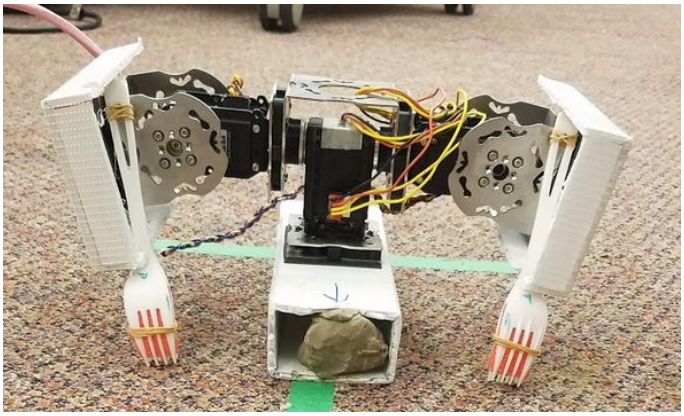
Project 0 - Legged Locomotion Robot

EECS 464 - Winter 2018

Assembly Instruction Documentation

February 5, 2018



Team Blue:

Royce Chung

Anne Gu

Mukai Wang

Ali Yassine

Course Instructor:

Prof. Shai Revzen

TABLE OF CONTENTS

1. Material Used

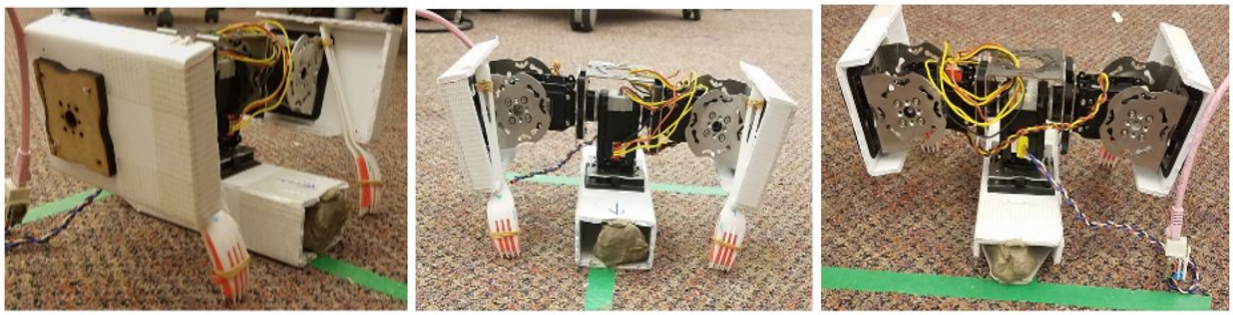
Table 1 contains a comprehensive list of the materials used for blue team's P0 robot.

Table 1: Materials used for team blue's P0 robot

Material	Quantity
Dynamixel RX64 Motor	3
Metal Mounting Plate	3
Wooden Mounting Plate	3
Plastic Mounting Plate	3
Snap Lock	3
Scotch Fiber Tape Roll	1
Box Cutter	1
Plastic Fork	4
White Foam Core Board	As Needed
Glue Gun	1
CAT Ethernet Cable	1
Motor to Ethernet Adapter	1
Rubber Band	2
Clay	As Needed
1.6" x .75" x.31" Piece of Foam	2

2. Complete Assembly

Blue team's complete P0 robot assembly is shown in Fig. 1. The robot consists of three main subsystems: the base, the legs, and the three servos. The three Dynamixel RX64 servos are attached to the weighted foam core base. The robot is able to move forward and turn with legs that have fork attachments.



A B C

Figure 1: Complete robot assembly: A) Side view, B) Front view, C) Back view

3. Robot Subsystems

The blue team's complete P0 robot consists of three main subsystems: the base, the legs, and the three servos, as seen in Fig.2.

