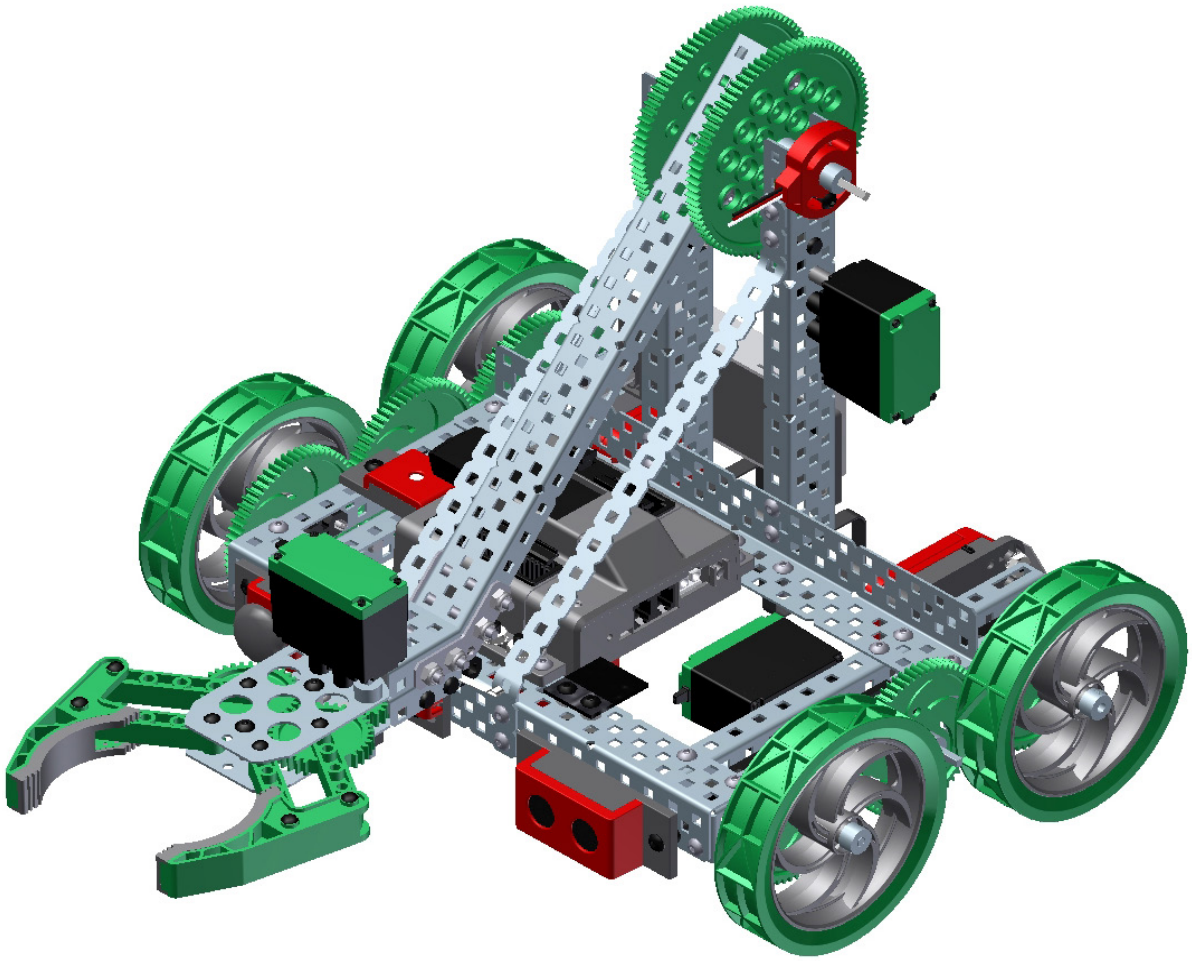
CLAWBOT WITH SENSORS BUILDING INSTRUCTIONS



USING THE VEX CORTEX

CLAWBOT BUILDING INSTRUCTIONS

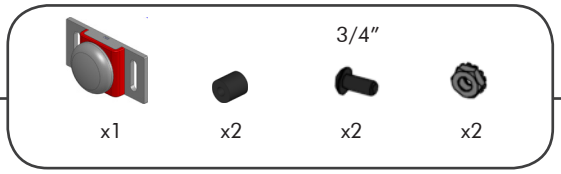
1 Collect the parts and tools from the list below to attach the sensors:

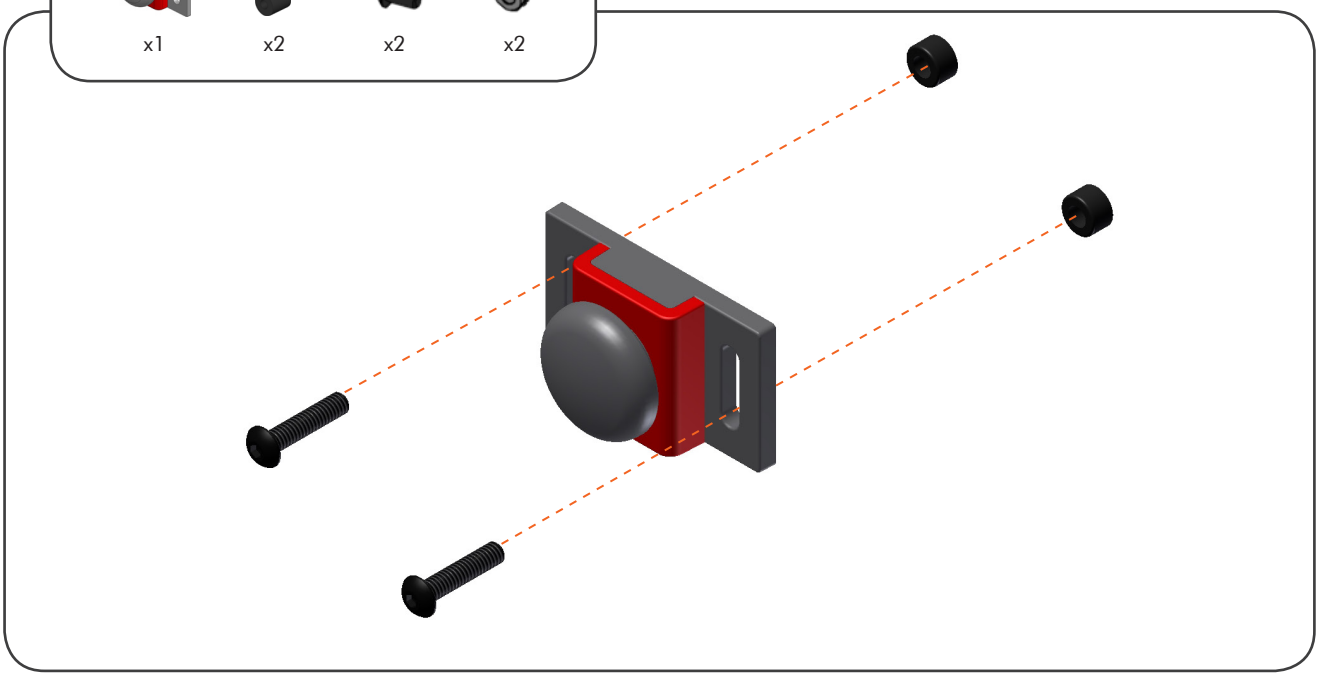
Materials	Quantity
Shaft, 4" Long	1
Shaft, 5" Long	2
Screw, 8-32 x 3/8" Long	9
Screw, 8-32 x 1/2" Long	2
Screw, 8-32 x 3/4" Long	12
Nut, 8-32 Keps	19
Shaft Spacer, Thin (4.6mm)	8
Shaft Spacer, Thick (8mm)	5
Standoff, 1" Long	1
Angle Gusset	2
Optical Shaft Encoder	2
Ultrasonic Rangefinder	1
Potentiometer	1
Bump Sensor	1
Limit Switch	1
Ambient Light Sensor	1
Yaw Rate Gyroscope	1
Line Tracker	3
LCD Display	1
Integrated Motor Encoder Kit	1
Allen Wrench 3/32"	1
Allen Wrench 5/64"	1
Open End Wrench 1/4"	1
#1 Phillips Screwdriver	1
Pliers	1
Hacksaw	1

Note that this robot can only be built if you have a standard Clawbot already assembled

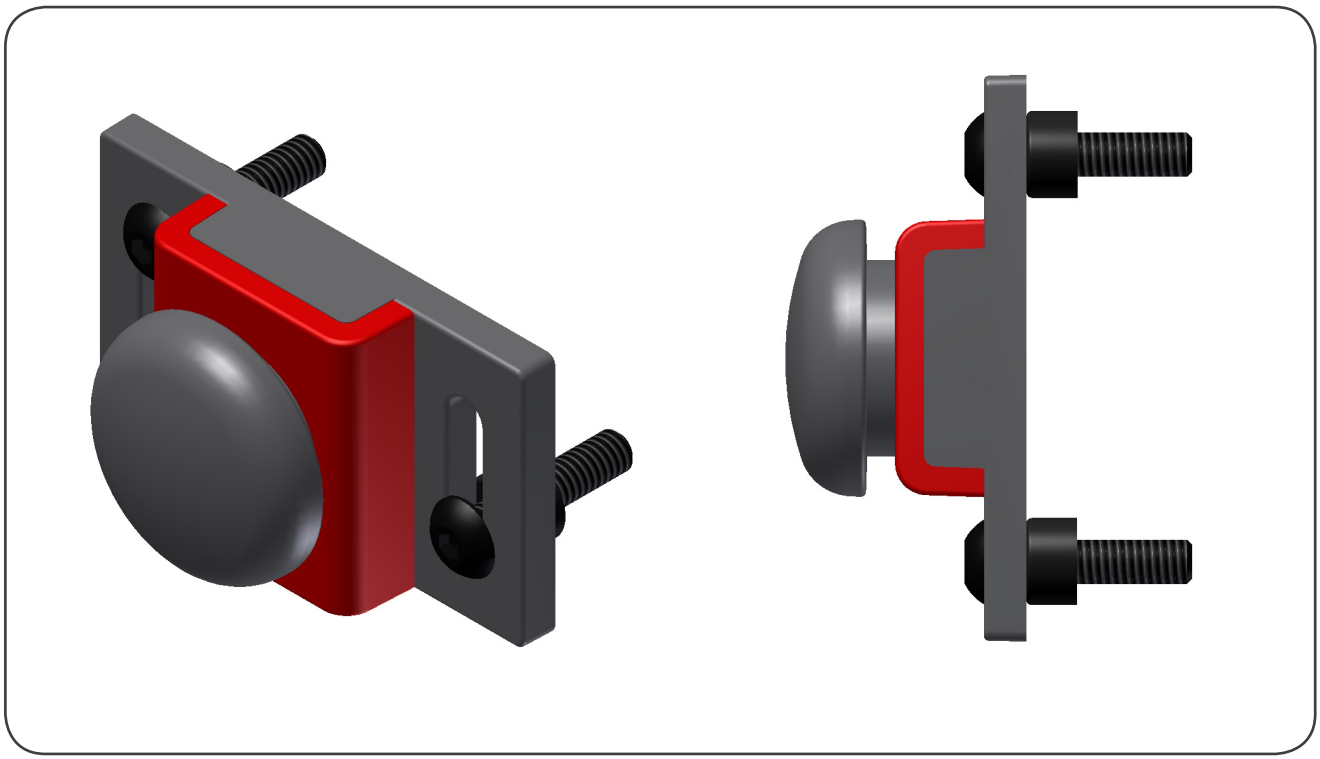
CLAWBOT BUILDING INSTRUCTIONS

2 Attaching the Bumper Sensor





Place screws through the bump sensor and place thin spacers on the opposite side

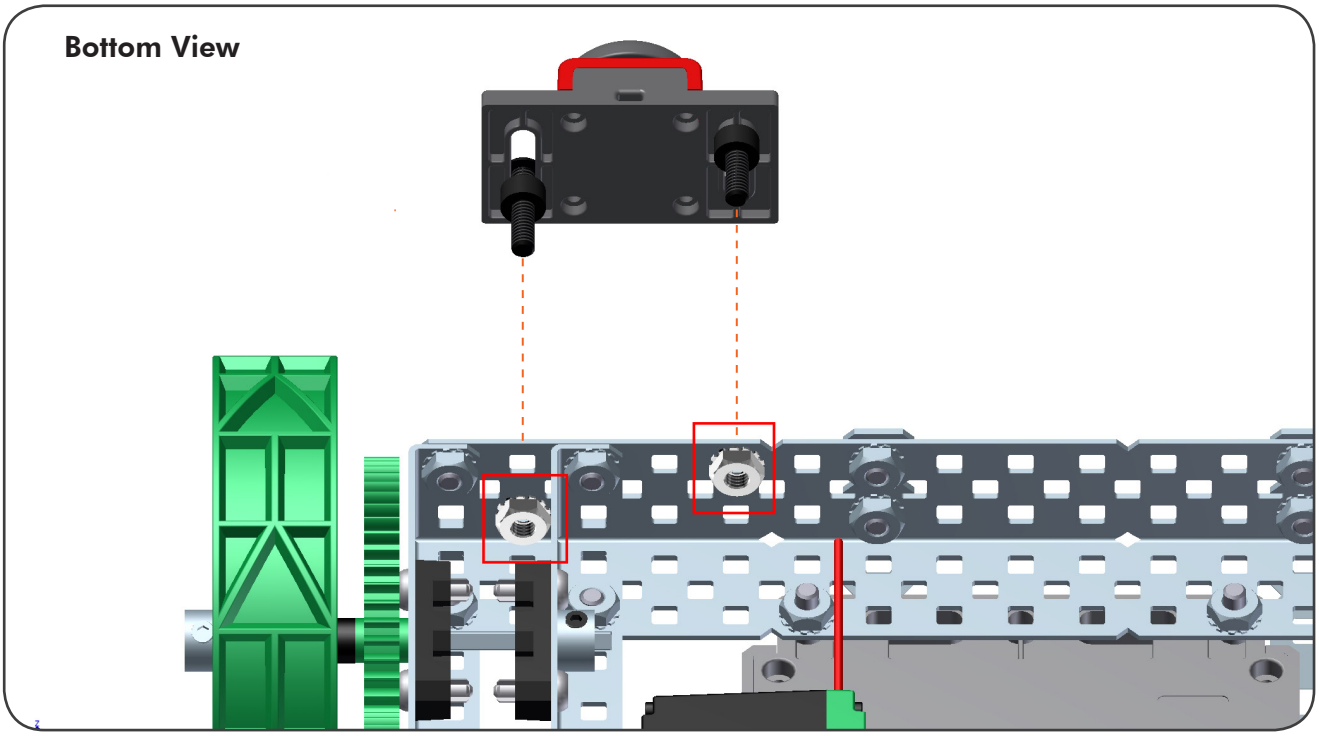


CLAWBOT BUILDING INSTRUCTIONS

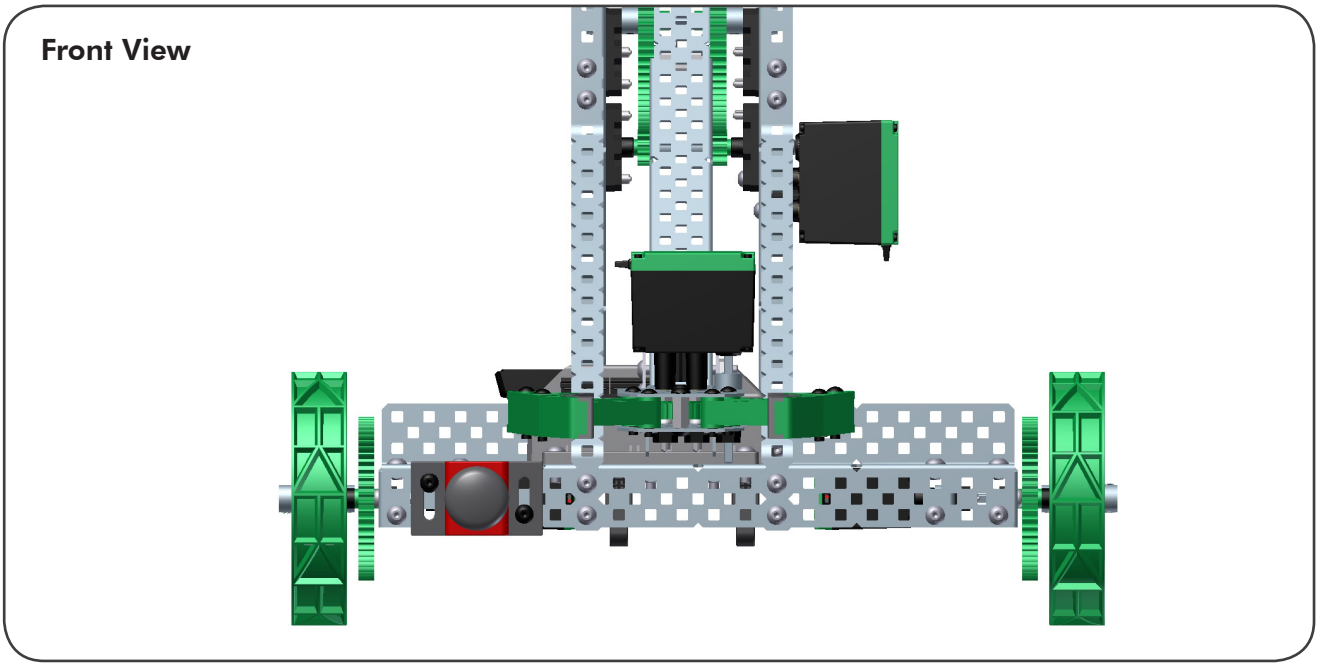
2 Attaching the Bumper Sensor *(continued)*