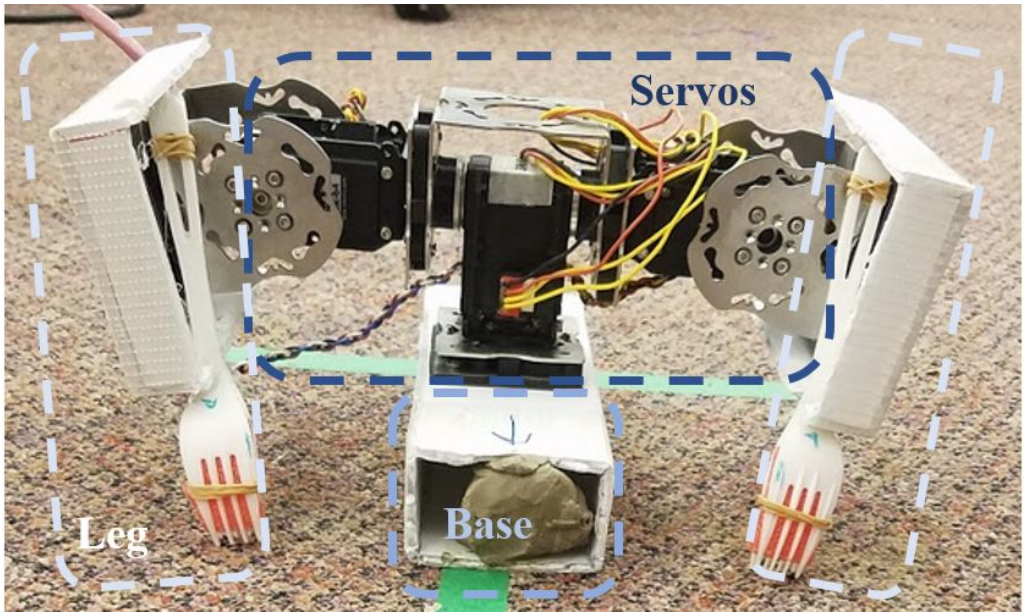


Figure 2: Complete robot assembly with labeled subsystems

3.1 Base

1. Cut a 8.25” x 8.75” piece of foam core and make half cuts at the locations shown in Fig.3.

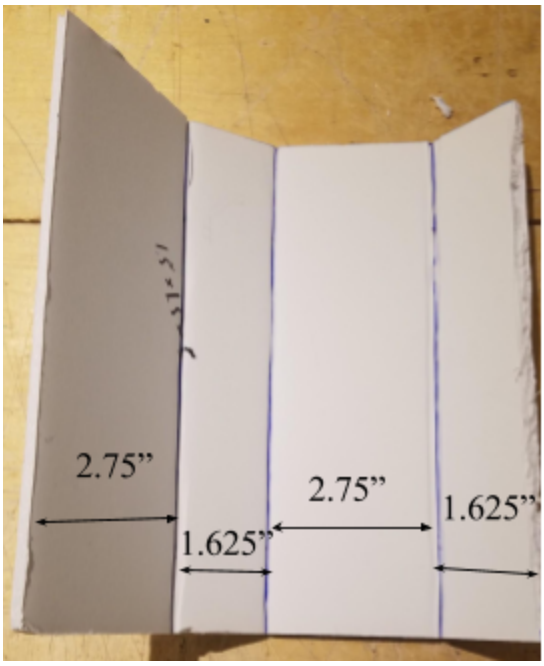


Figure 3: Foam core base reference with segment lengths

2. Fold the piece along the cuts to make a rectangular tube and hot glue the folded joints together.

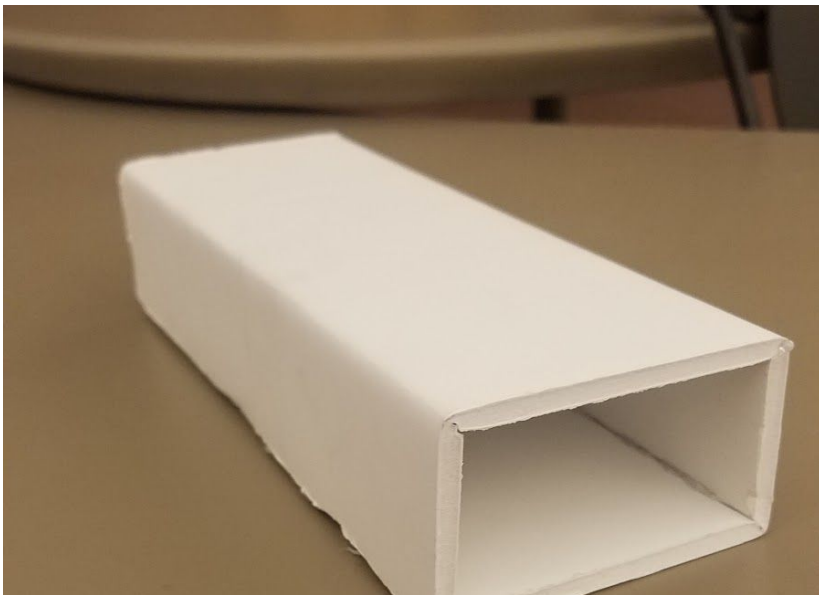


Figure 4: Foam base hot glued together

3. Use 9” of reinforced tape around the top and the bottom of the tube.