Attach the bump sensor as shown below

Bottom View

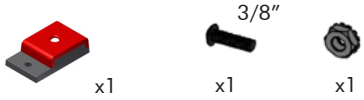


Front View

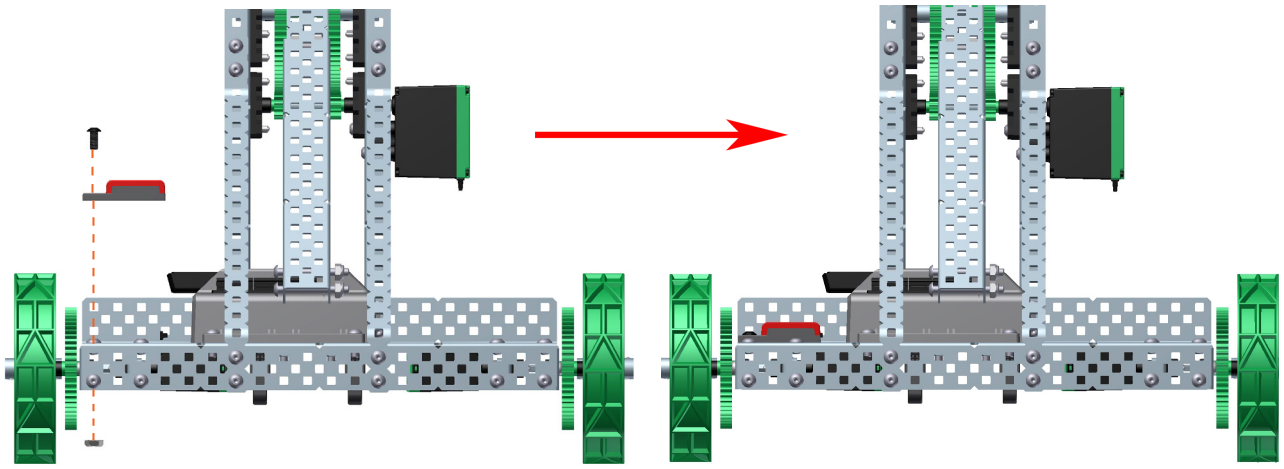


CLAWBOT BUILDING INSTRUCTIONS

3 Attaching the Ambient Light Sensor

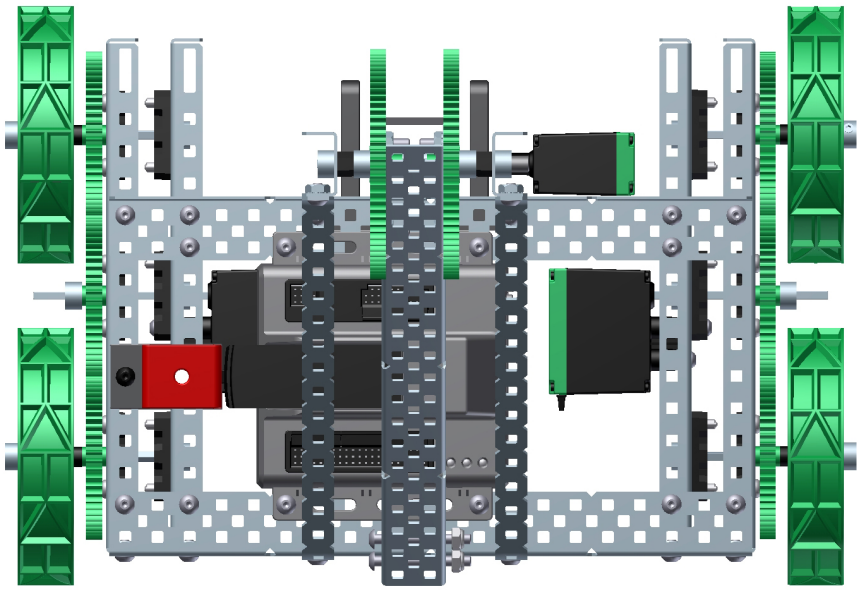


Claw is hidden for visibility purposes



Front View

Top View

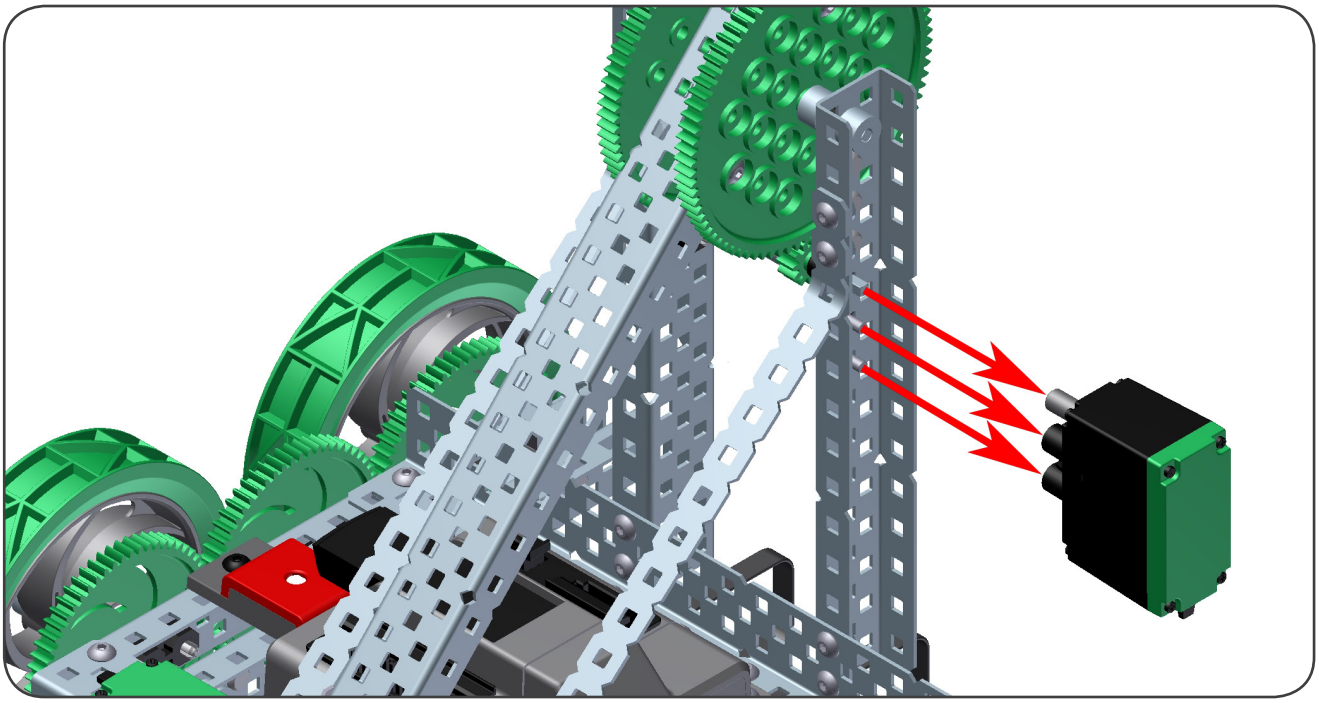


CLAWBOT BUILDING INSTRUCTIONS

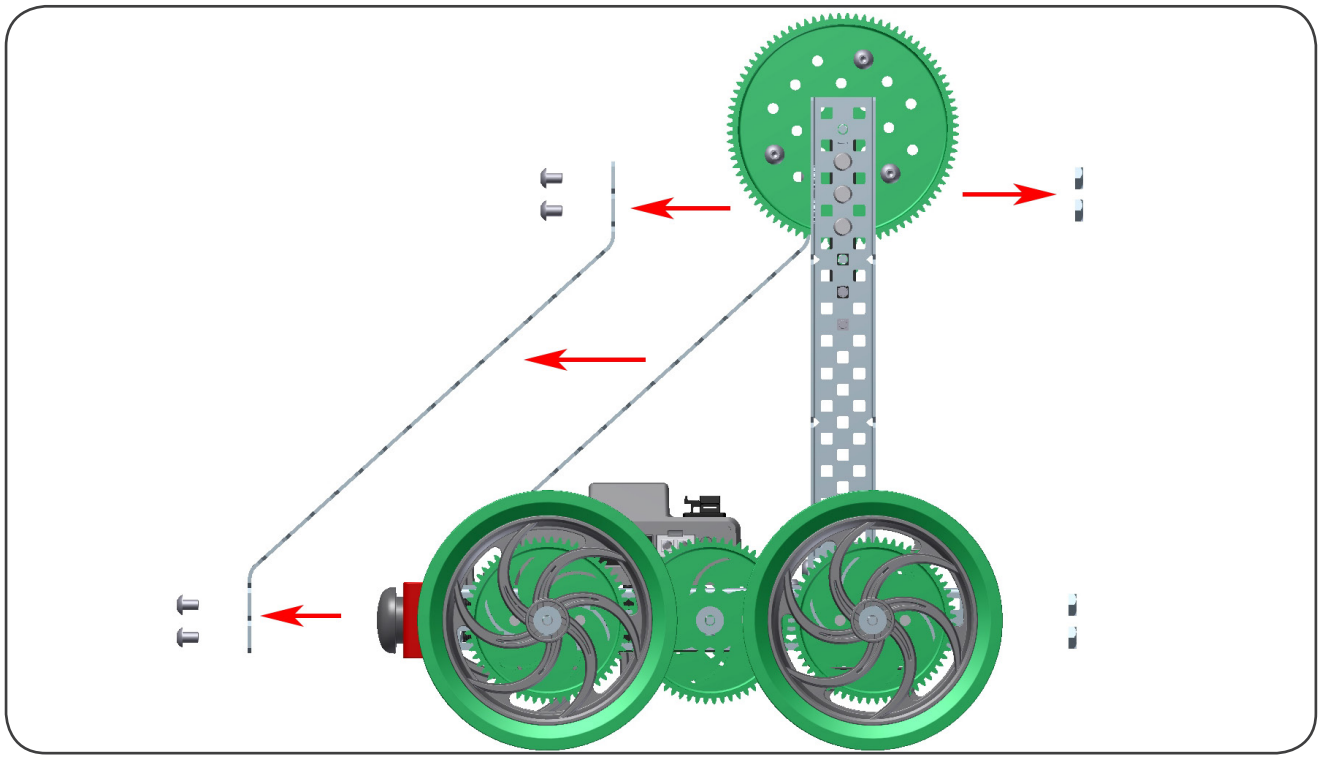
4 Attaching the Potentiometer

To attach the Potentiometer, we first need to reverse the left C-Channel holding the arm

Remove the arm motor along with the clutch post and shaft coupler

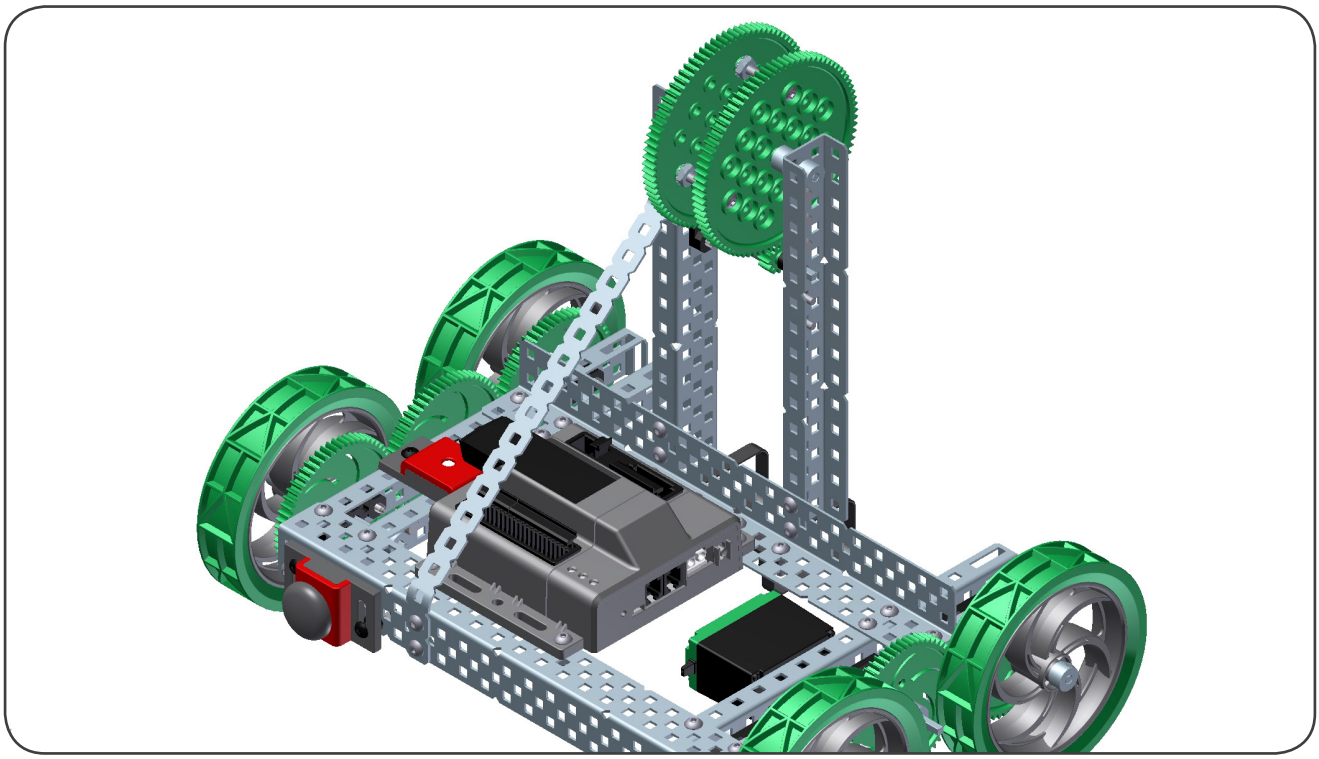


Next, remove the left, bent bar and its screws and nuts

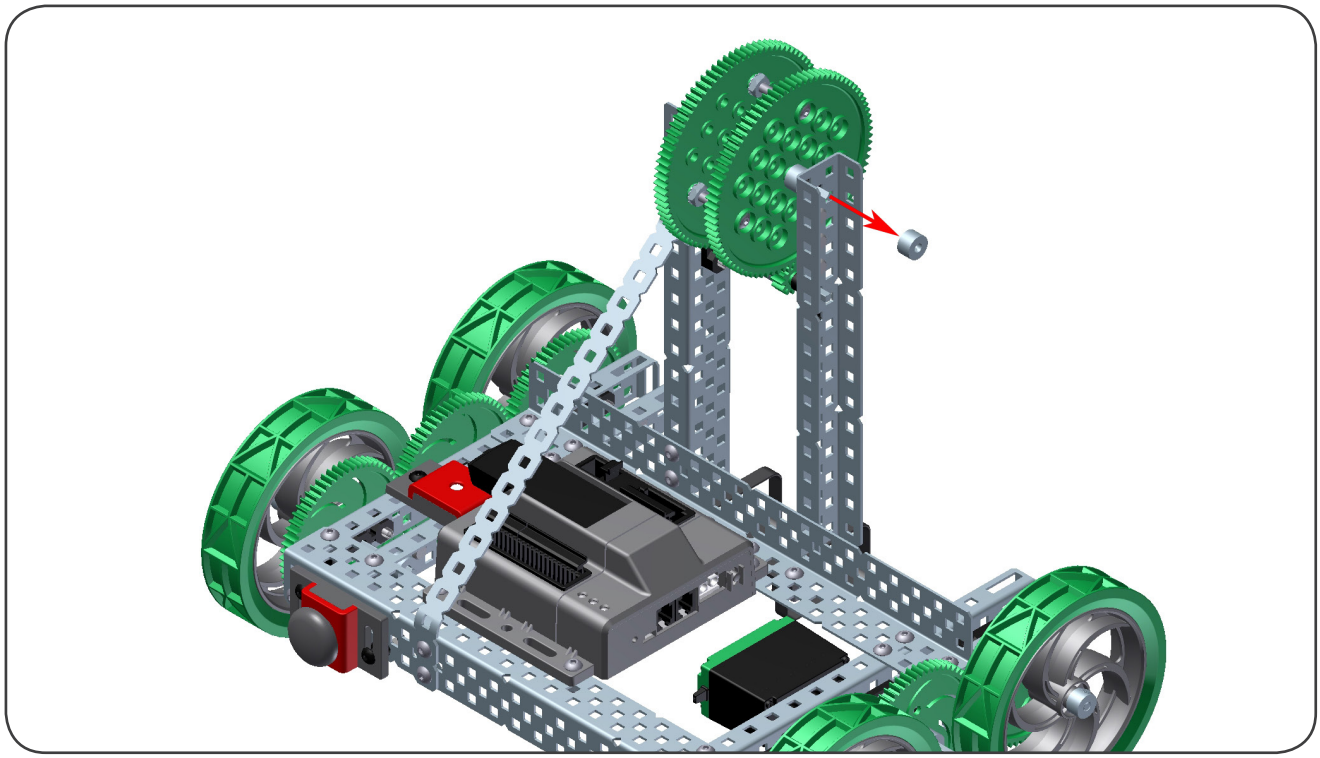


4 Attaching the Potentiometer *(continued)*

This is what the robot should look like after the bar is removed

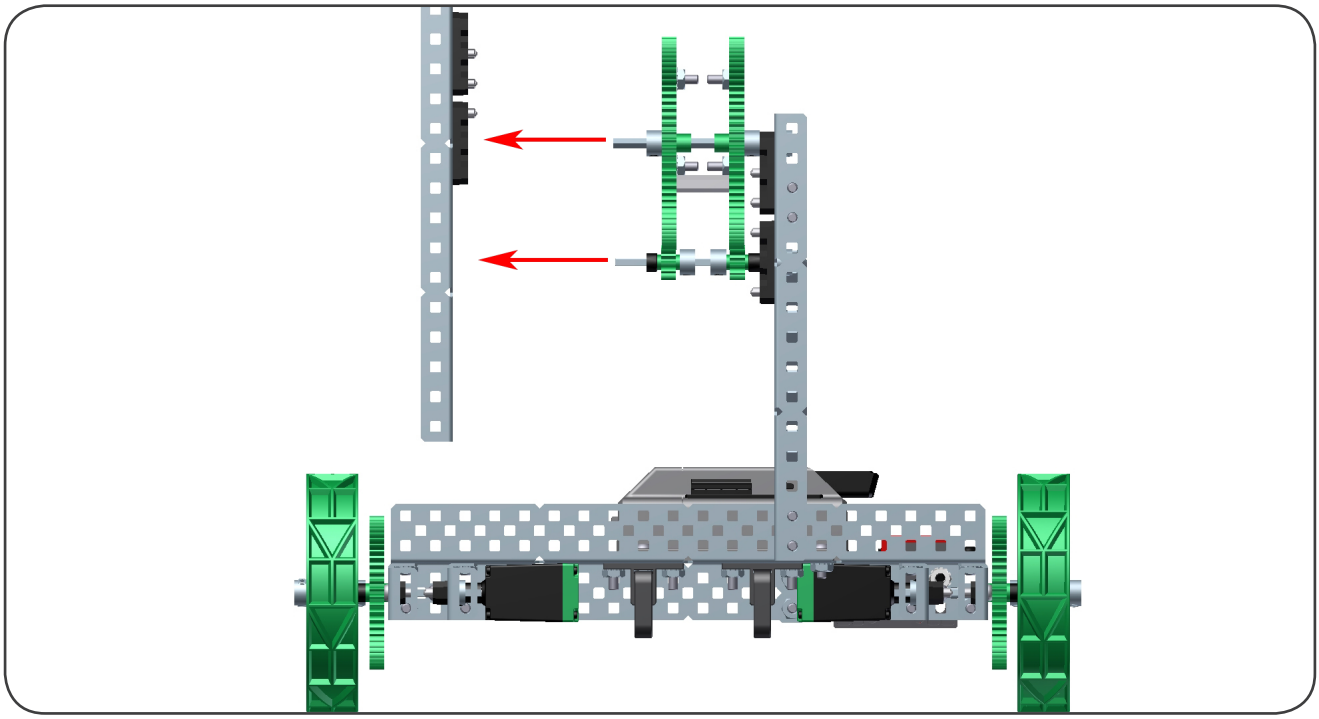


Remove the shaft collar below

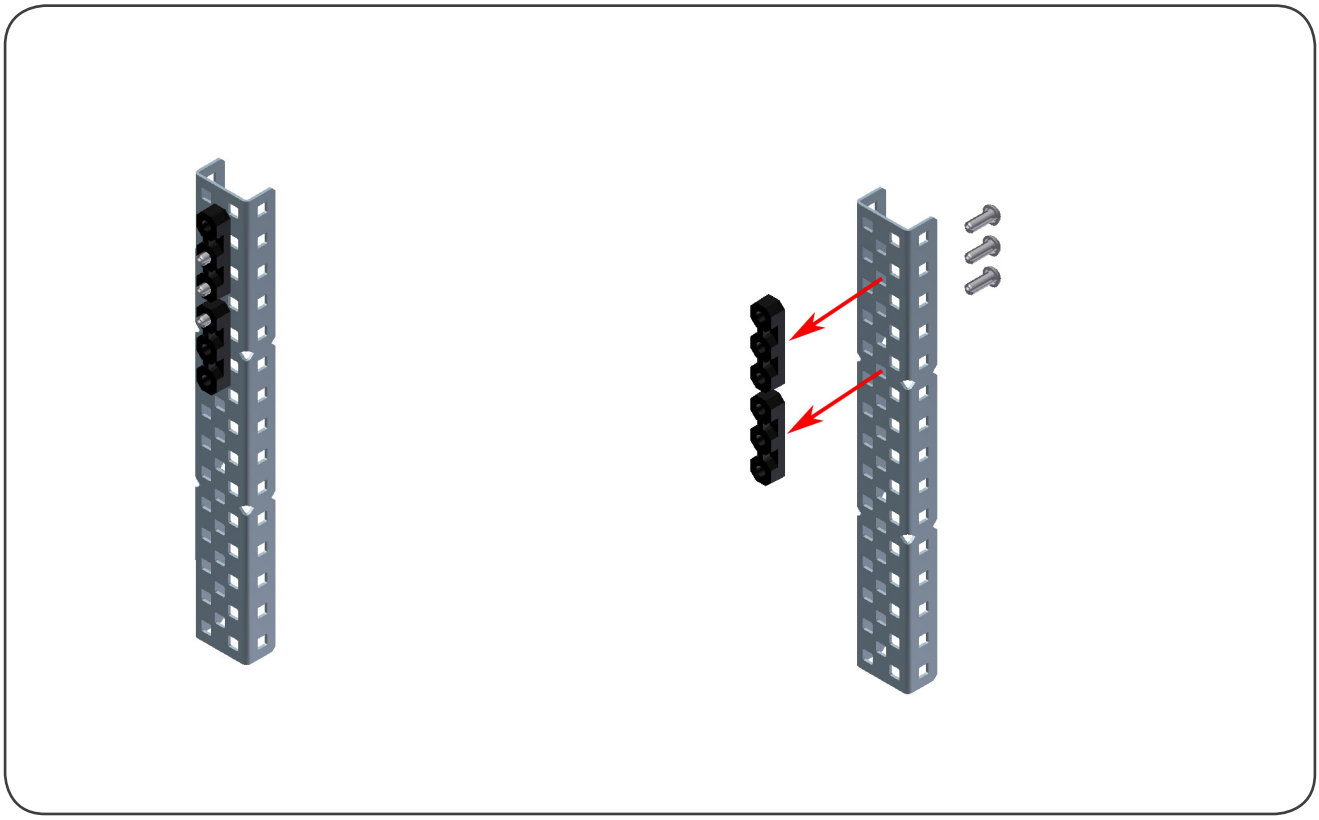


4 Attaching the Potentiometer *(continued)*

Carefully slide the C-Channel off the arm structure. Keep the bearing blocks intact.



Take the metal bar and remove the bearing blocks and rivets.

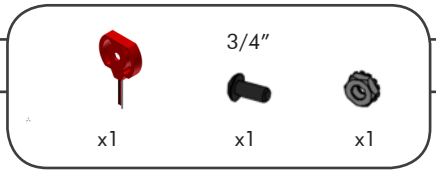


CLAWBOT BUILDING INSTRUCTIONS

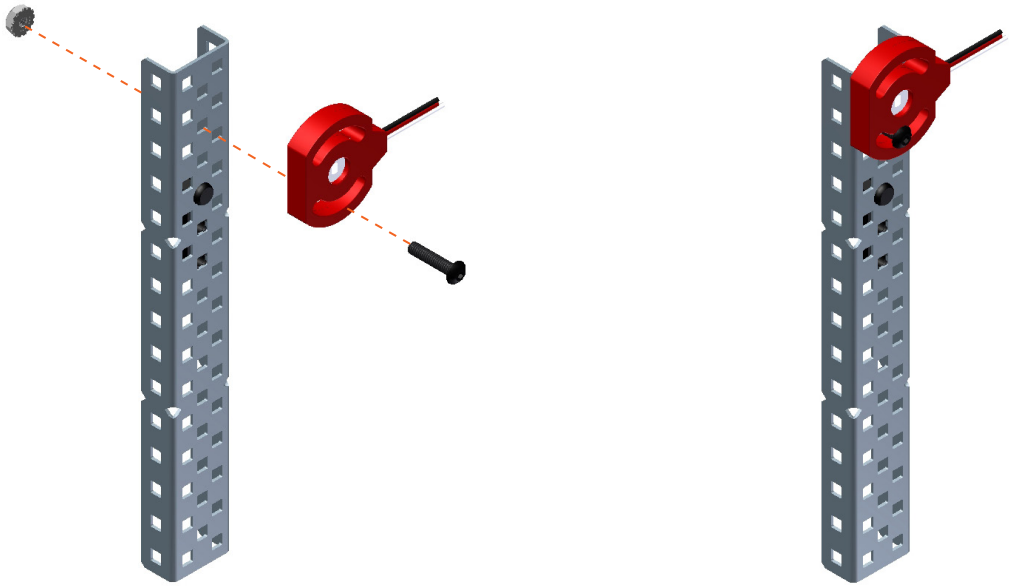
4 Attaching the Potentiometer *(continued)*

Reattach the block on the opposite side of the metal bar

> ***Keep the other flat, bearing block and 2 rivets. We will use it later for the limit switch.***