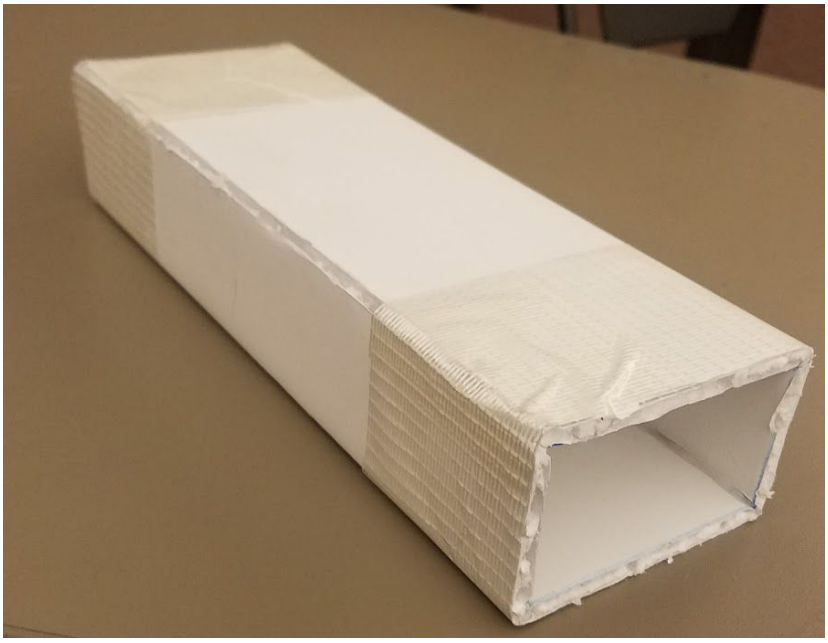


Figure 5: Foam base reinforced with tape

4. Screw the metal, plastic, and wood mounting brackets to the rectangular tube.

Figure 6: Snap lock connection parts added to foam base

5. Add cutouts with dimensions to the bottom backside of the foam base.

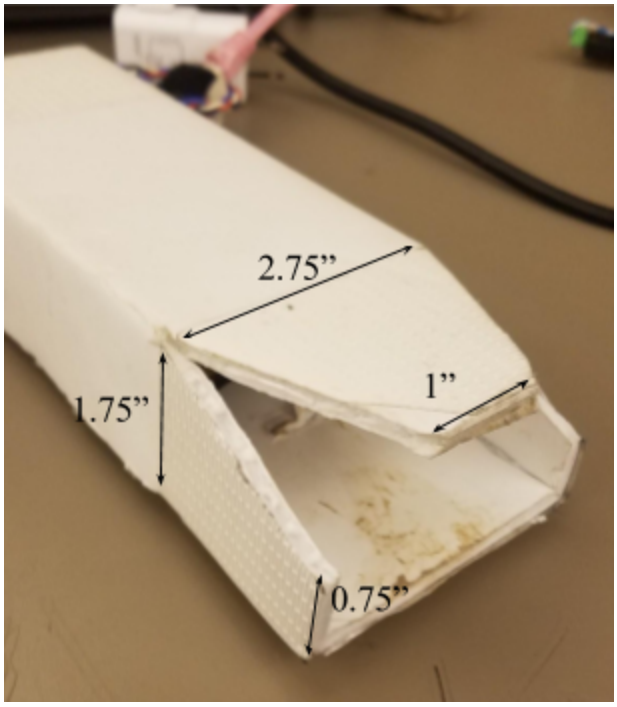


Figure 7: Dimensioned cutouts made in the base

3.2 Legs

1. Cut a 5” x 5” piece of foam core and make half cuts at the locations. Fold the piece along the cuts to make a u-channel tube and hot glue the folded joints.

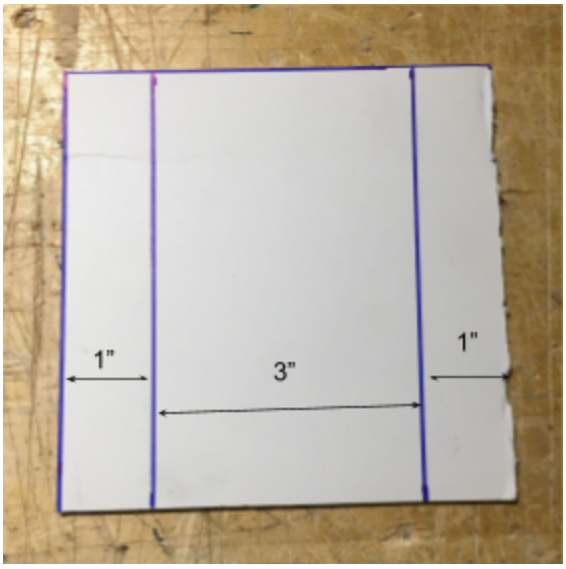


Figure 8: U-channel dimensions for leg

2. Cut a 3” x 1” piece of foam core and hot glue the piece into the foam core u-channel.

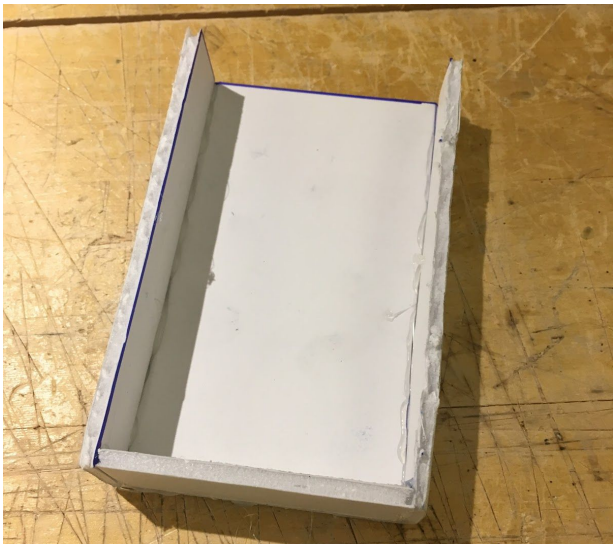


Figure 9: U-channel glued with foam core brace

3. To make the fork attachments for the legs, assemble all the necessary material, as seen in Fig. 10. Materials include two forks, two rubber bands, and one 1.6” x .75” x.31” piece of foam.

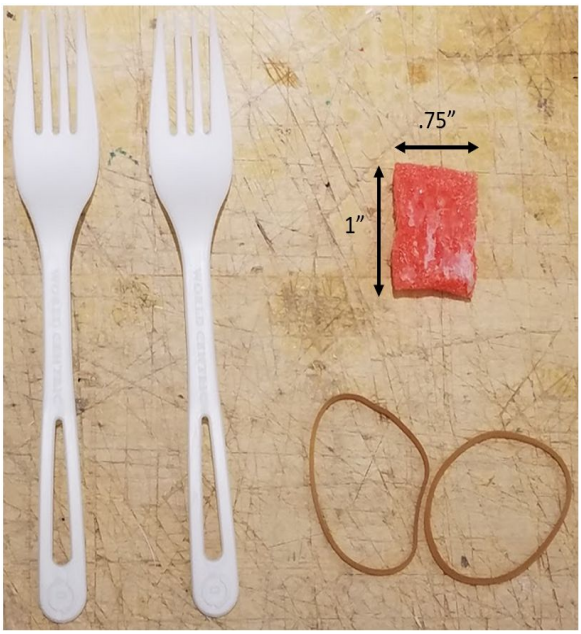


Figure 10: Materials needed to make fork attachment for one of the legs

4. Attach the two forks together with a rubber band around the hand holding portion of the fork.

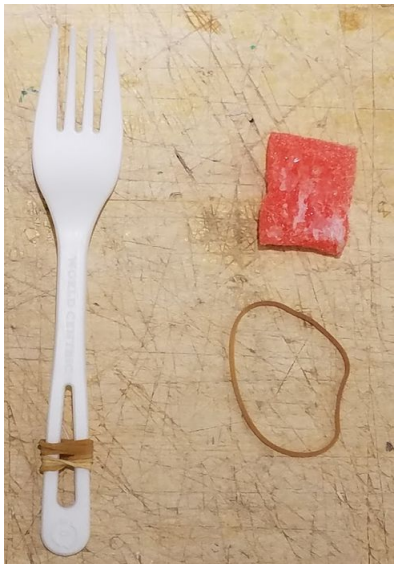


Figure 11: Two forks attached with one rubber band

5. Insert the foam between the unsecured end of the two forks. To ensure that the robot can move properly, leave approximately .25” of the tines (Tip of the fork) exposed.