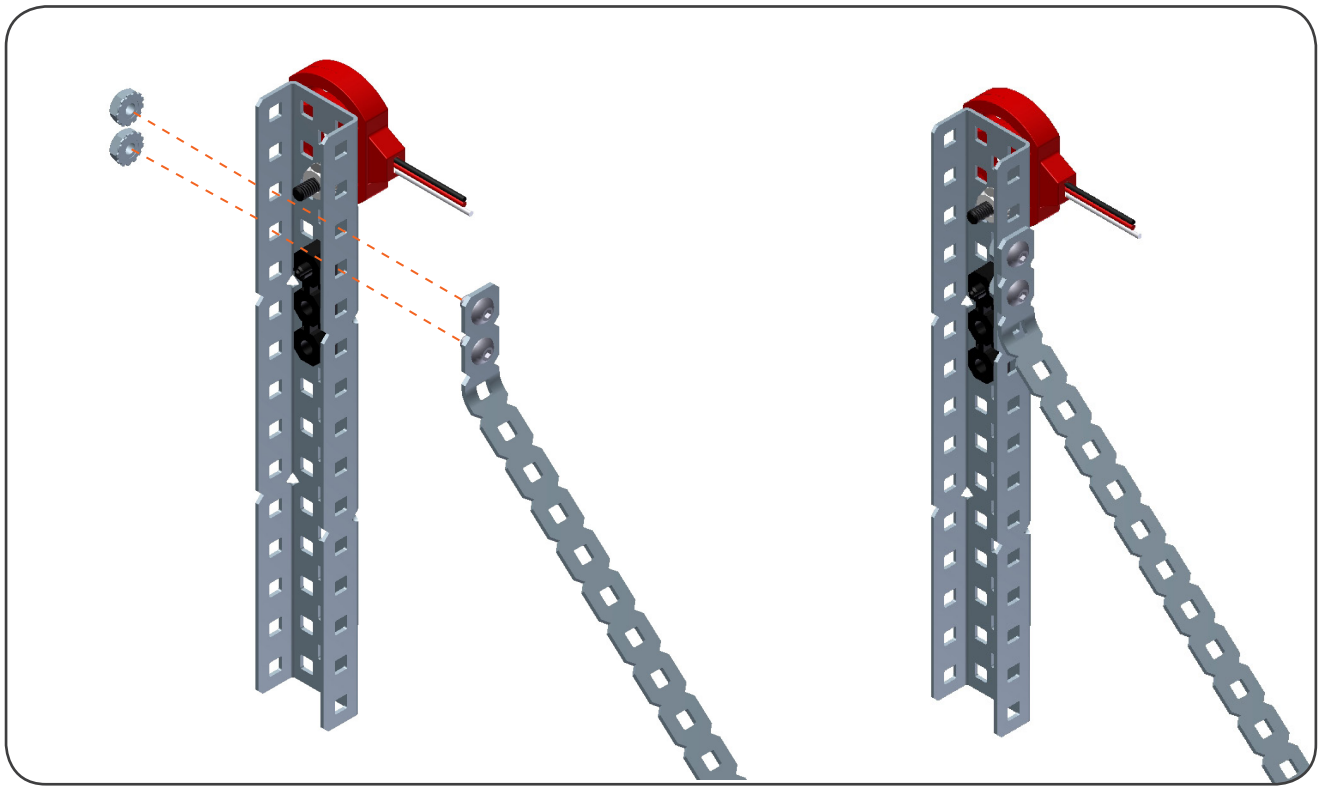


Attach the Potentiometer

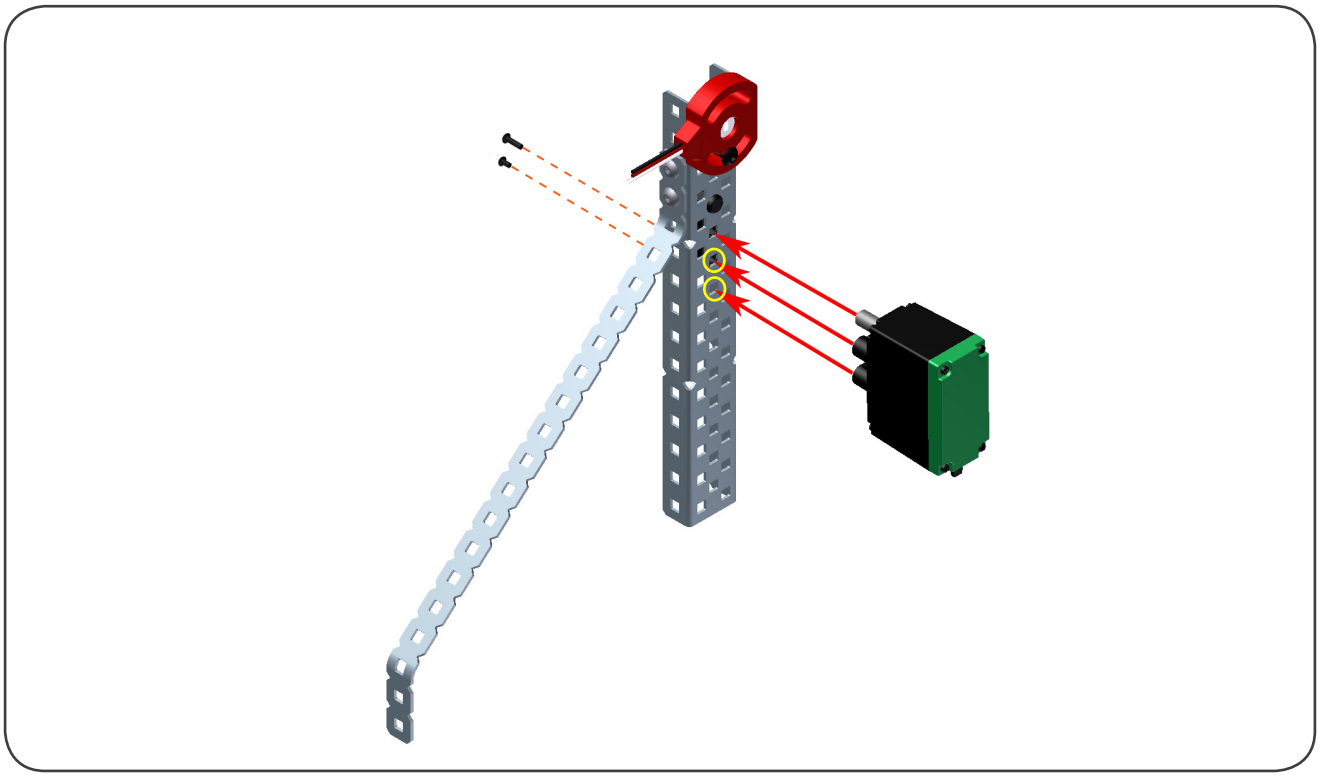


4 Attaching the Potentiometer *(continued)*

Reattach the bent bar we removed earlier



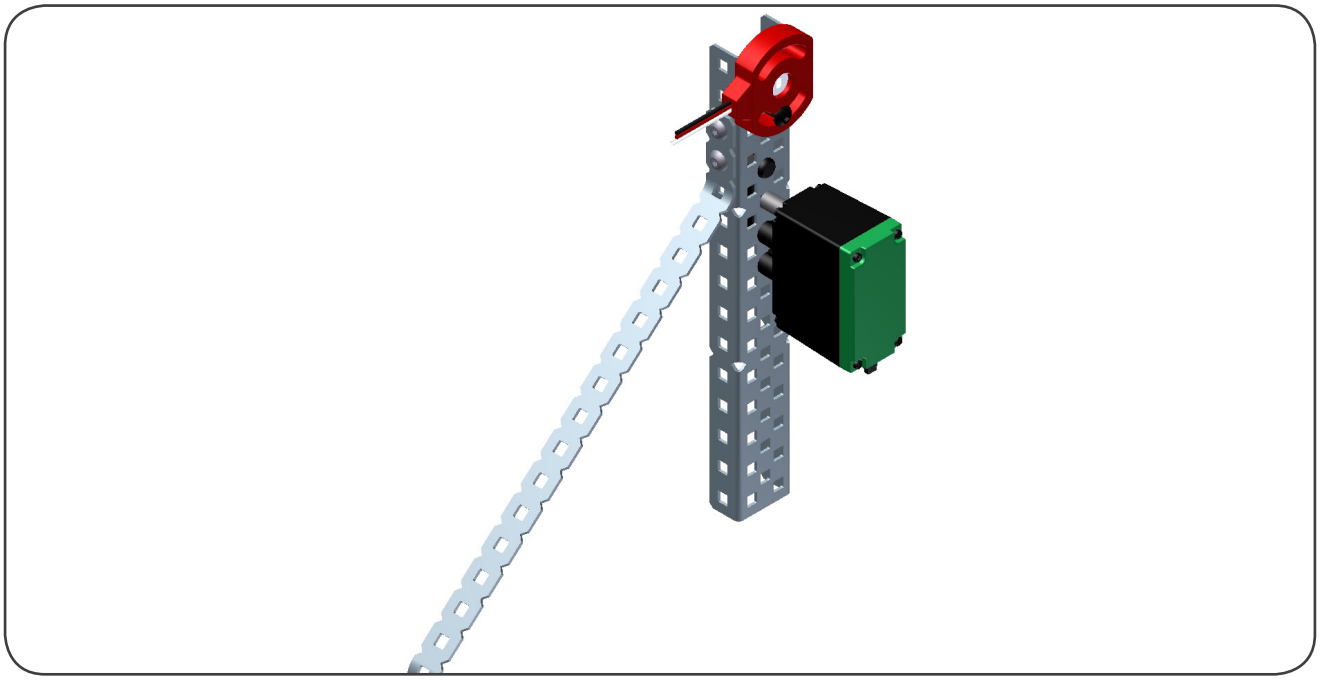
Re-attach the arm motor along with the clutch post and shaft coupler



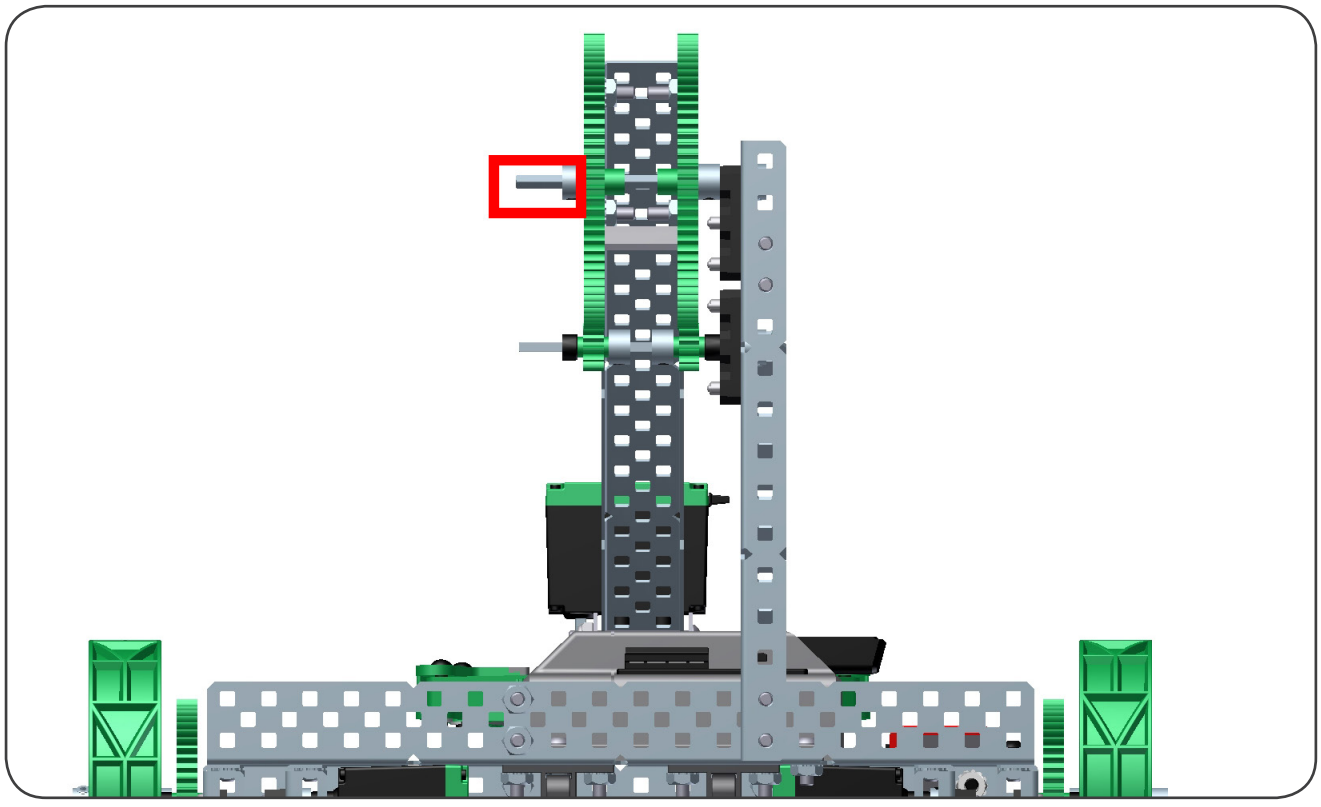
CLAWBOT BUILDING INSTRUCTIONS

4 Attaching the Potentiometer *(continued)*

Make sure your structure looks like this before moving on



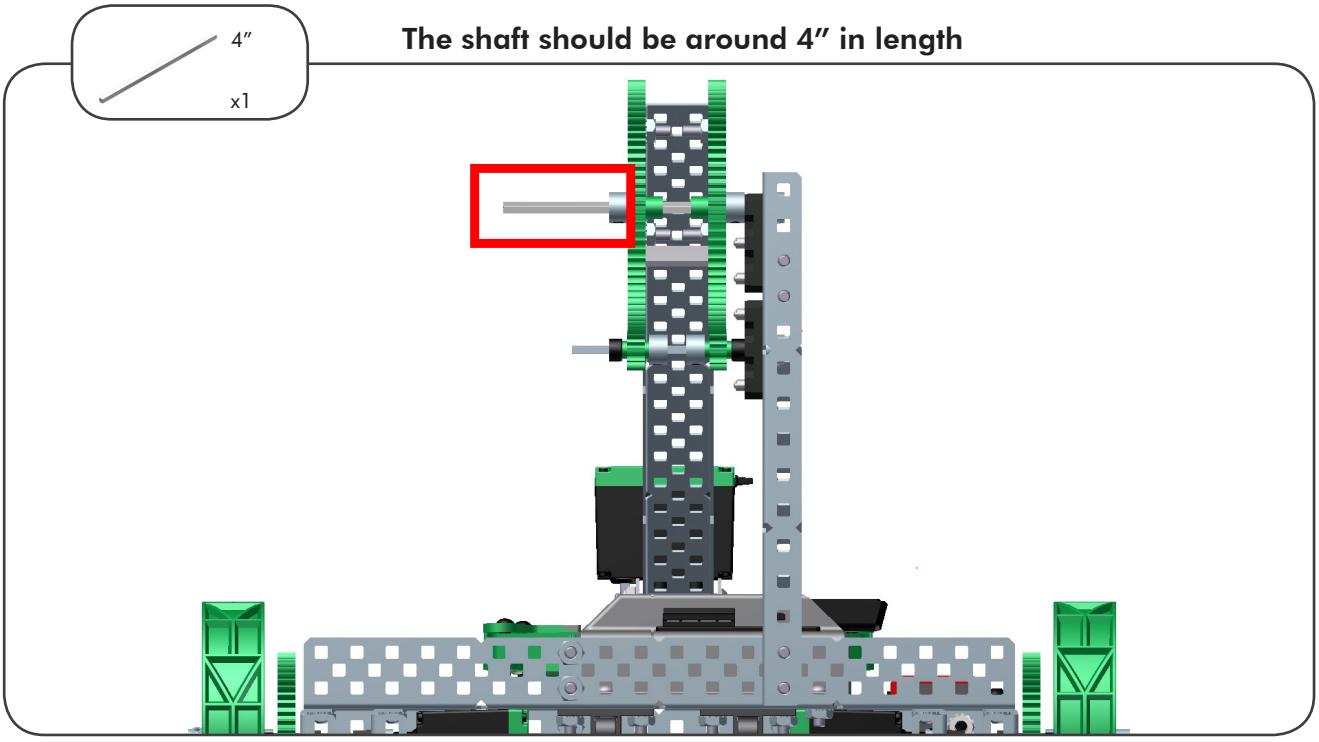
Replace the uppermost shaft of the arm with a longer shaft.



4 Attaching the Potentiometer *(continued)*

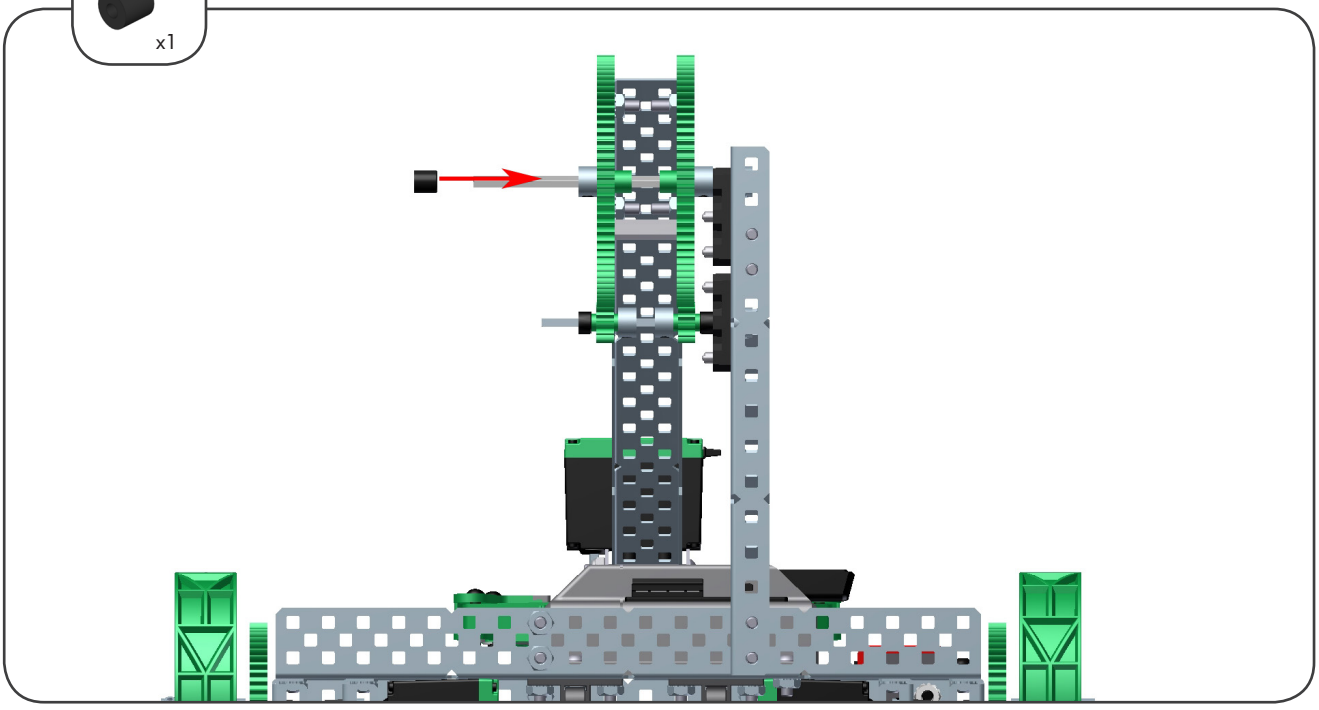
4″ x1

The shaft should be around 4″ in length



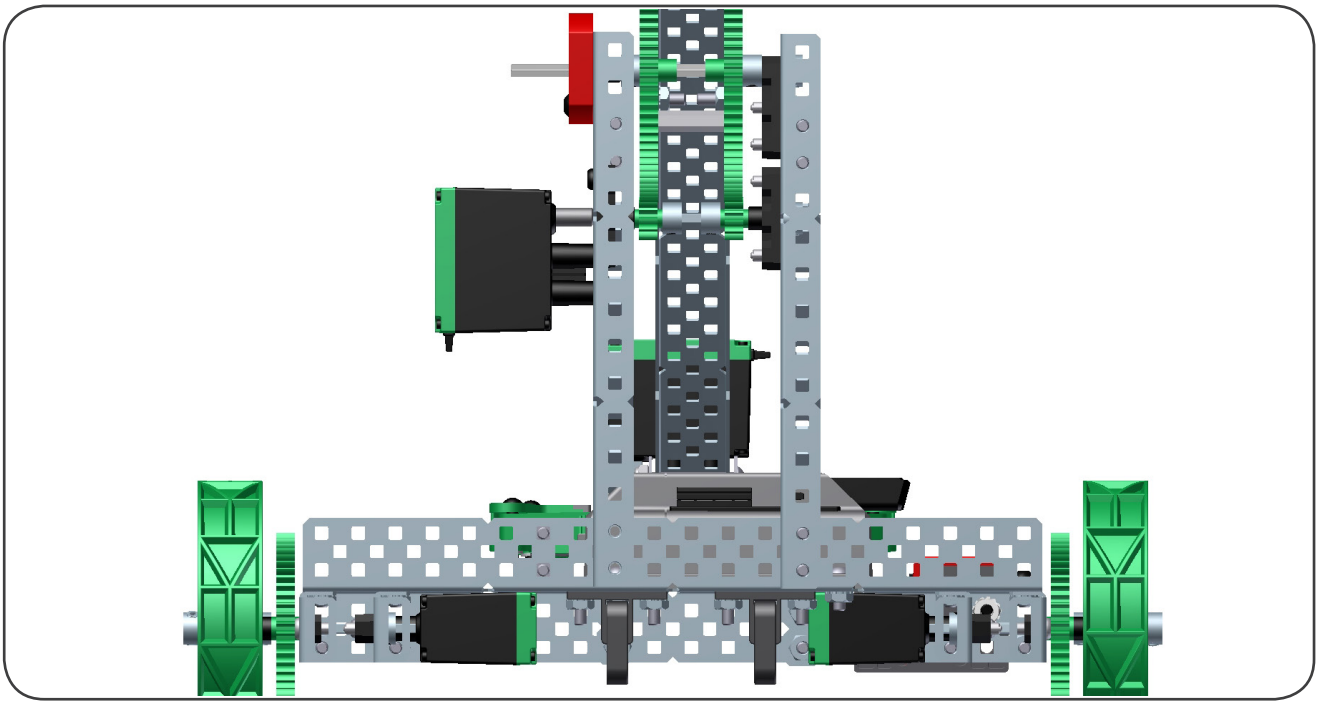
x1

Place a thick spacer on the shaft



4 Attaching the Potentiometer *(continued)*

Slide the structure back in place. Both C-Channels should now open to the right.



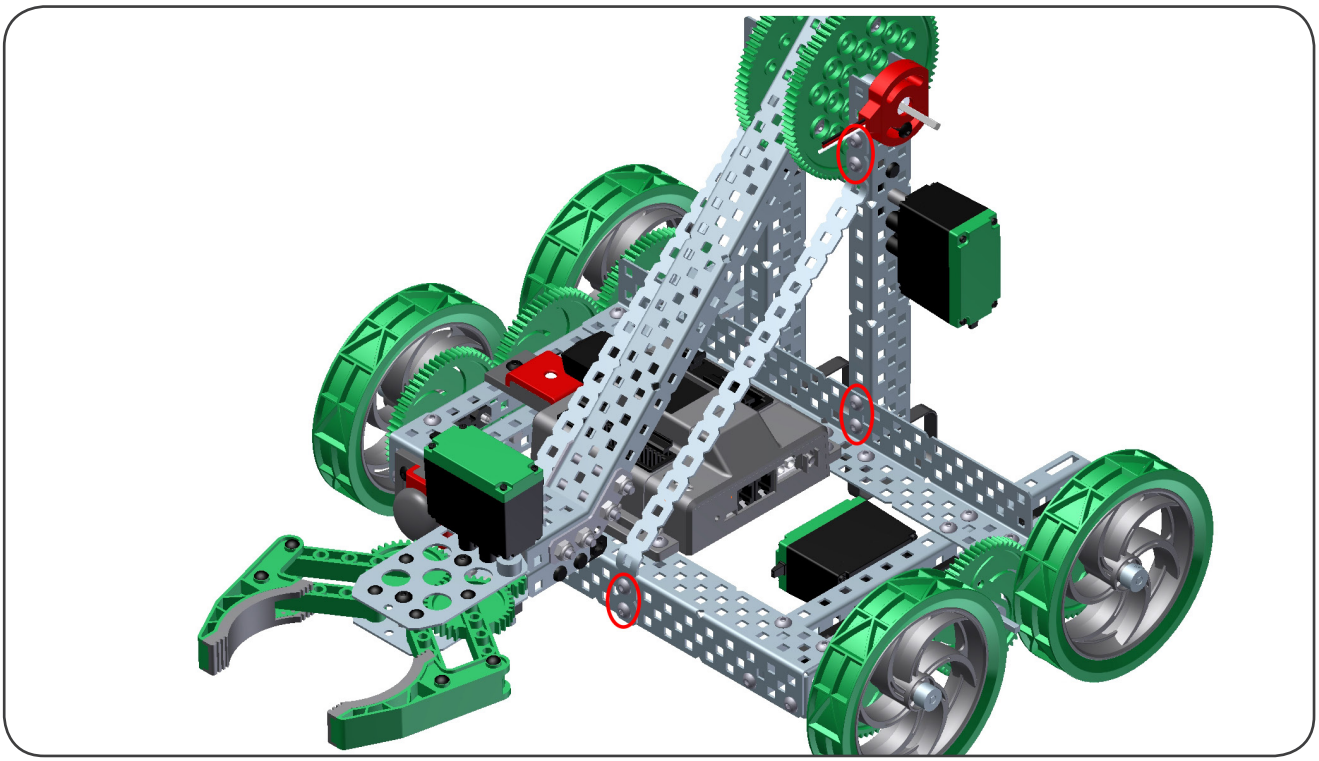
Building Tip - Potentiometer Range of Motion

At this step, make sure the arm rotates within the potentiometer's range of motion.

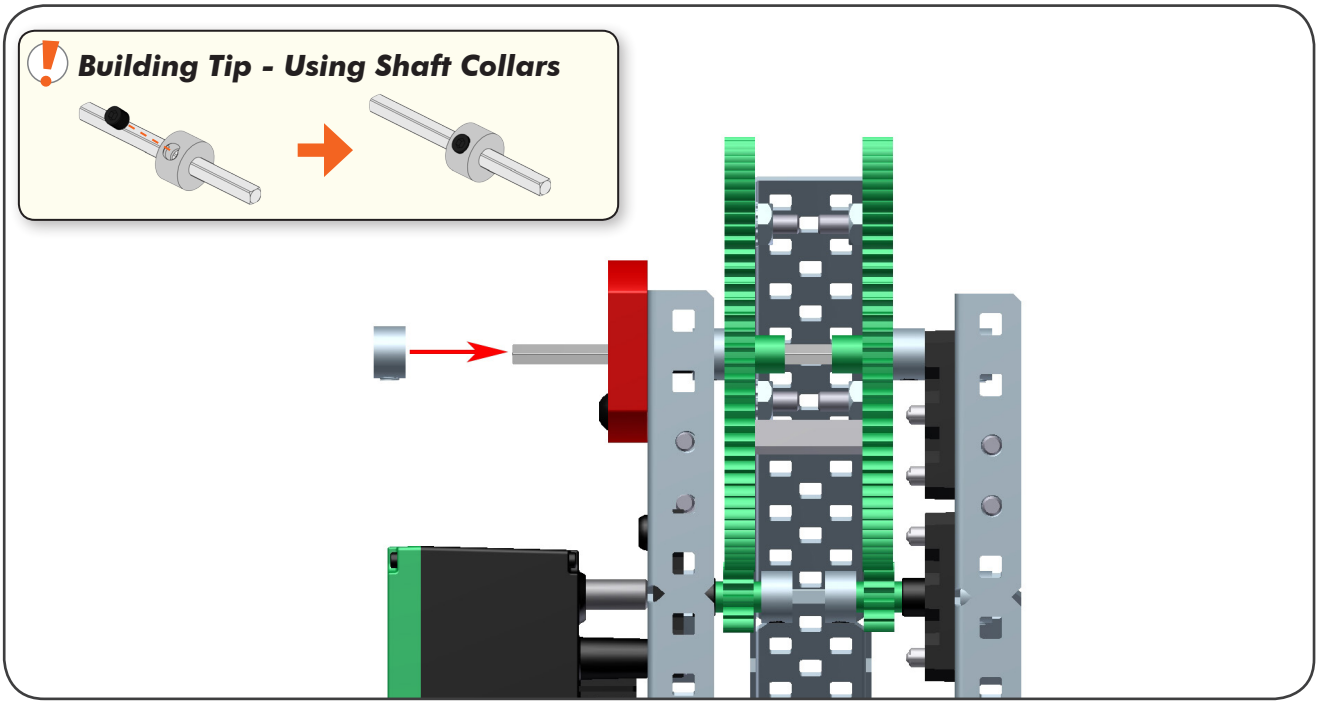
Forcing the potentiometer beyond its mechanical stops will damage the sensor.

4 Attaching the Potentiometer *(continued)*

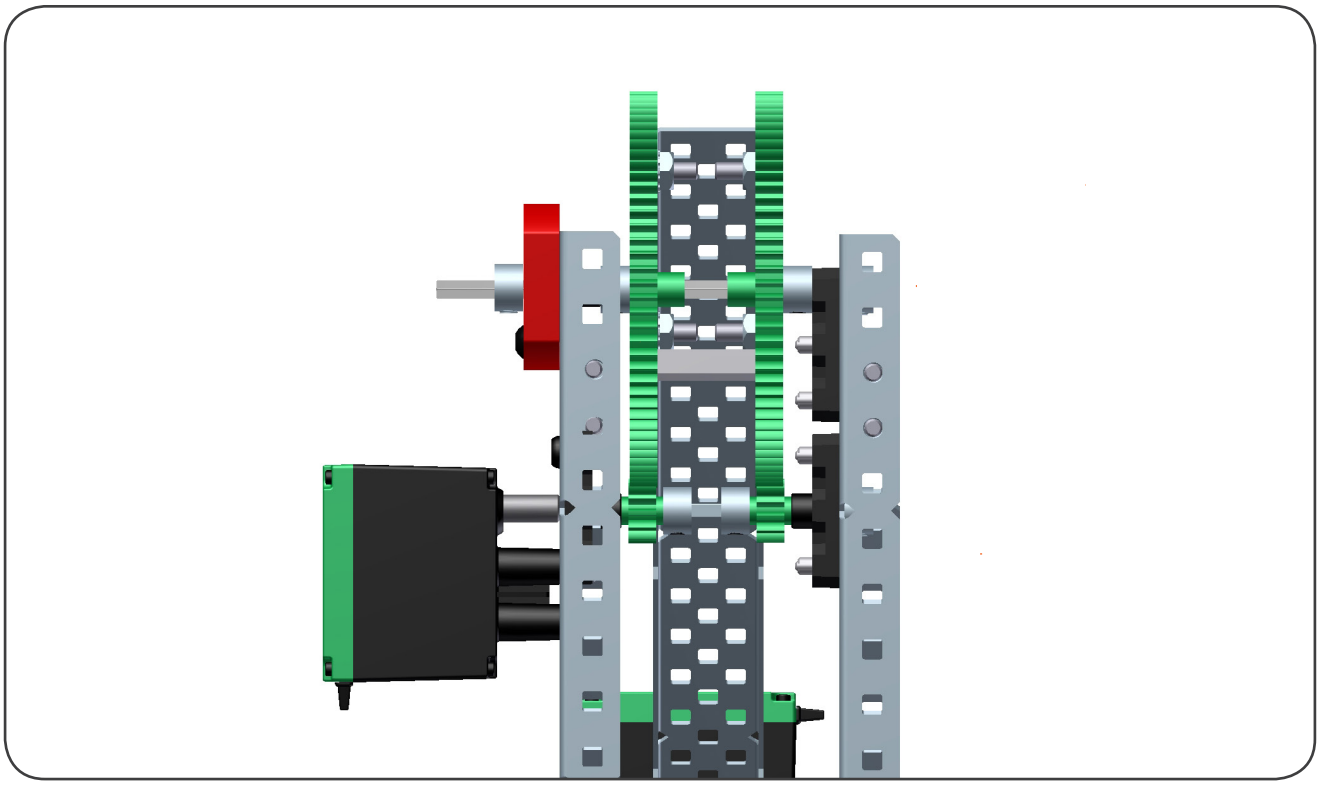
Screw the screws and nuts shown below back into place



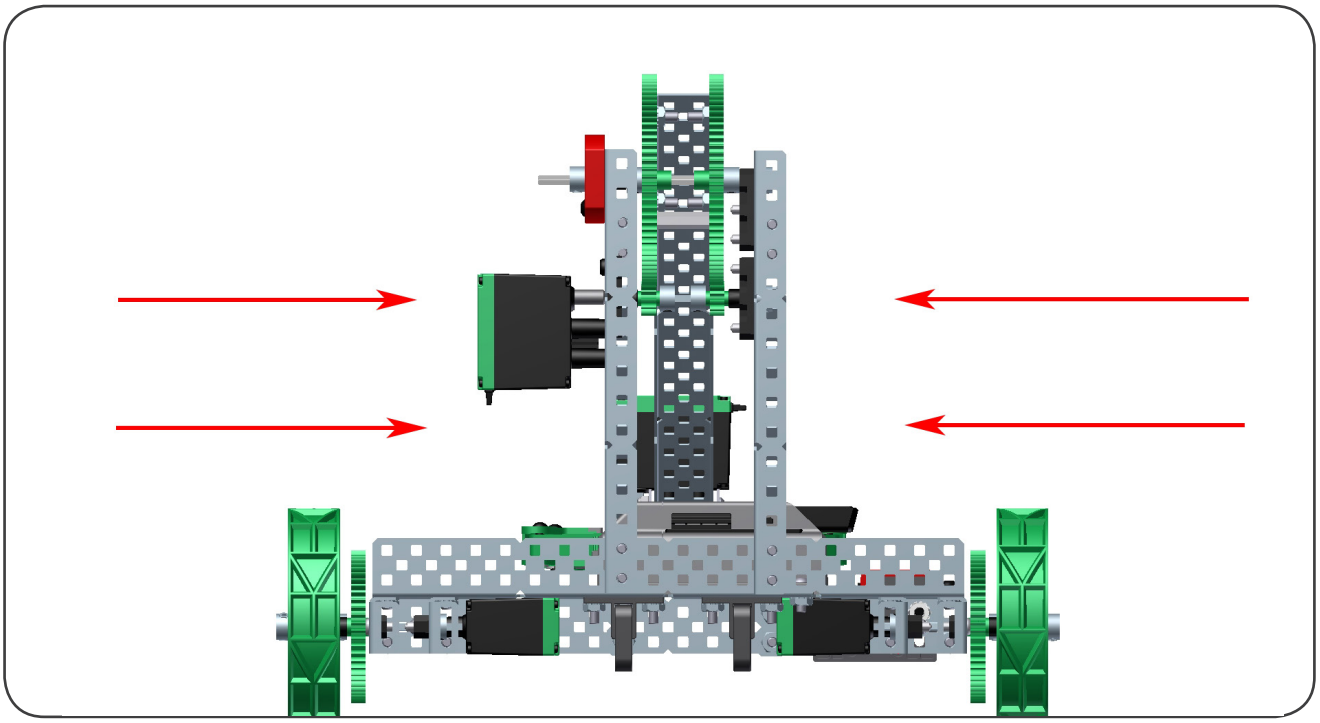
Finish by putting on the shaft collar we removed earlier



4 Attaching the Potentiometer *(continued)*



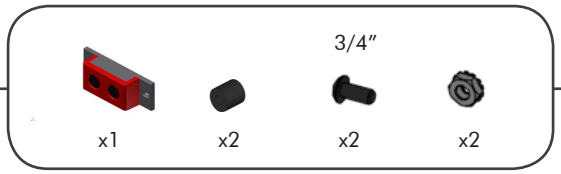
Push the arm structure inwards and make sure everything is tight

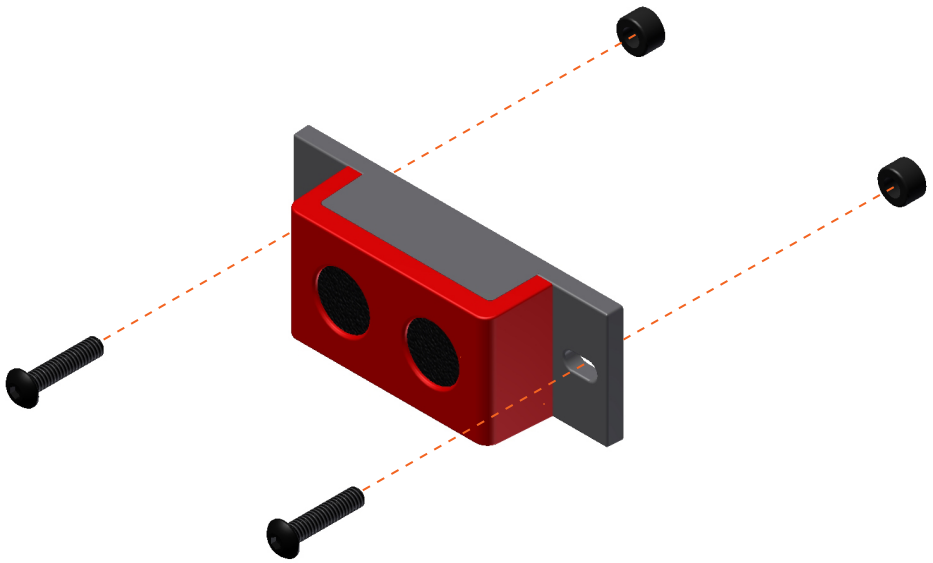


Make sure the arm moves freely

CLAWBOT BUILDING INSTRUCTIONS

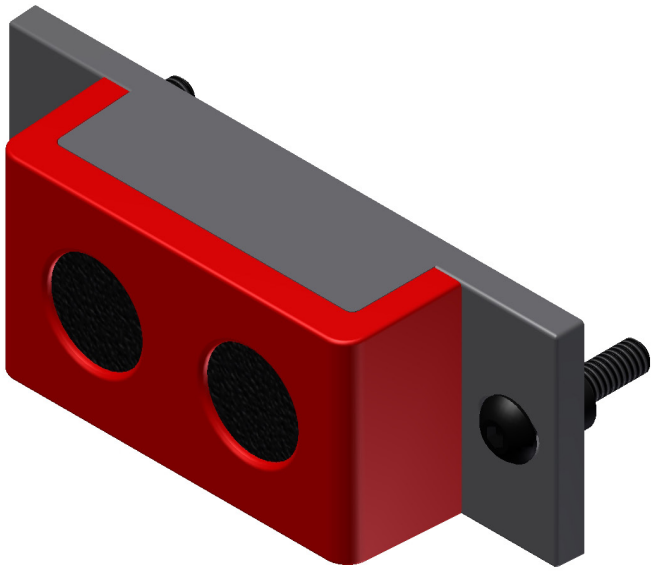
5 Attaching the Sonar Sensor





Much like the bumper sensor, start with 2 screws and a spacer

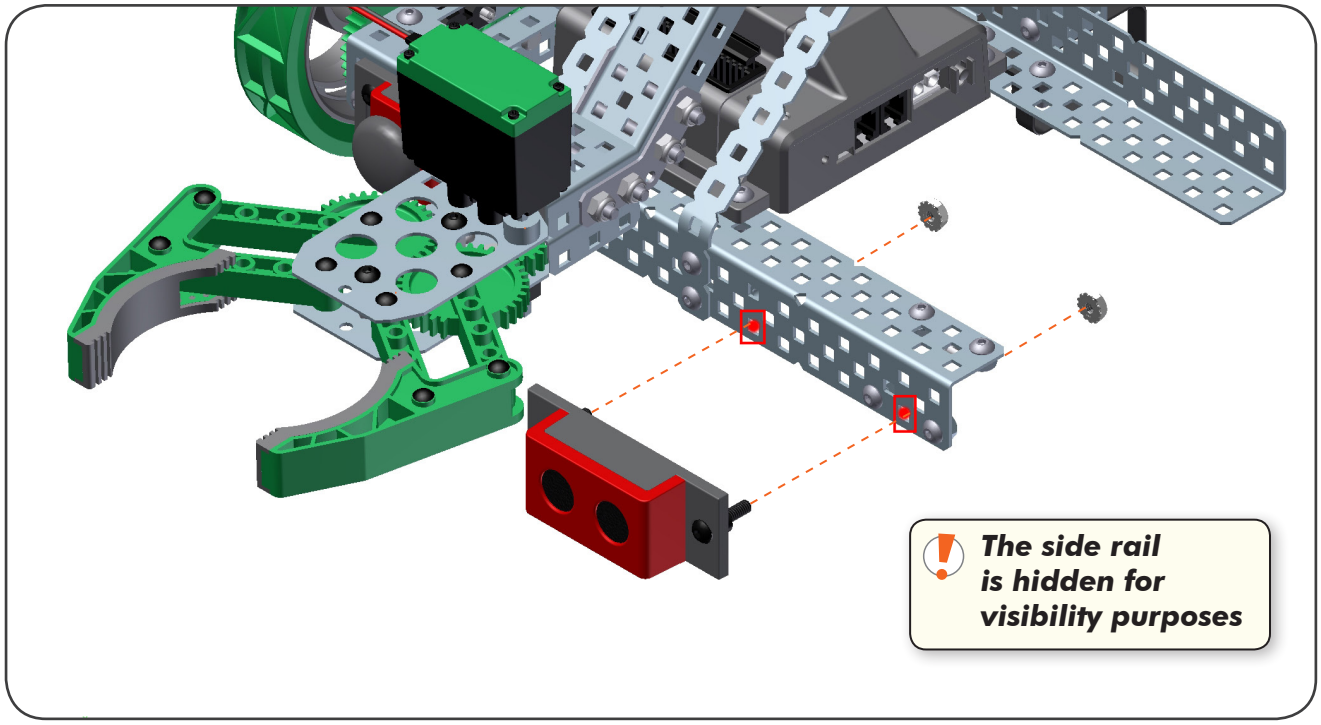
Orthographic view

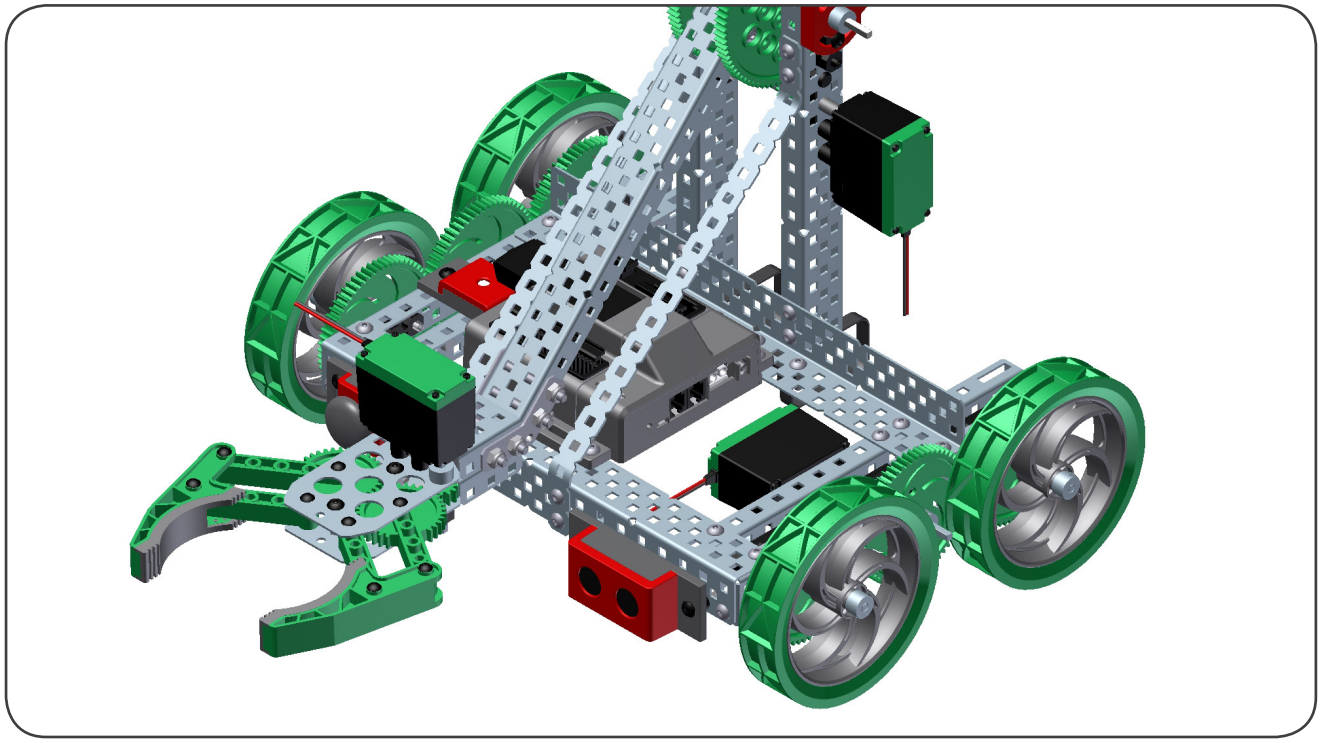


Top-down view

5 Attaching the Sonar Sensor *(continued)*

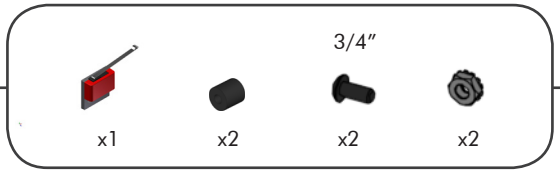
Attach the sonar to the front of the robot