Figure 12: Foam put in between the forks with approximate .25” of the tines exposed

6. Put the remaining rubber band on to secure the foam into place. Double check that the forks are aligned with each other. The complete fork attachment can be seen in Fig. 13.

Figure 13: Finished fork attachment for a leg

7. Hot glue a fork attachment in the slit locations shown in Fig. 14.

Figure 14: Fork is attached to the leg at the locations shown above

8. Screw the metal, plastic, and wood mounting brackets to the rectangular tube.

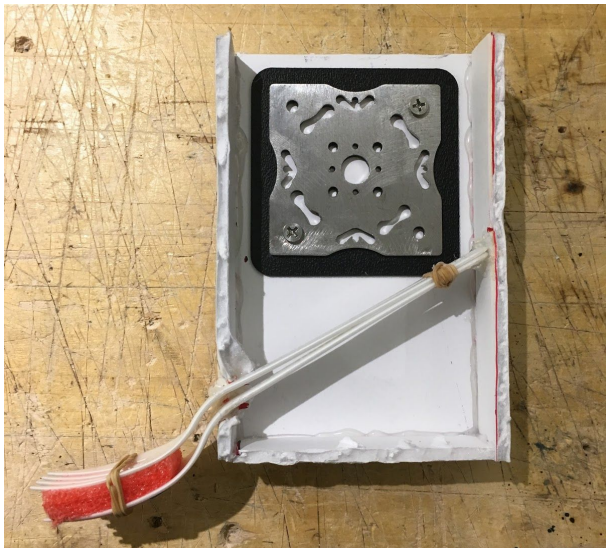


Figure 15: Snap lock connection parts are added to the leg

9. Repeat the section and create another leg.