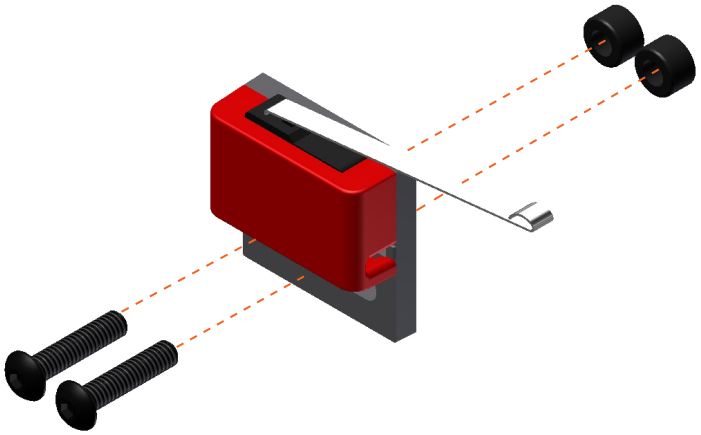




CLAWBOT BUILDING INSTRUCTIONS

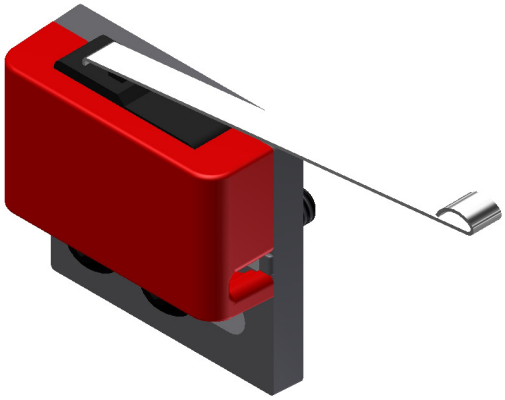
6 Attaching the Limit Switch



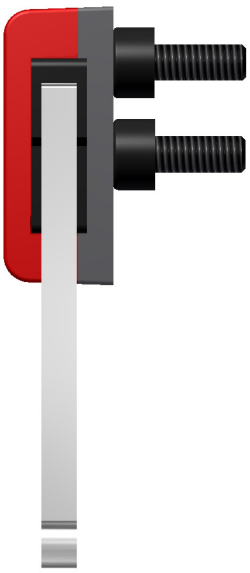


The limit switch is also attached using 2 screws and spacers

Orthographic view

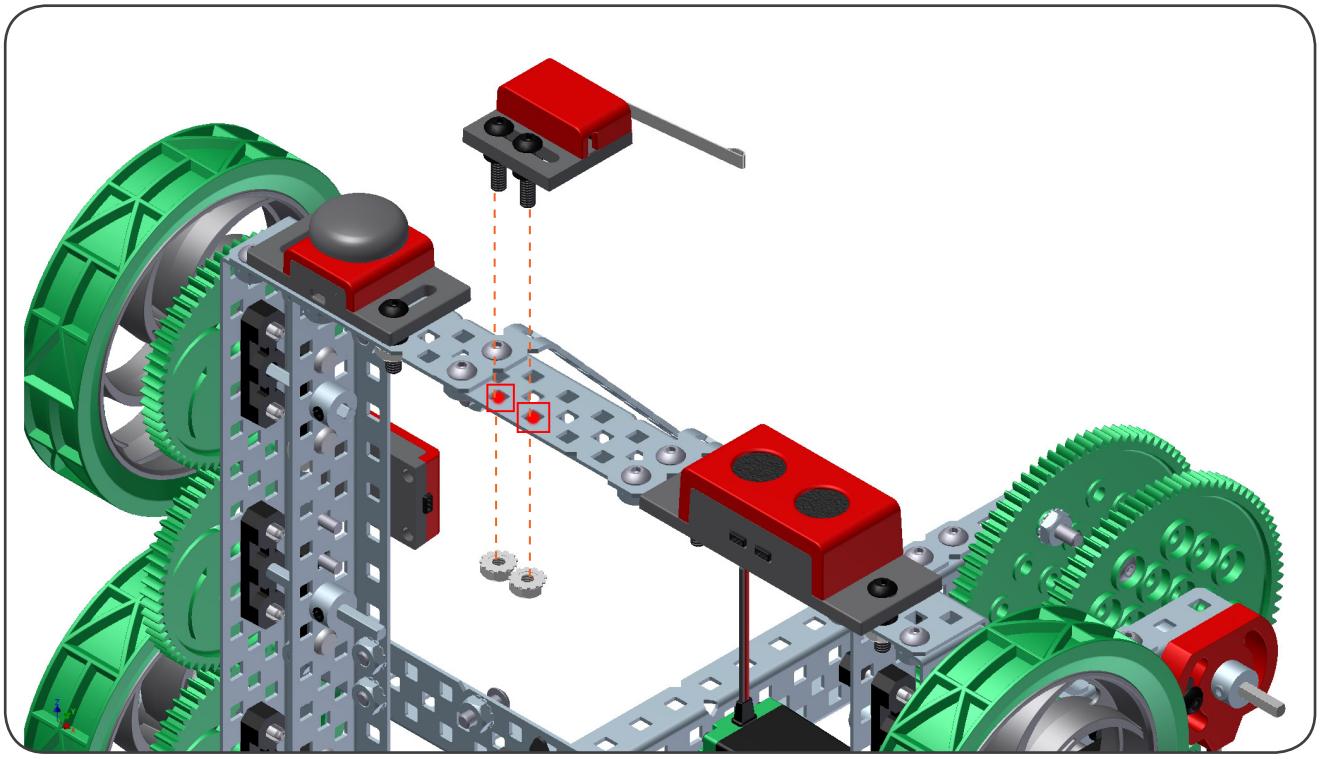


Top-down view

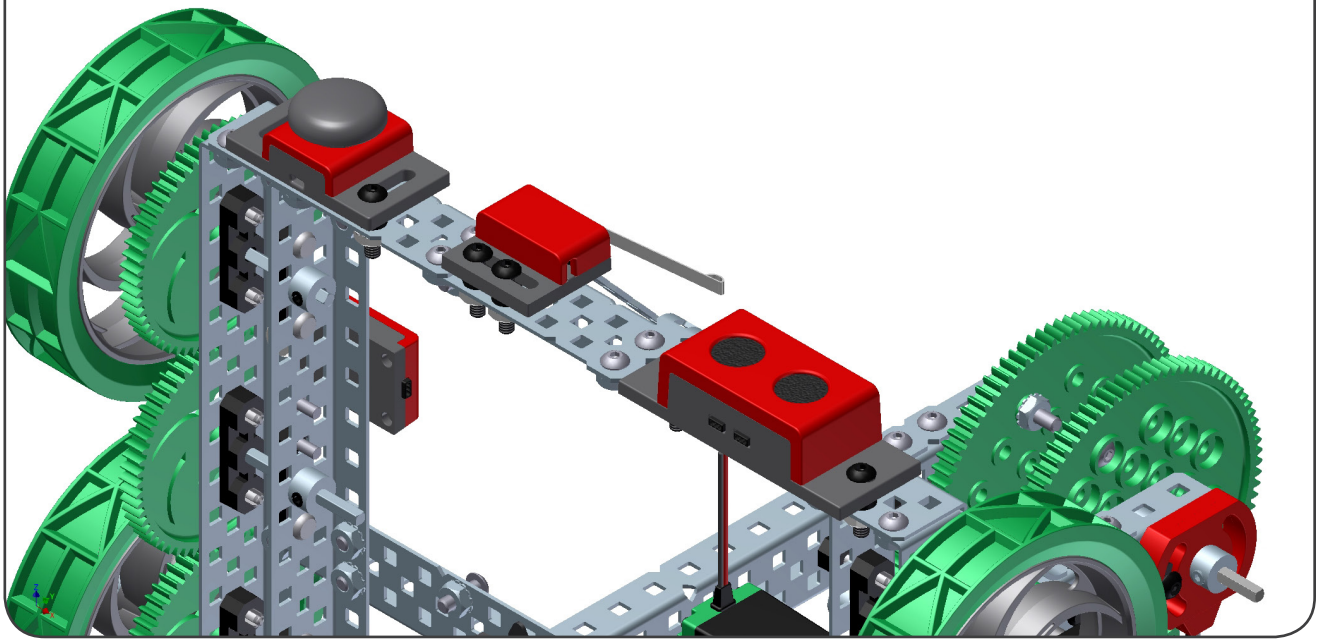


6 Attaching the Limit Switch *(continued)*

Place the sensor in between the bent bars on the front of the robot like such

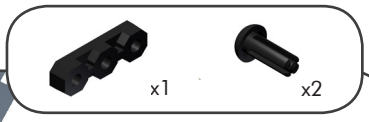


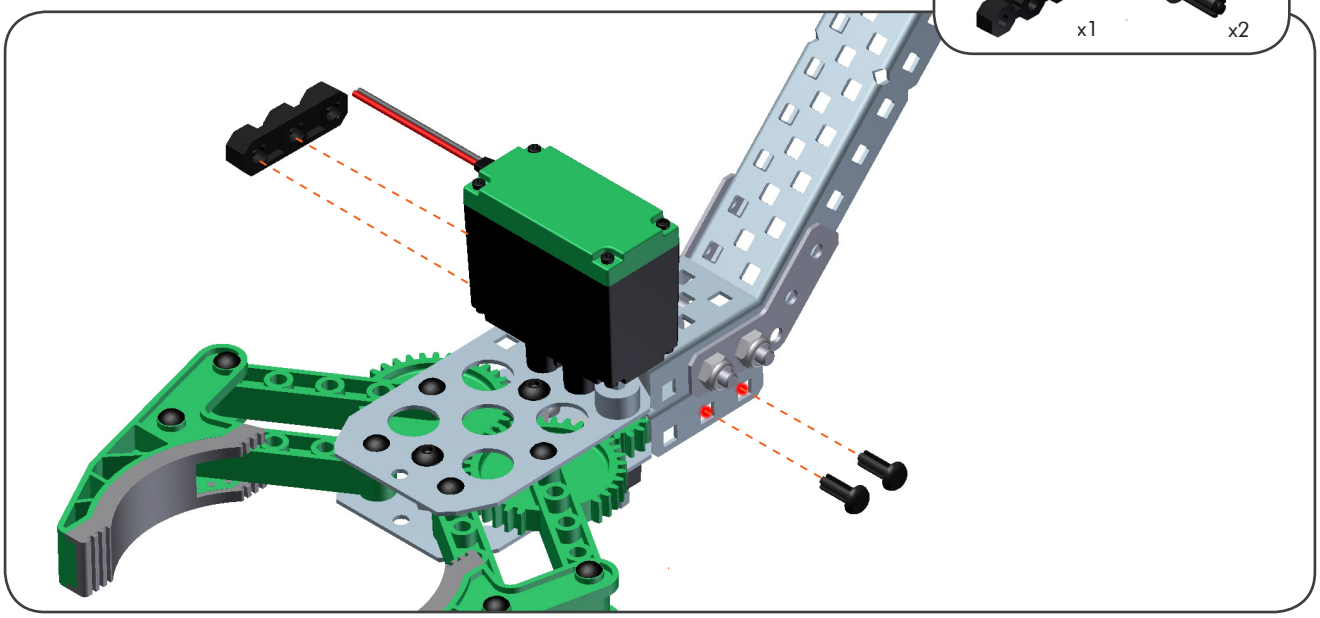
Front view from a bottom perspective



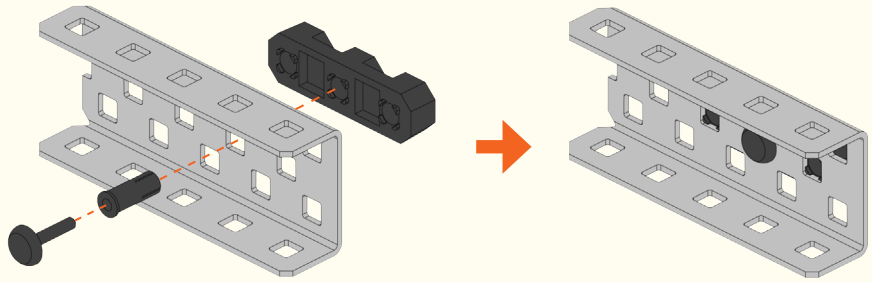
CLAWBOT BUILDING INSTRUCTIONS

6 Attaching the Limit Switch *(continued)*

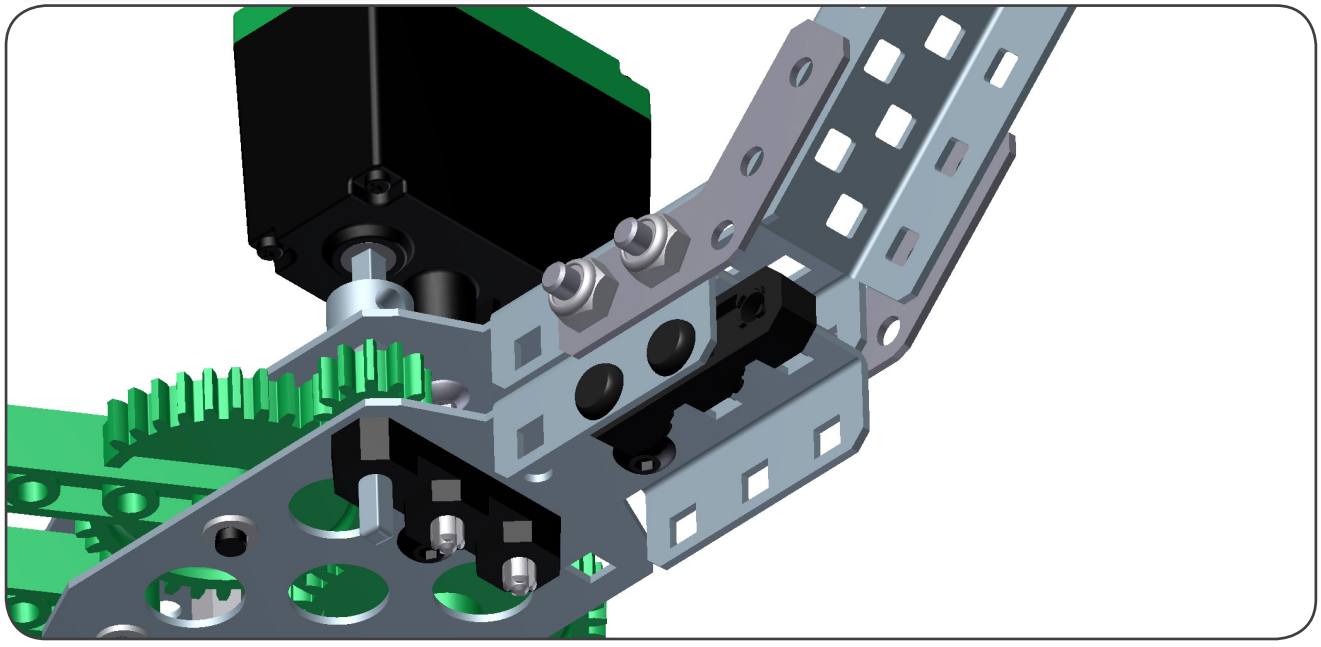




Building Tip - Using Pop Rivets

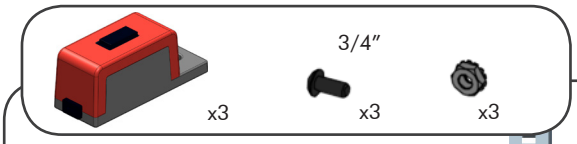


Recover the bearing block you saved earlier from the potentiometer build. Place it underneath the claw as shown below. This will help the claw activate the limit switch 100% of the time

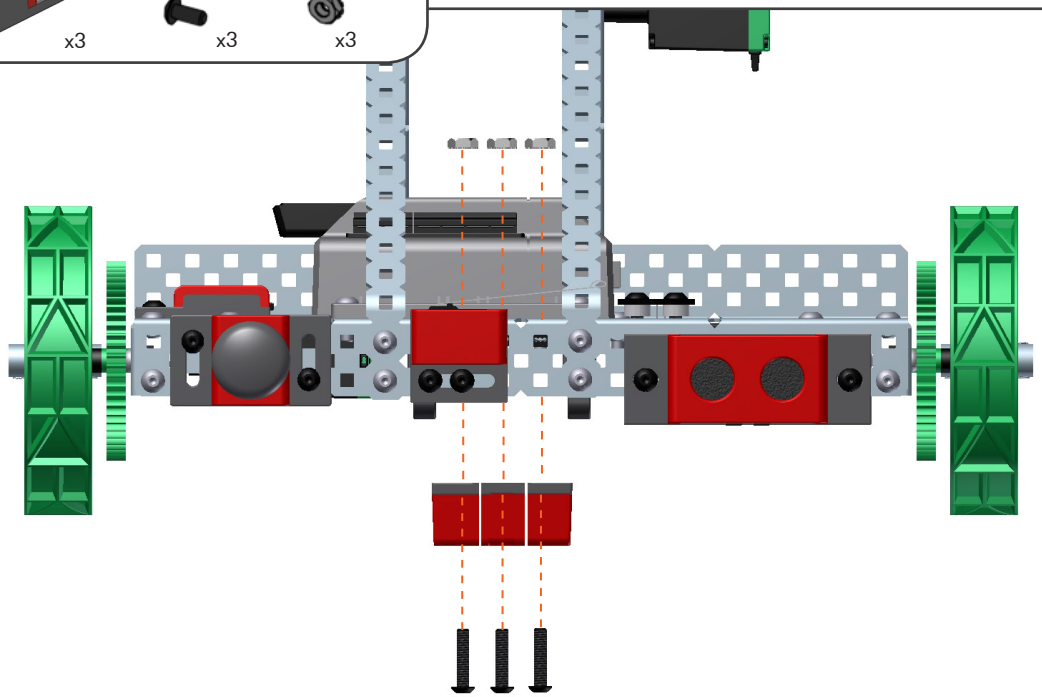


CLAWBOT BUILDING INSTRUCTIONS

7 Line Tracking Sensor Construction

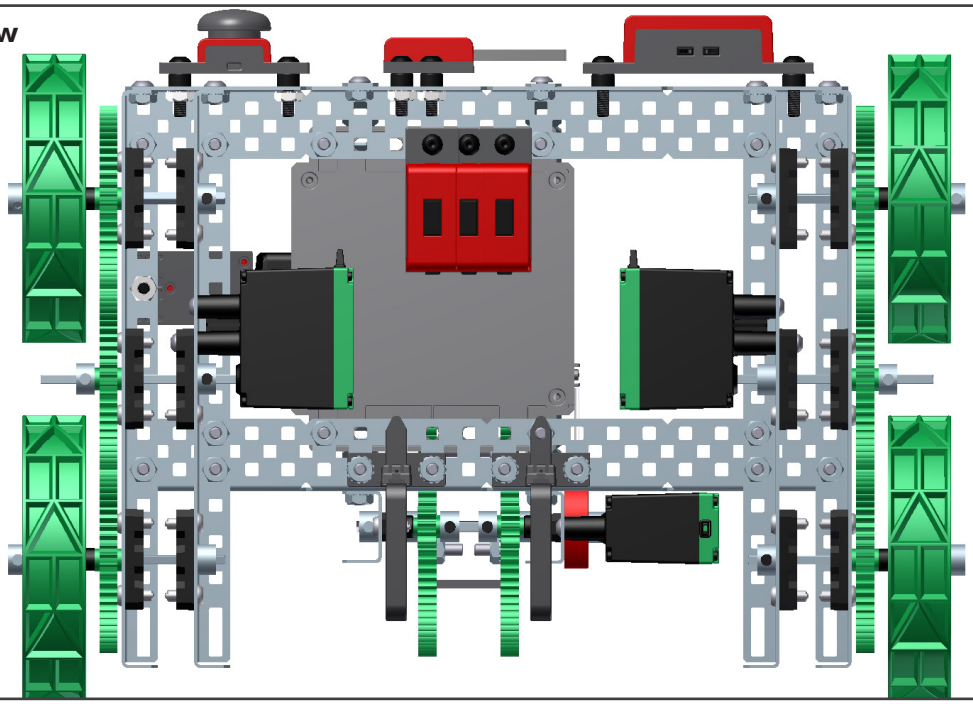


Next, attach the line tracking sensors



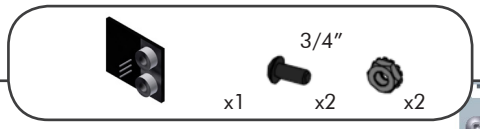
Make sure the line trackers are centered on the robot

Bottom View

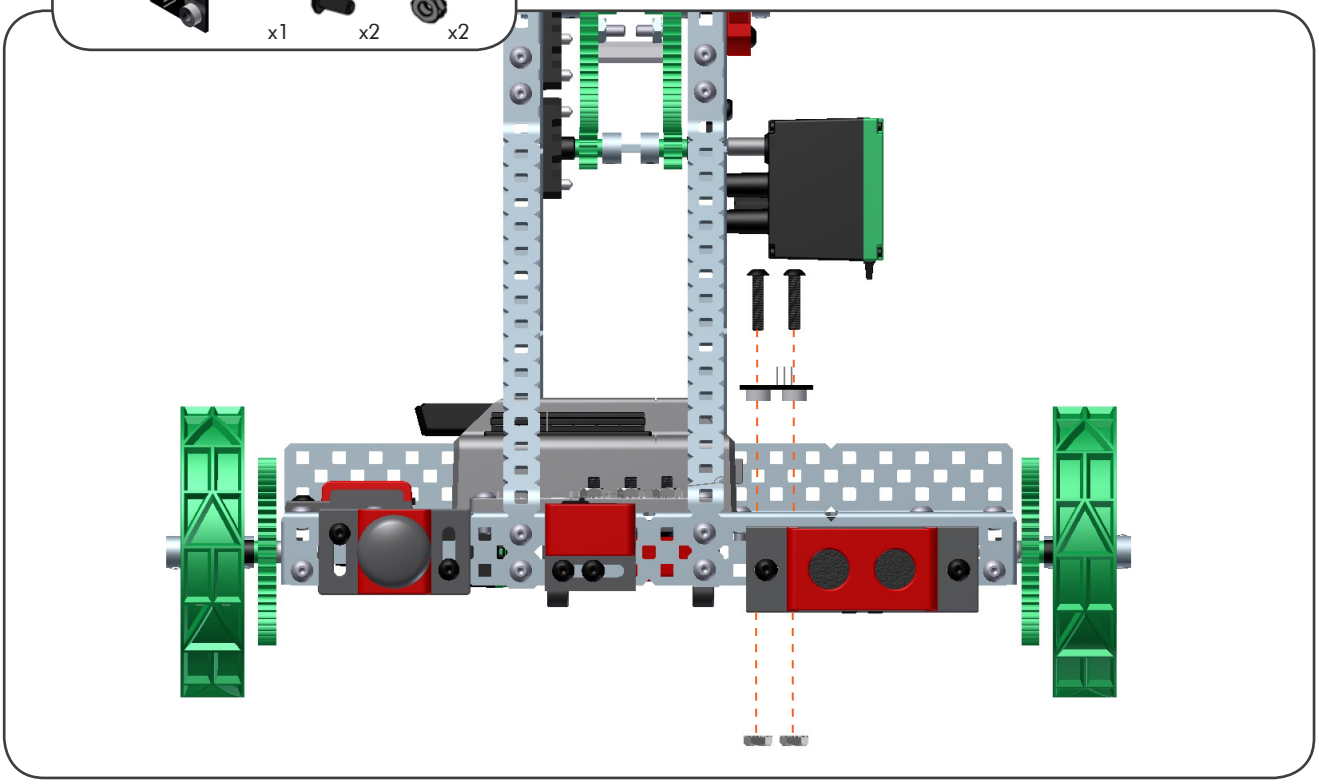


CLAWBOT BUILDING INSTRUCTIONS

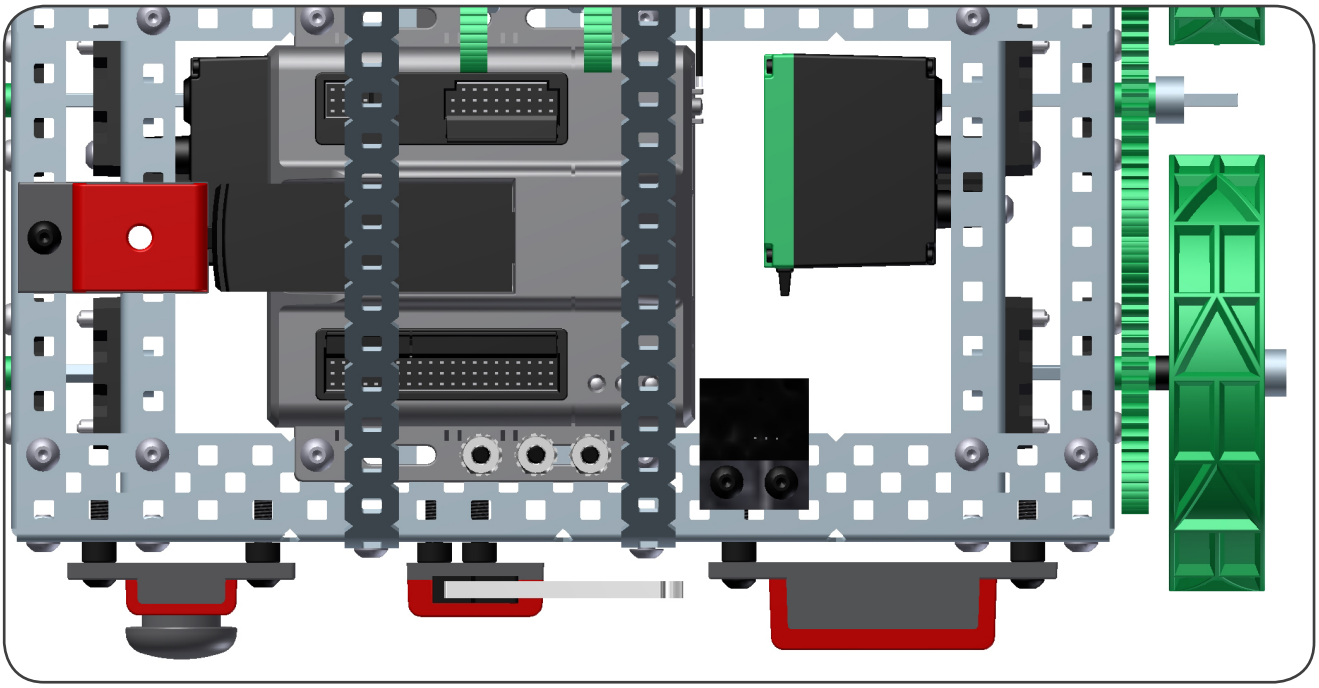
8 Attaching the Gyroscope



Attach the gyroscope as close to the center as possible



Below is the top view



CLAWBOT BUILDING INSTRUCTIONS

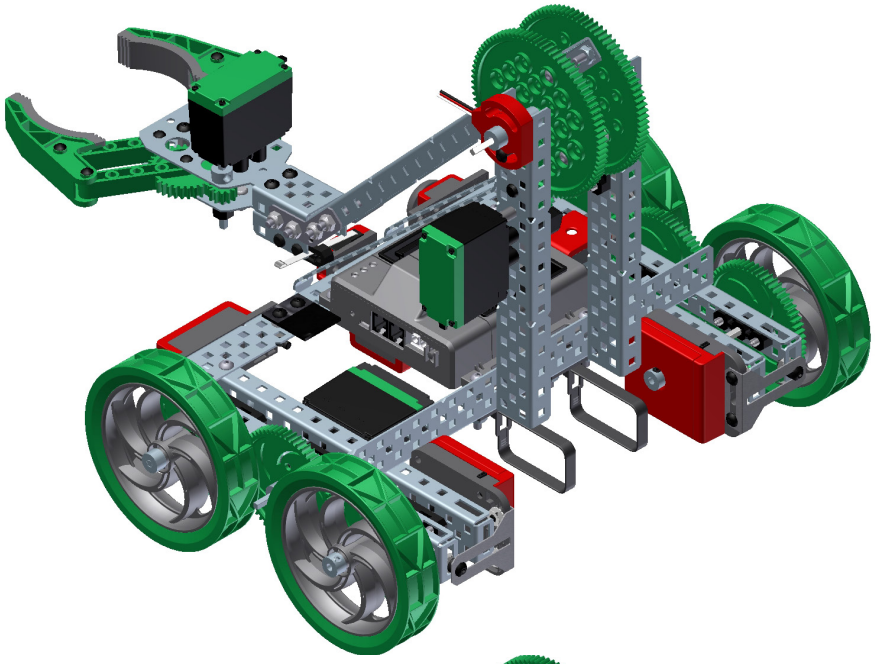
This robot model features 2 options for motor encoder:.

A.) Attaching the external VEX Quadrature Encoders to the shafts connecting the back wheels to the drive train.

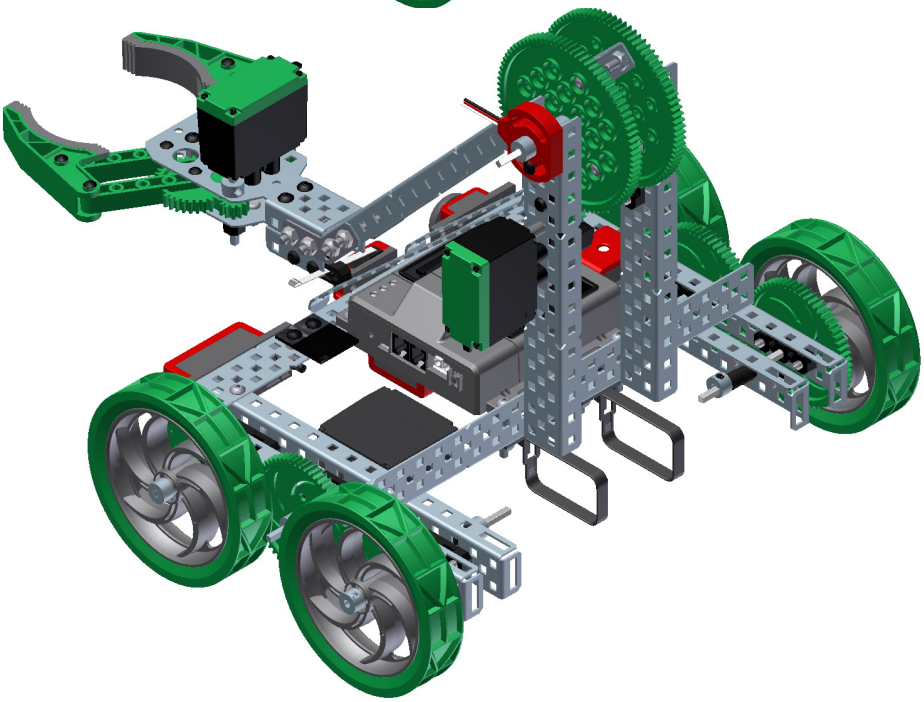
B.) Using the Integrated Motor Encoders.

This guide will show you how to build both.

A.

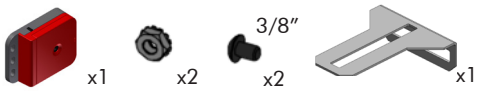


B.

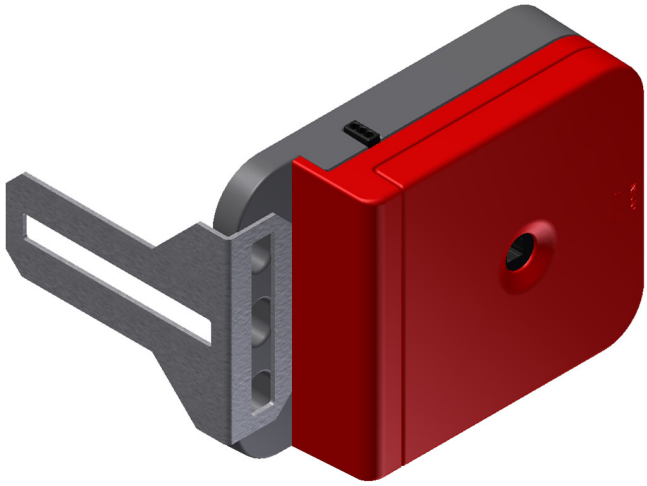


CLAWBOT BUILDING INSTRUCTIONS

9 Attaching the Left Encoder



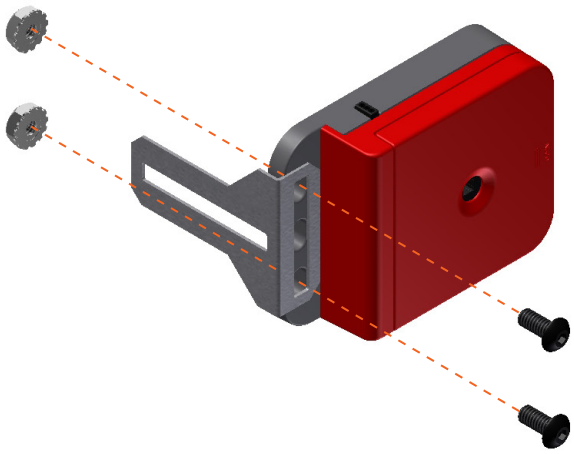
Take an angle gusset and an encoder



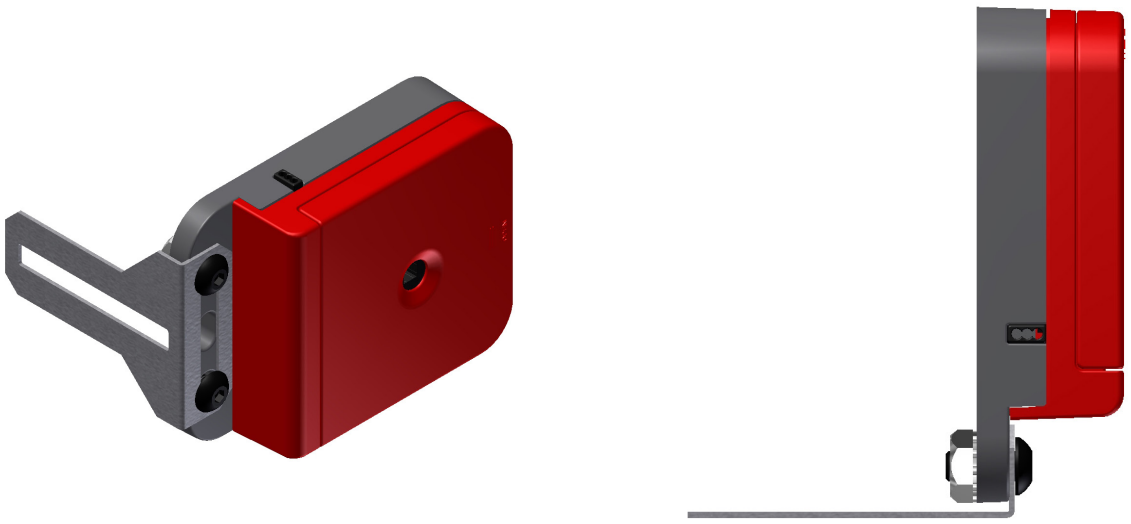
Option A:

This section covers how to assemble the external Quadrature Encoders. If you would like to use the Integrated Motor Encoders, skip pages 24-31

Connect them together



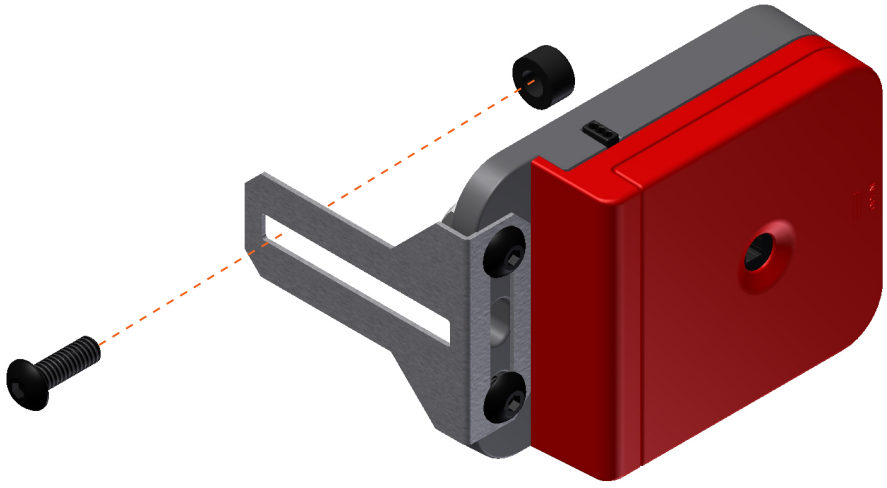
9 Attaching the Left Encoder *(continued)*



3/4″

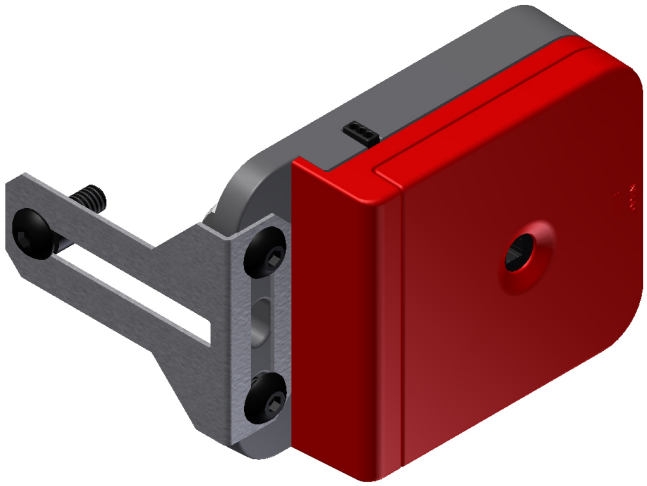
x1 x1

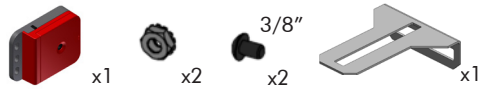
At the end of the gusset, place a screw and a thin spacer as shown below



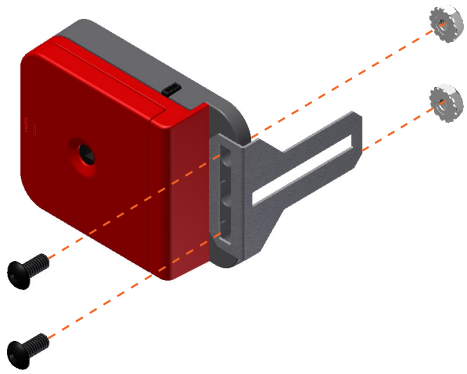
CLAWBOT BUILDING INSTRUCTIONS

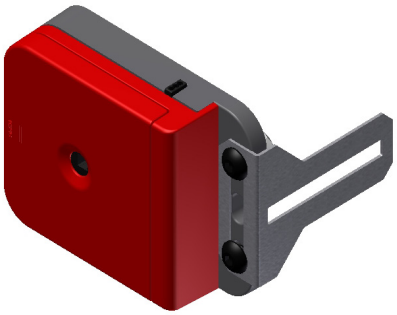
9 Attaching the Left Encoder *(continued)*



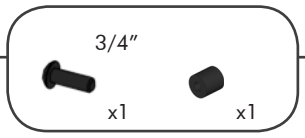


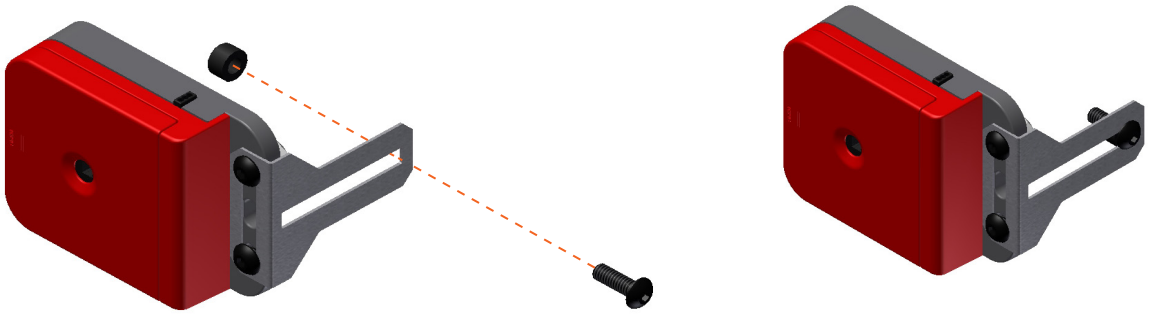
Now do the same for the right encoder



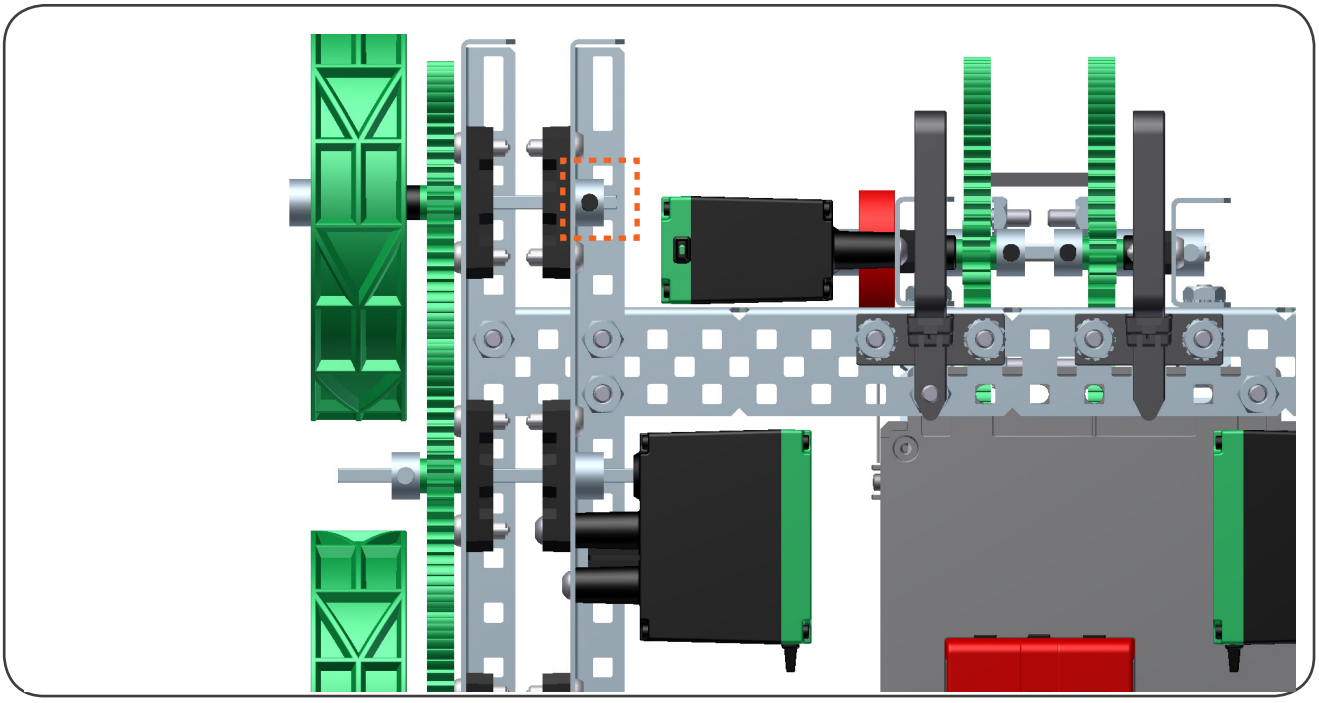


9 Attaching the Left Encoder *(continued)*

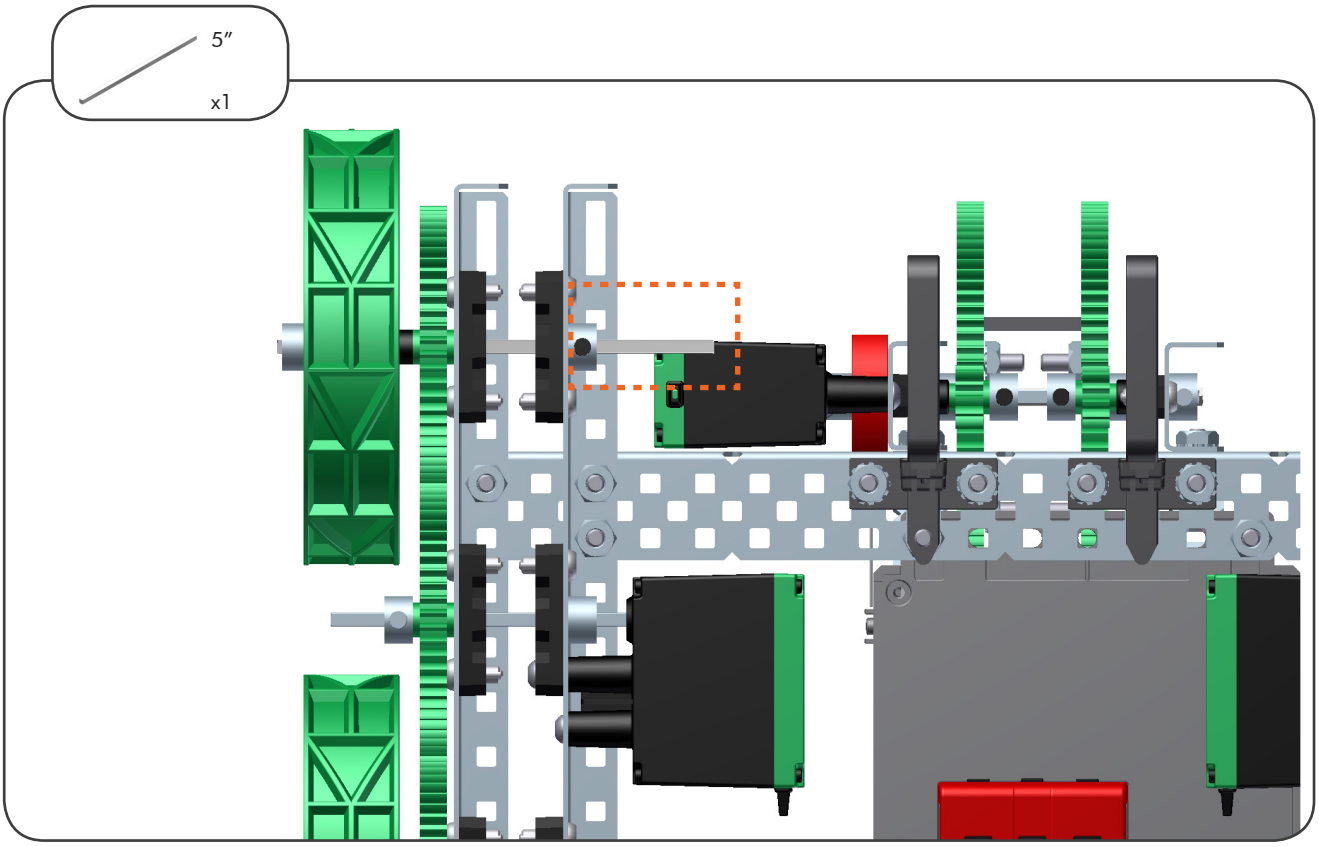


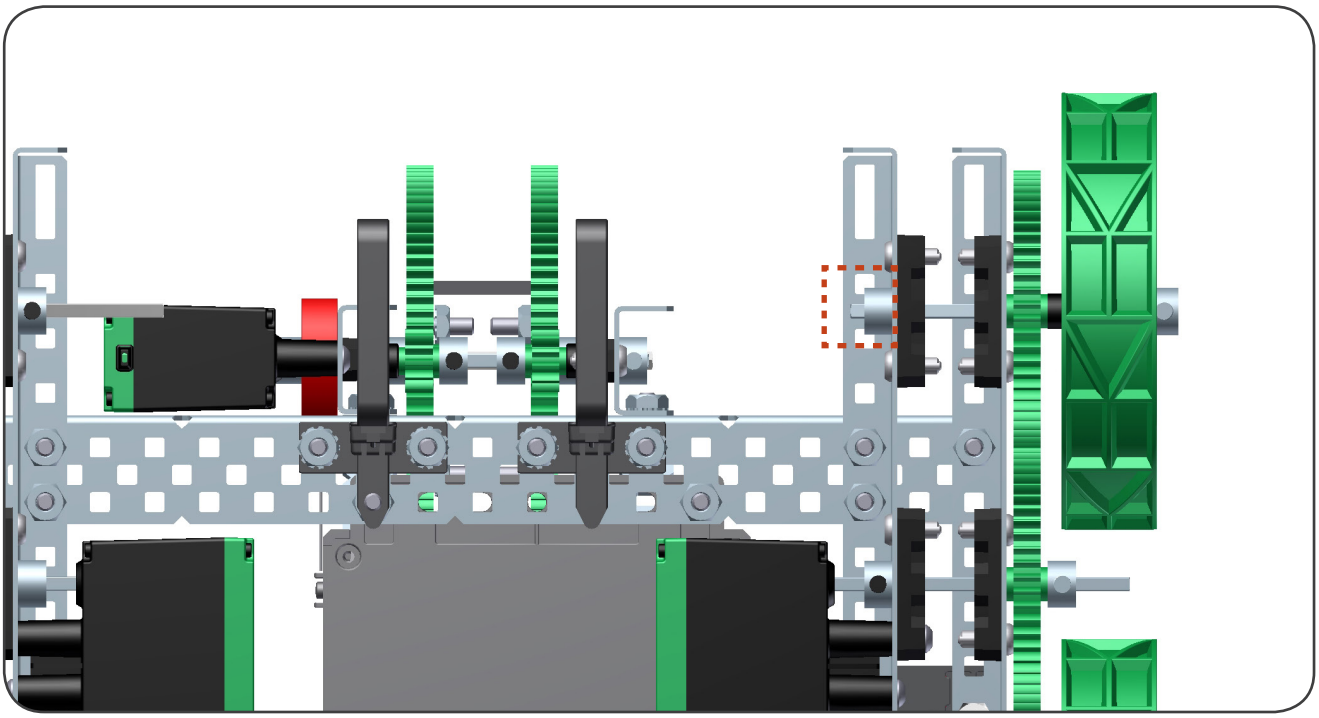


Just like the potentiometer, to build the encoders, we will need to lengthen the shaft