3.3 Robot Assembly

1. Attach the servos together with modlocks in the configuration.

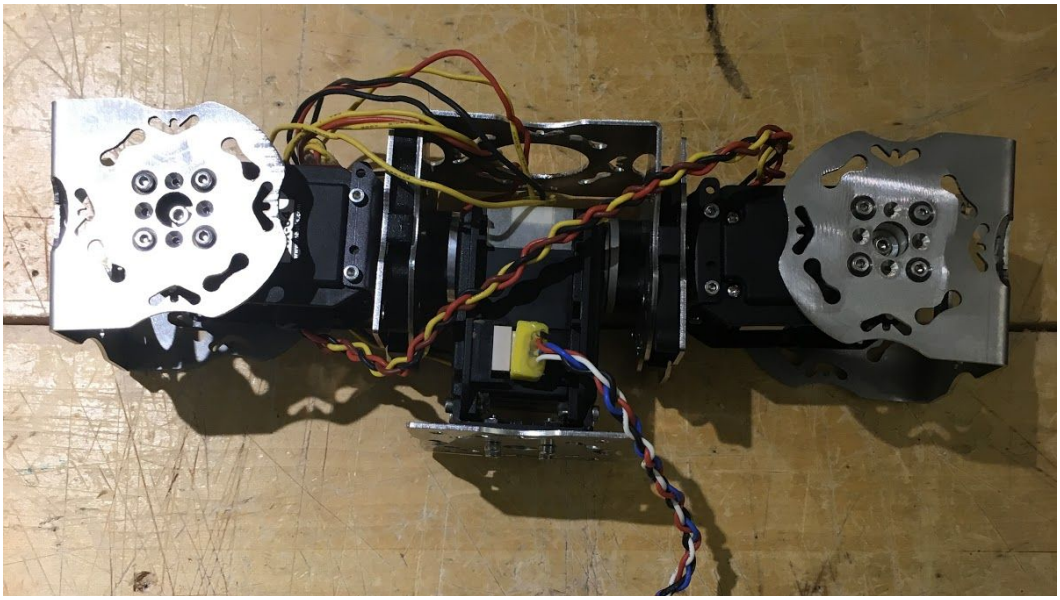


Figure 16: Dynamixel servo and modlock configuration

2. Attached the base to the middle servo.

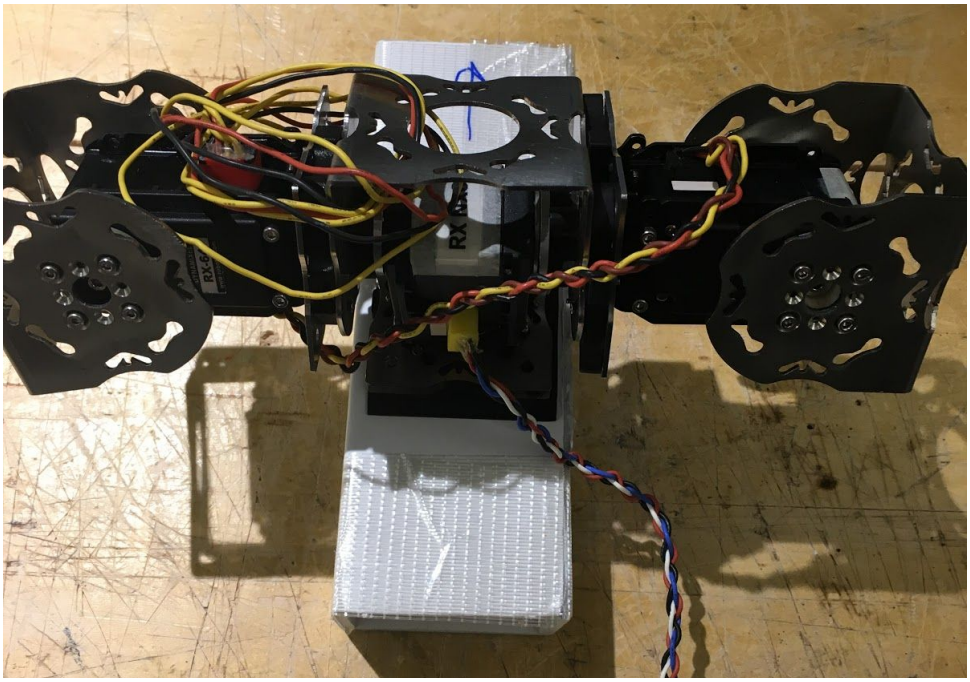


Figure 17: Base attached to the middle servo

3. Attach one of the legs to the left servo.

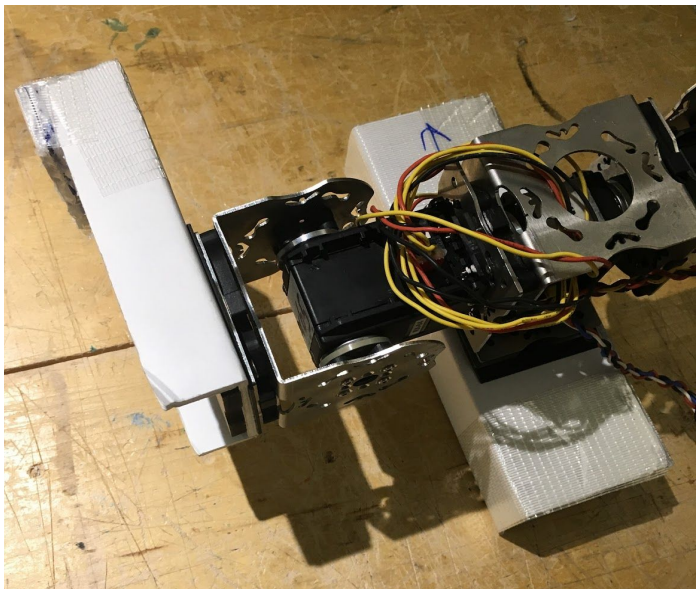


Figure 18: Leg attached to the left servo

4. Attach the remaining leg to the right servo. If robot experiences some instability, try adding clay weights to the base.

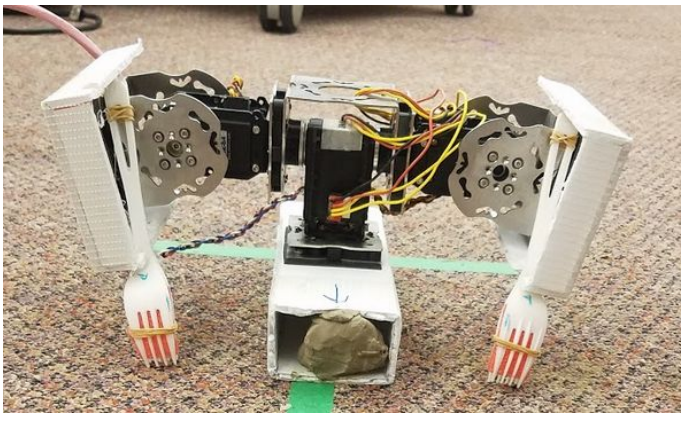


Figure 19: Leg attached to the right servo