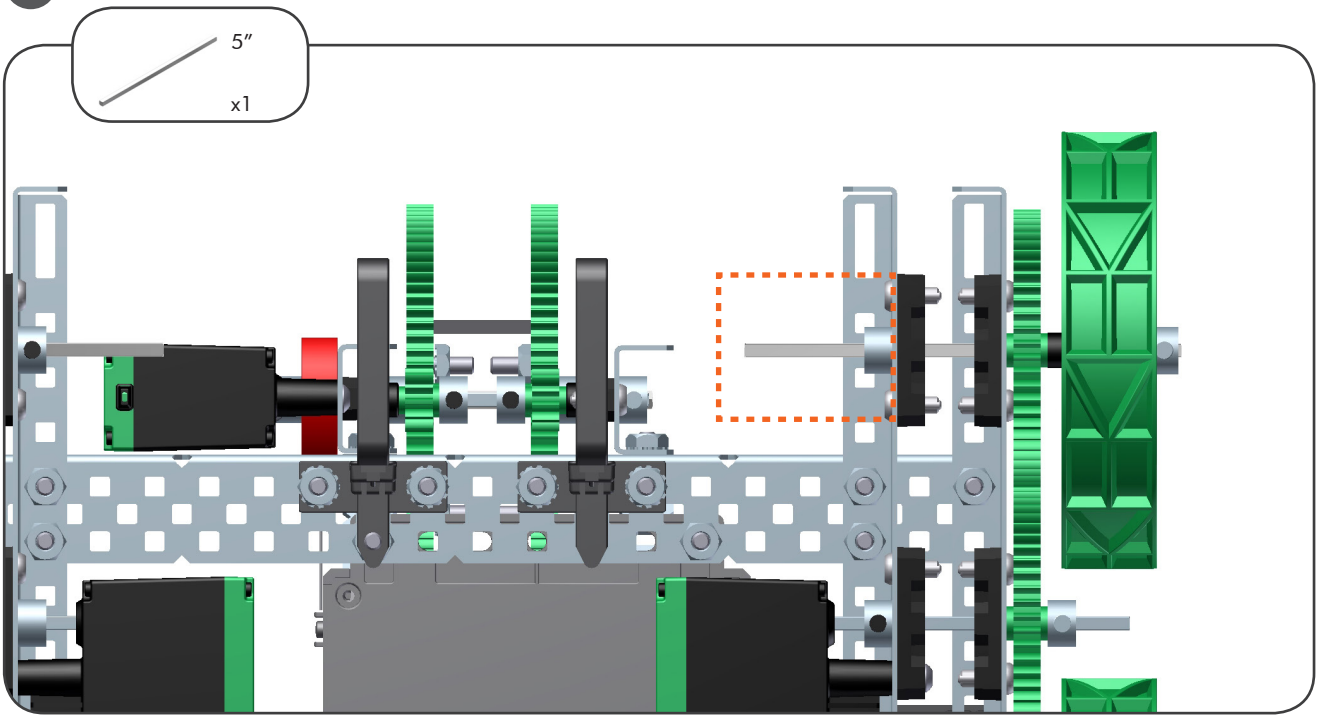


9 Attaching the Left Encoder *(continued)*

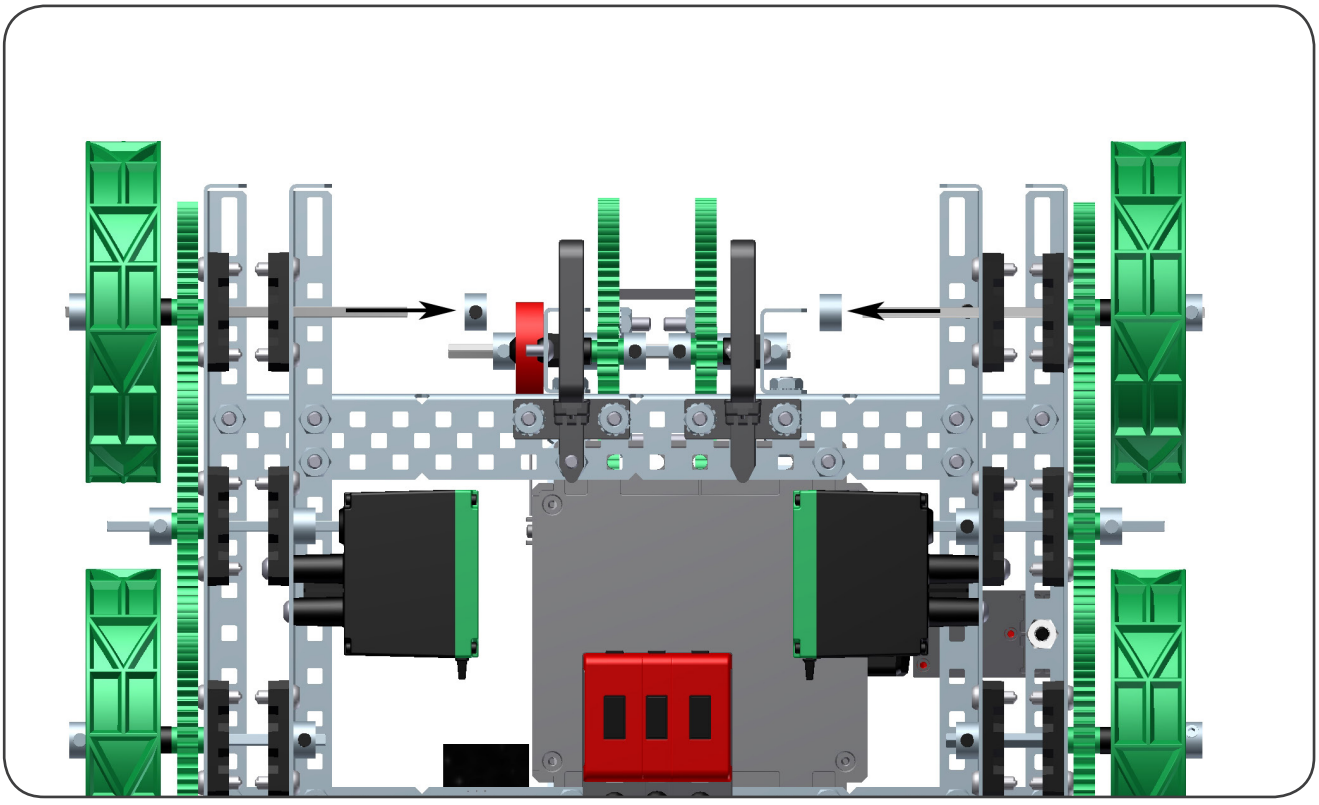




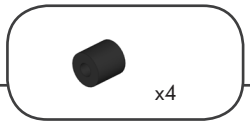
9 Attaching the Left Encoder *(continued)*

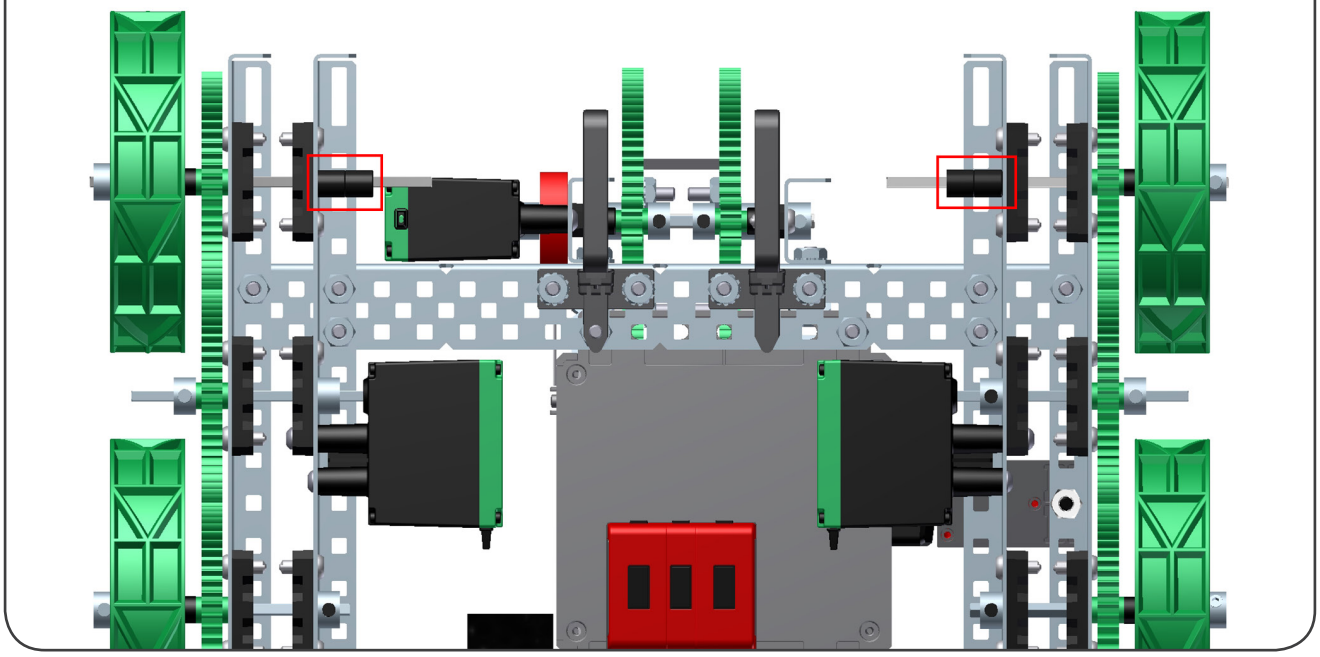


Remove these shaft collars and replace them with 2 thick spacers on each side

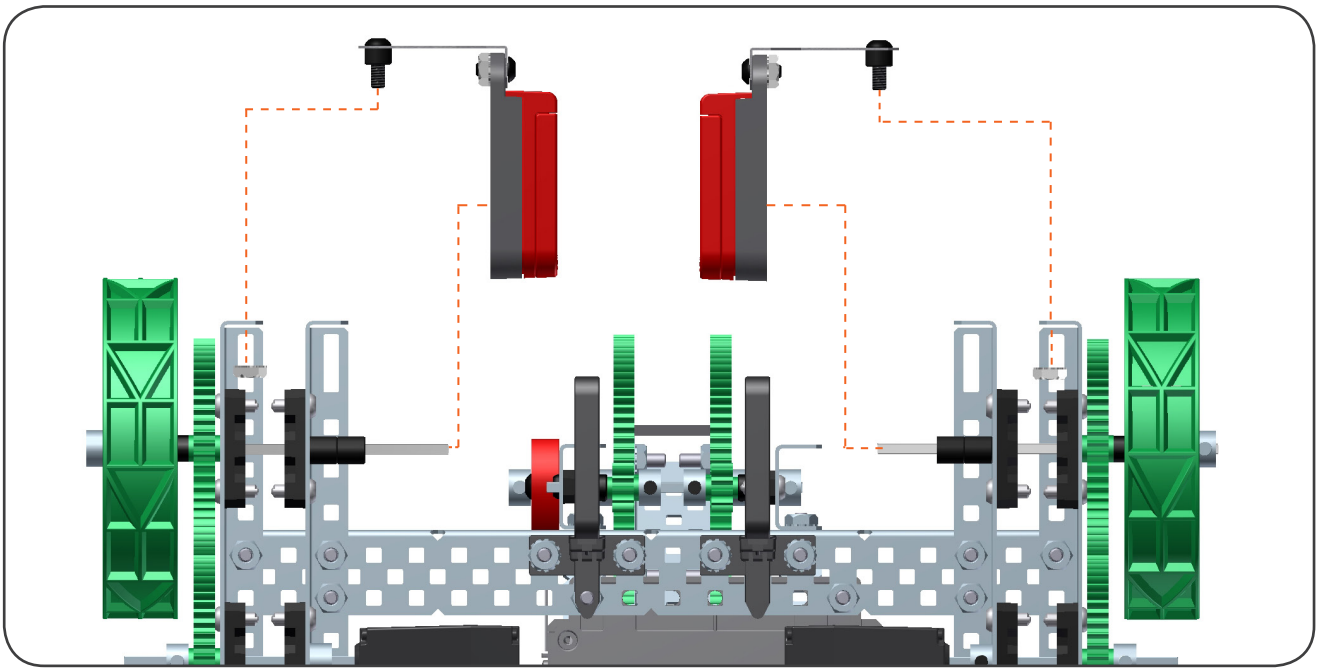


9 Attaching the Left Encoder *(continued)*



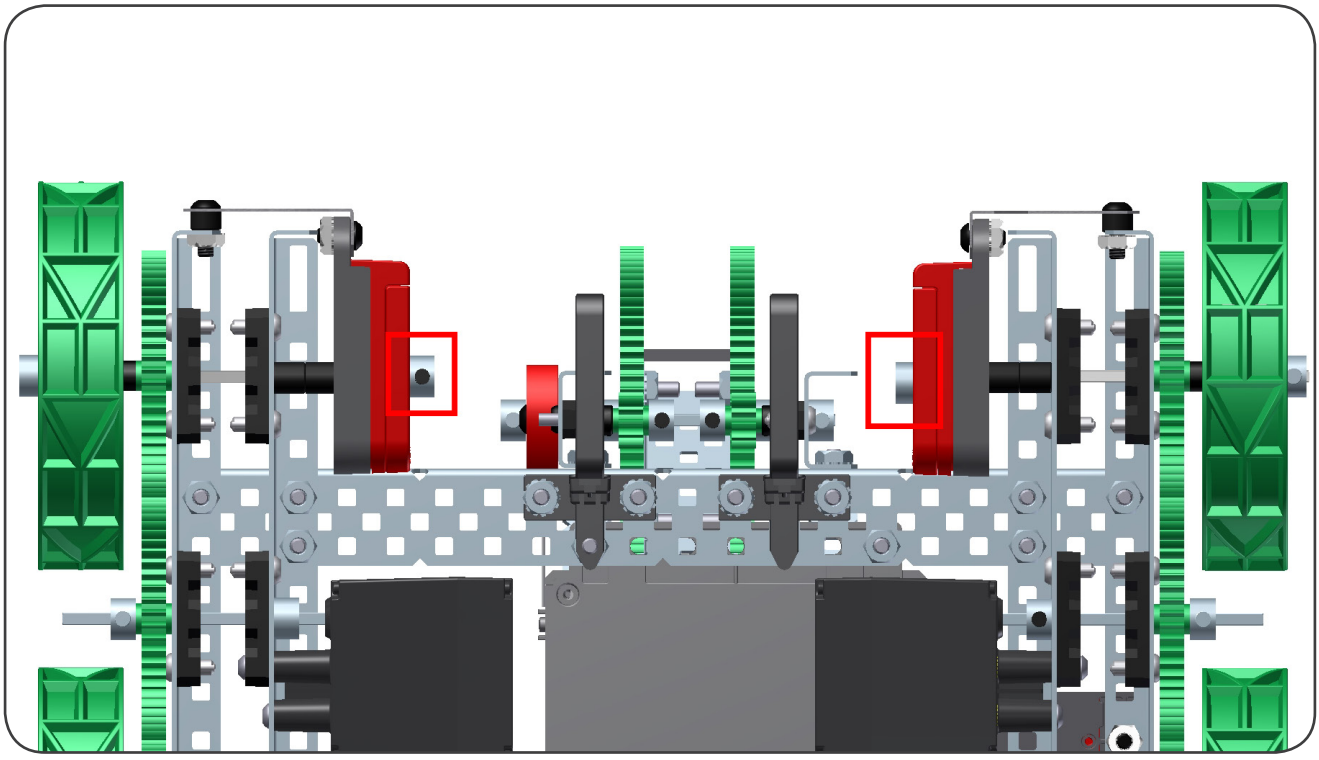


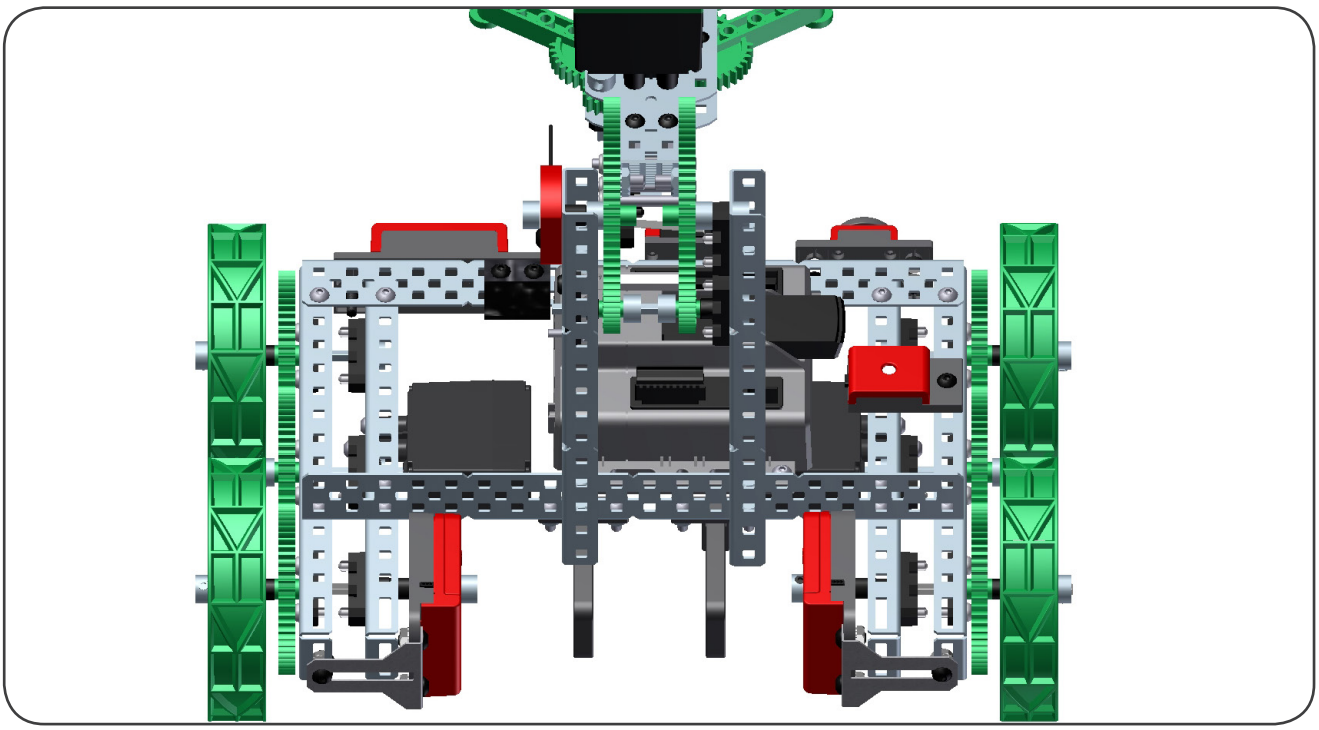
Slide the shaft through the encoder and then place the screws as shown below



9 Attaching the Left Encoder *(continued)*

Place the shaft collar back in place





CLAWBOT BUILDING INSTRUCTIONS

10 Attaching the Integrated Motor Encoders

This set of instructions to build the 393 Motors with the Integrated Motor Encoder was designed by VEX Robotics

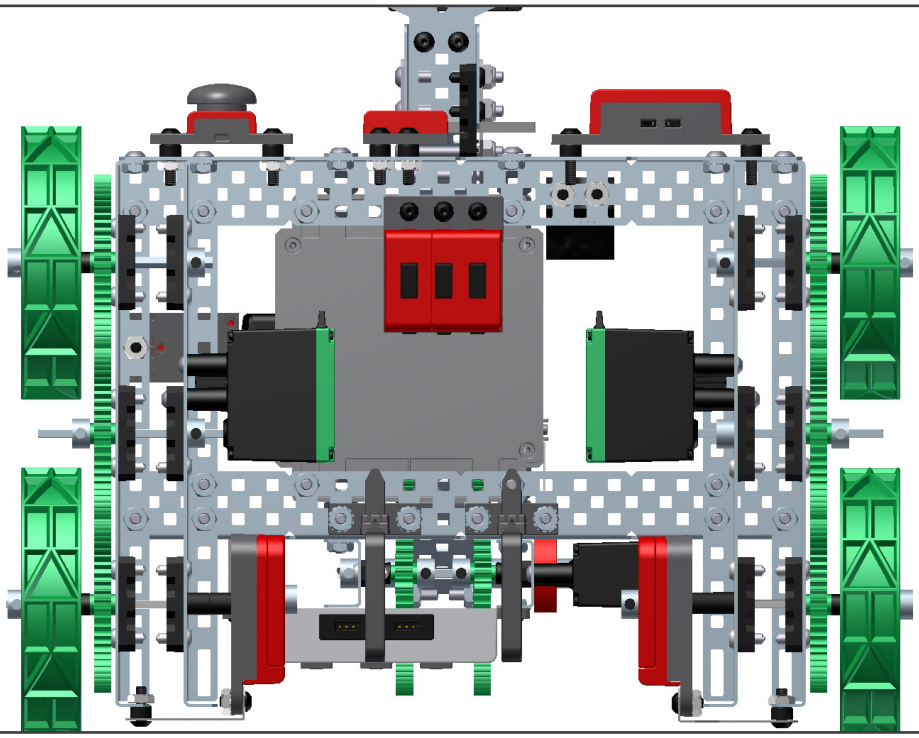
Option B:

This section covers using the Integrated Motor Encoders. If you built the external Quadrature Encoders, then skip pages 32-34.

Detailed instructions can be found at:

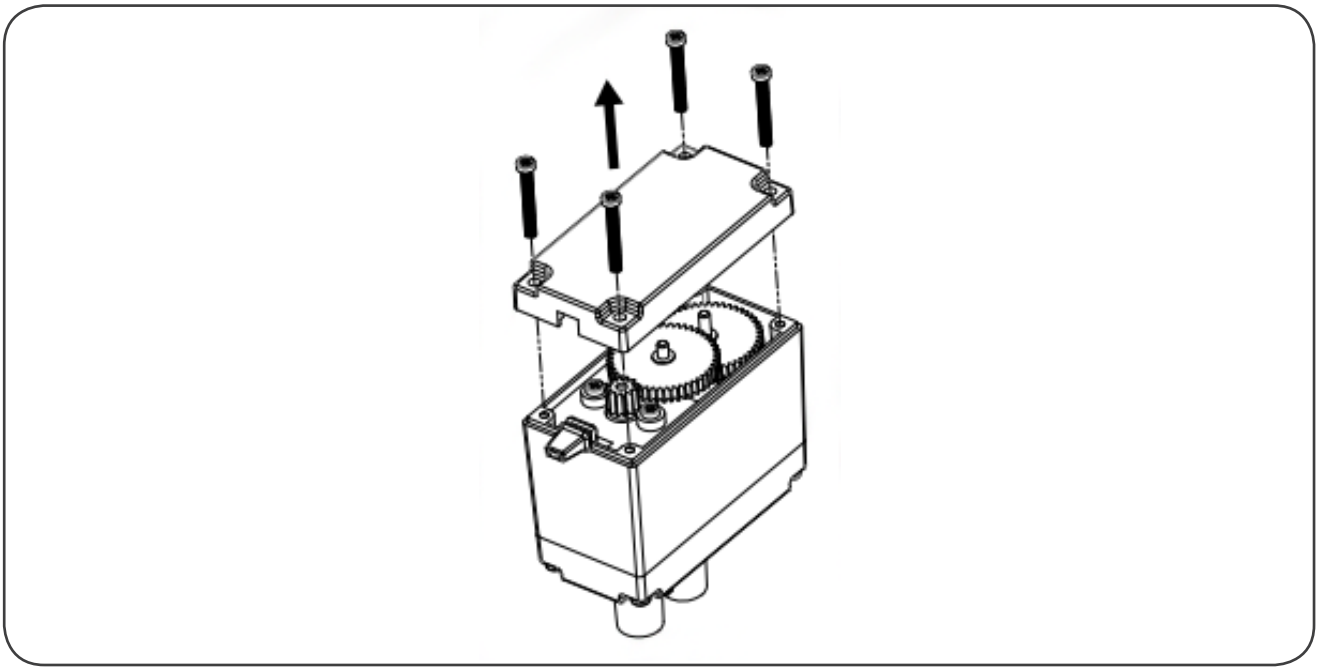
http://content.vexrobotics.com/docs/inventors-guide/276-1321-INST-0112.pdf

First, take out the two motors on the bottom of the robot's drive train

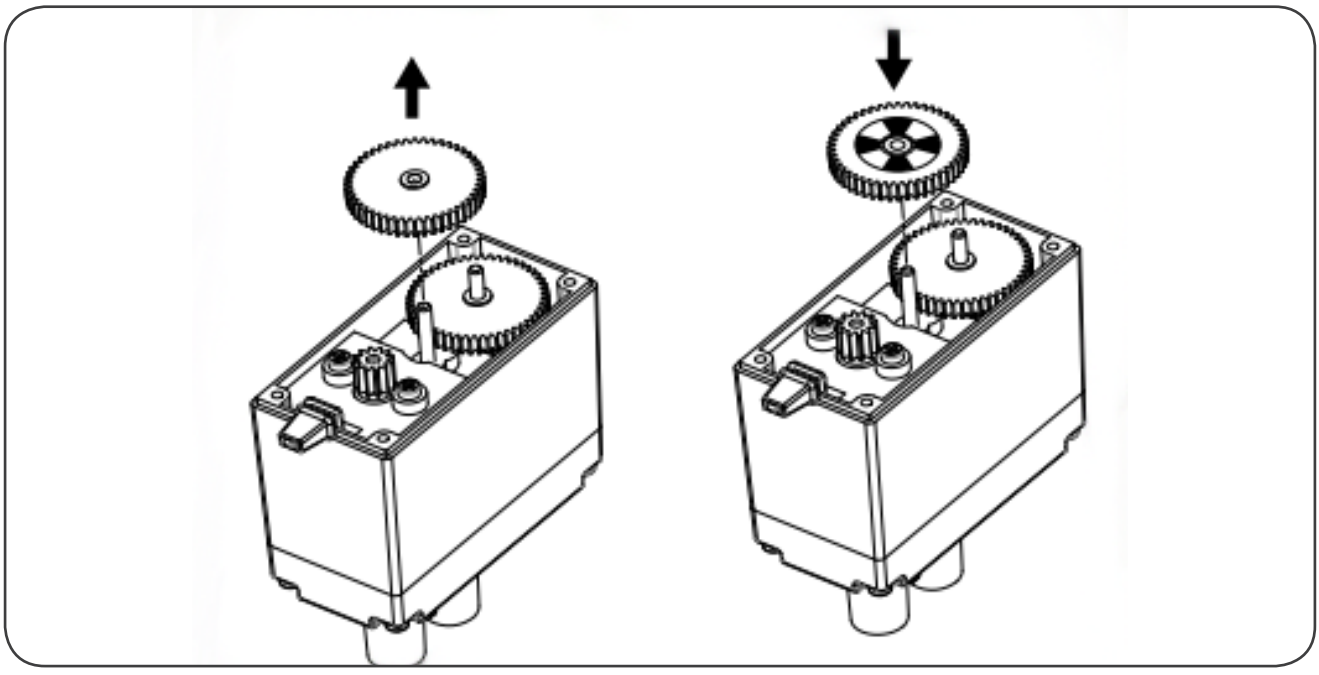


10 Attaching the Integrated Motor Encoders *(continued)*

Remove the back casing with a #1 Phillips Screwdriver

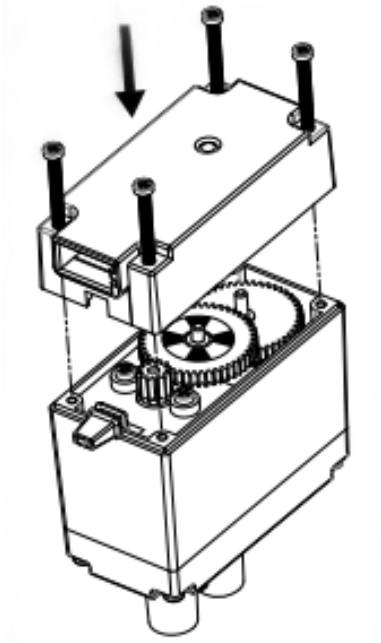


Remove the first cluster gear and replace it with the black/white encoder gear from the kit

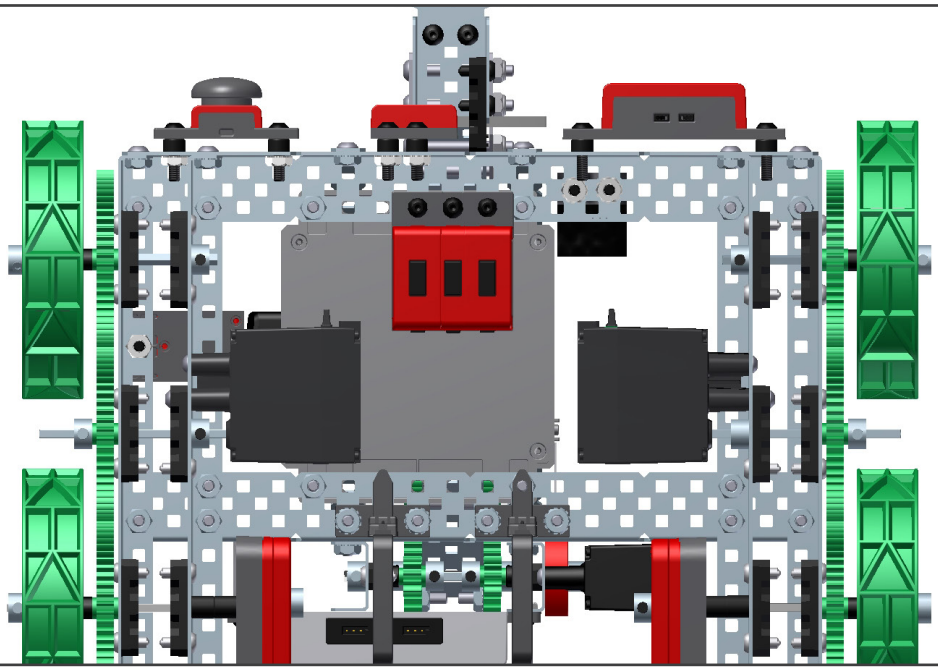


10 Attaching the Integrated Motor Encoders *(continued)*

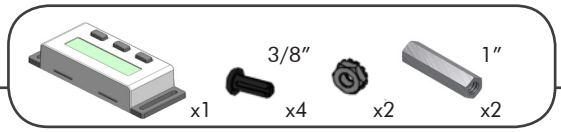
Place the new motor cap on to the 393 motor as shown

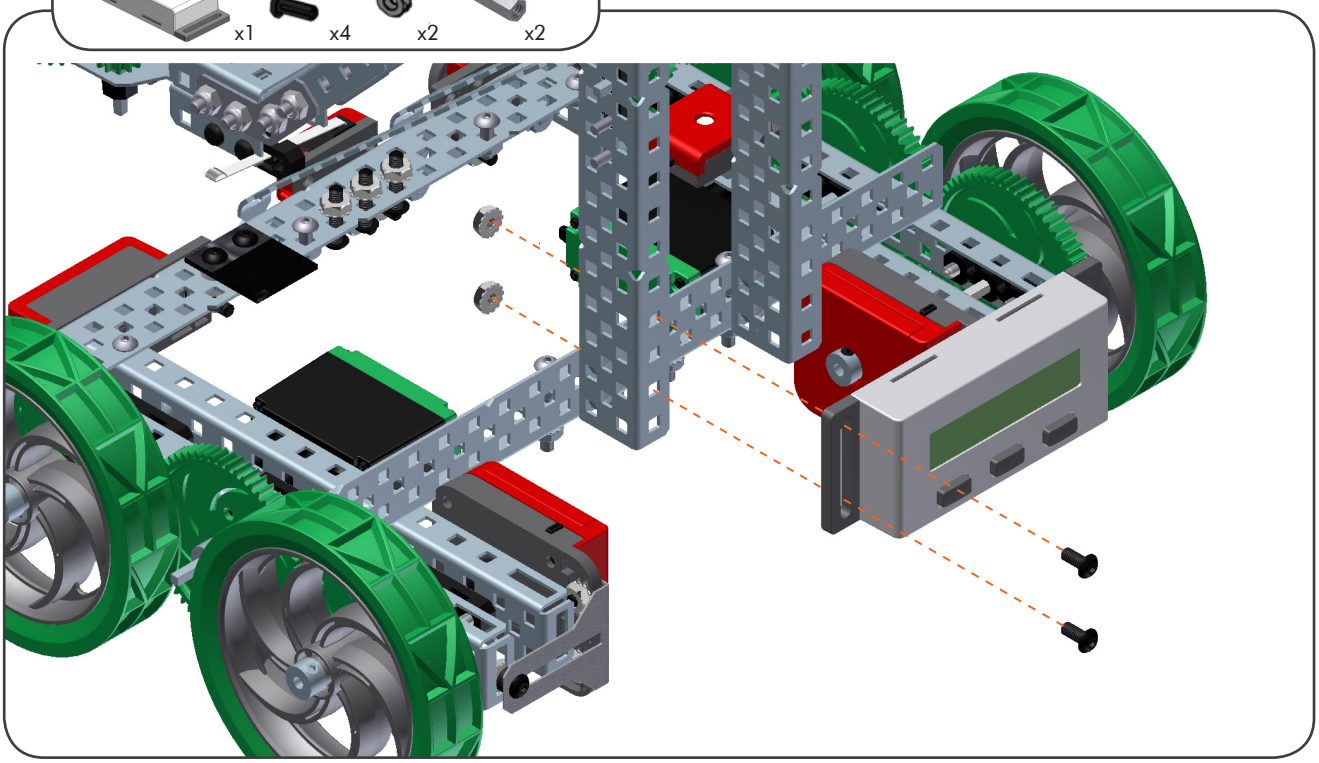


Reattach the motors to the drive train

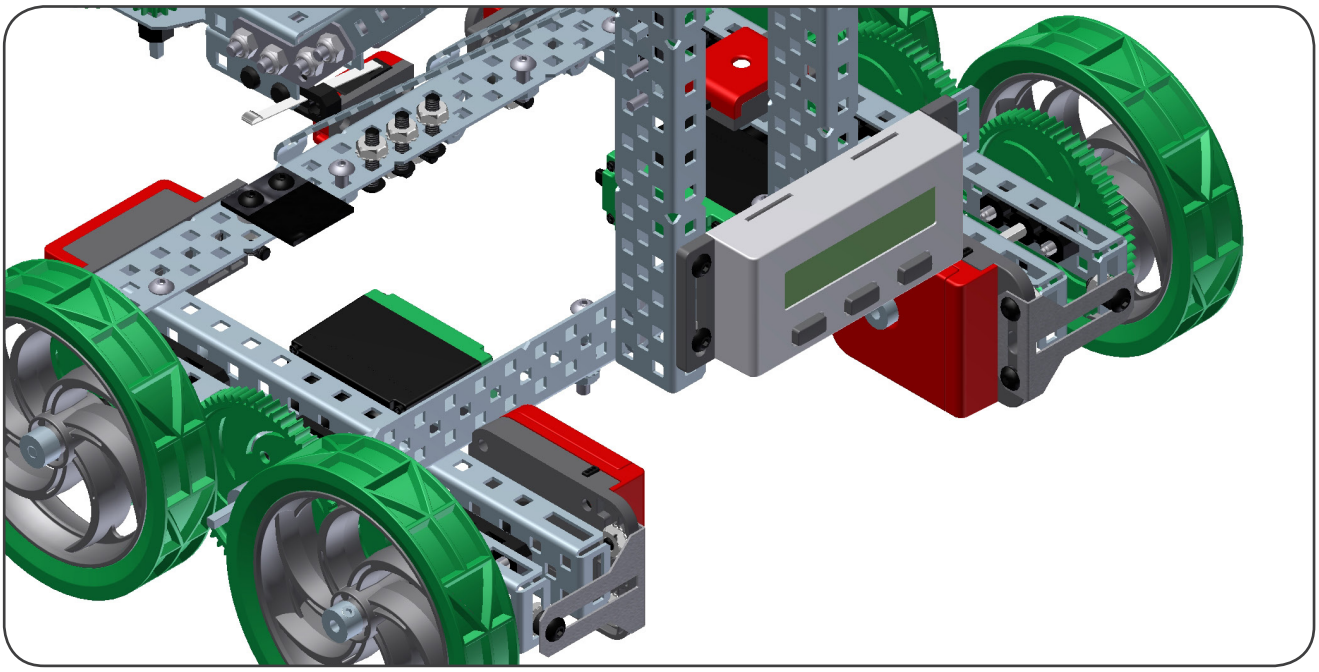


11 Attaching the LCD Display

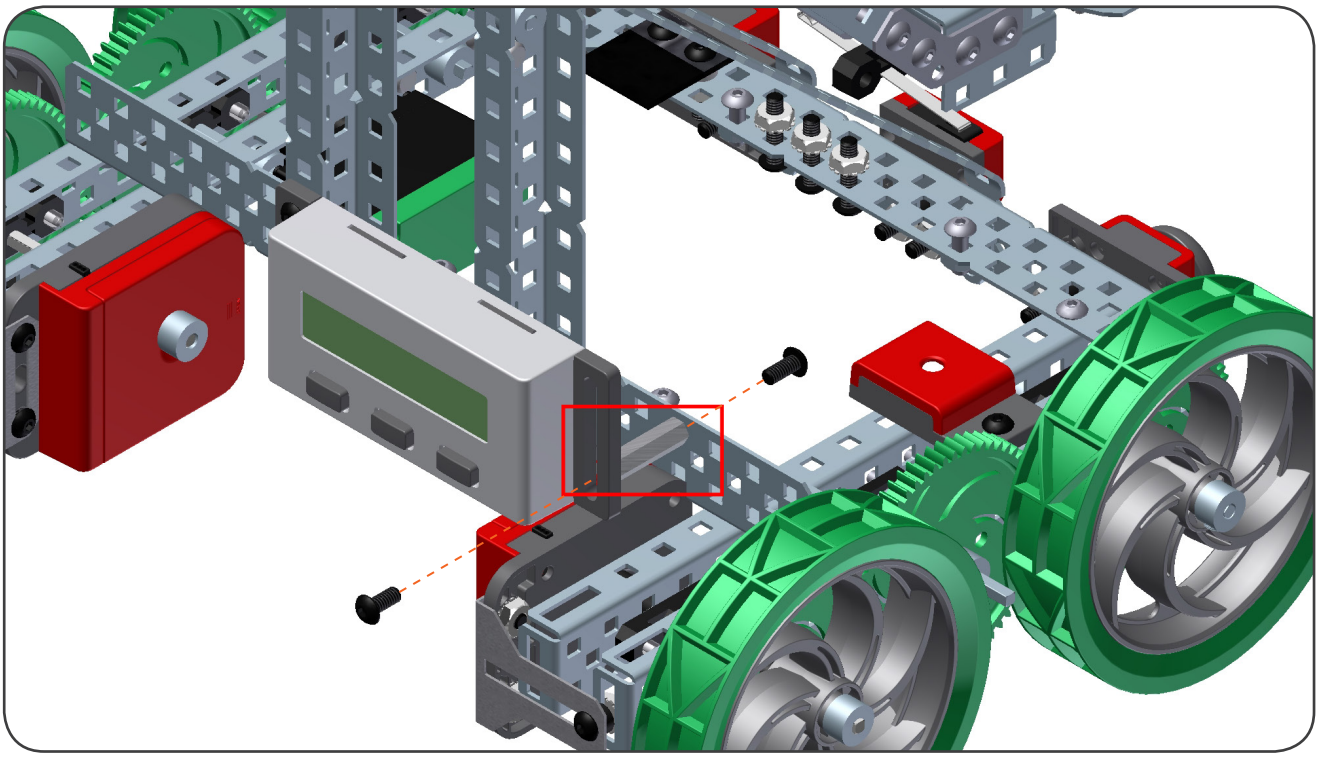




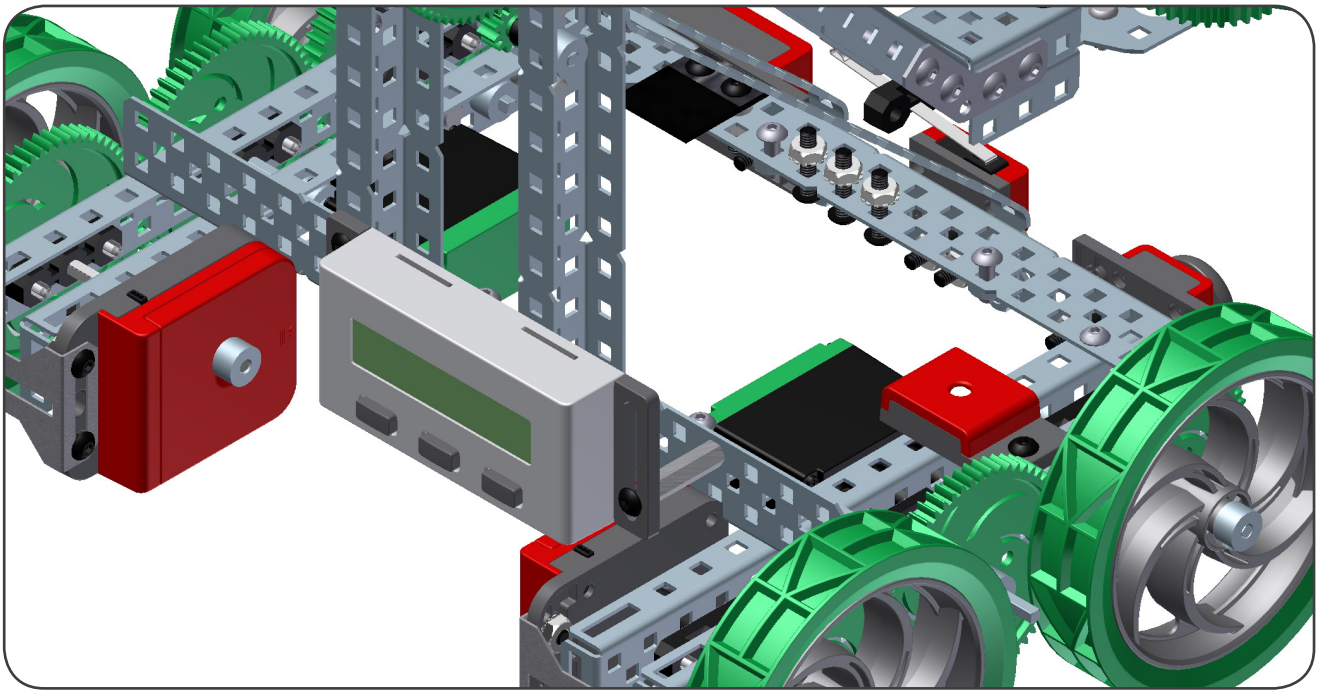
Connect the left side of the LCD to the left C-Channel



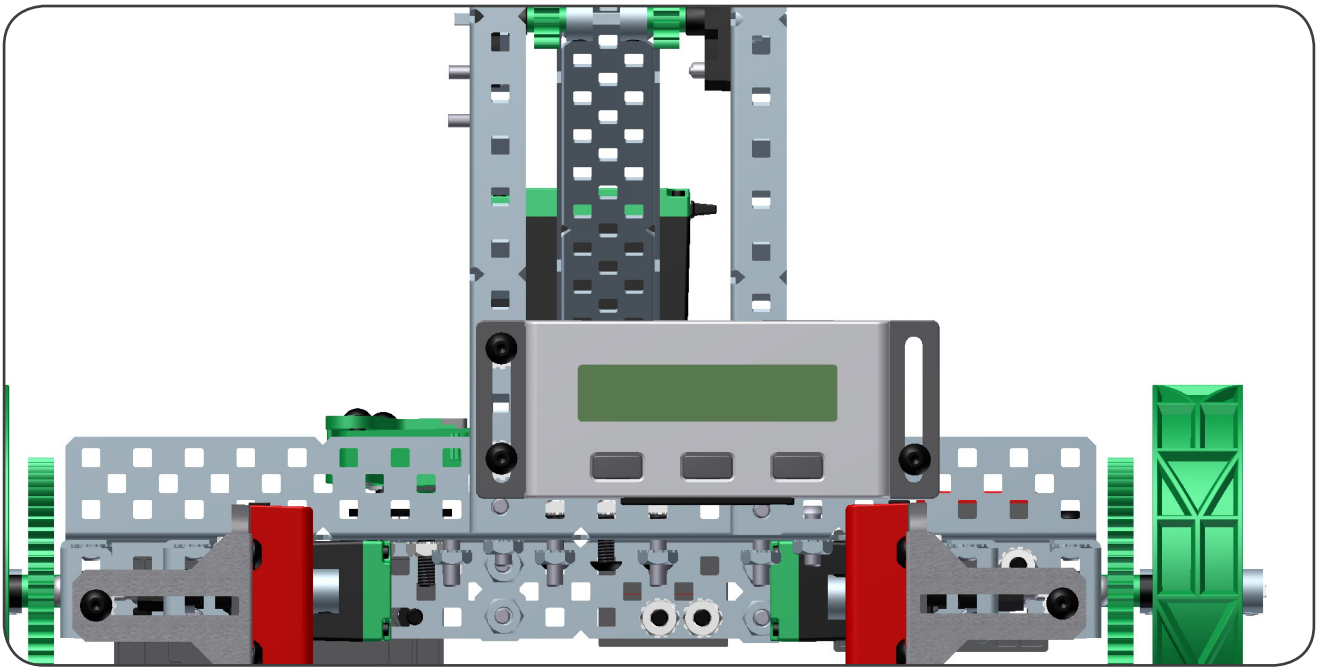
11 Attaching the LCD Display *(continued)*



Use a standoff to mount the display on the opposite side



CLAWBOT BUILDING INSTRUCTIONS



Your Clawbot with sensors is complete!