

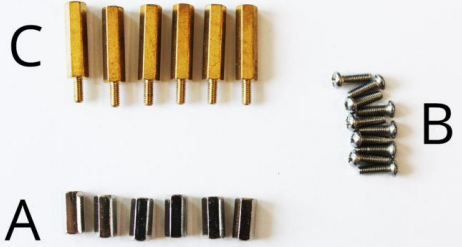
Projekthandbuch:
„GoPiGo-Bauanleitung“

Modul: Hands-on Innovation
SoSe 2019

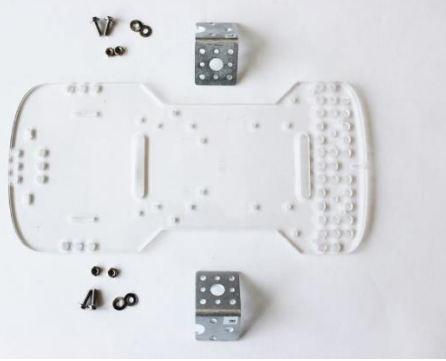
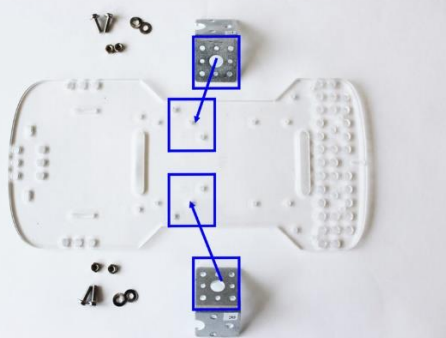
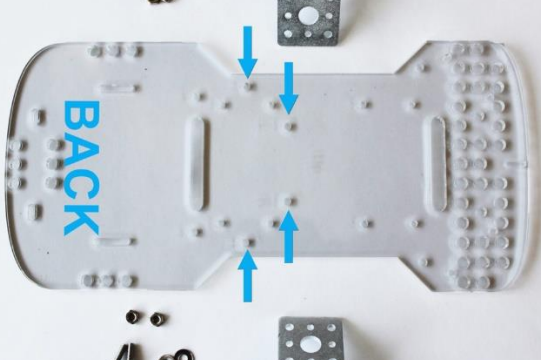
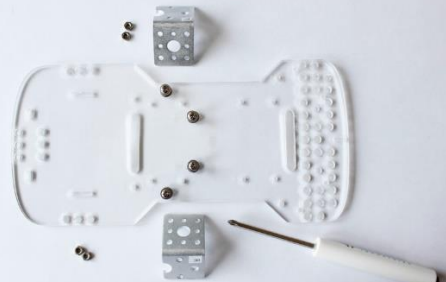
Vorgelegt bei: Prof. Oliver Mauroner
David Zakoth

GoPiGo-Bauanleitung

Relevanter Auszug aus der Bauanleitung für den GoPiGo von der Herstellerwebsite.¹

<p>1.</p>	<p>Unpack the Parts In the GoPiGo3 Base Kit box you should find the following:</p> <ul style="list-style-type: none"> • 2 Yellow Wheels • 2 Motors • 2 Motor Cables • GoPiGo3 Board (red) • 2 Metal Motor Brackets • 1 Metal Caster Wheel • 2 Large Acrylic Pieces (body and canopy) • 1 Battery Box • 1 Battery Cable • 1 Velcro Strap • 1 Small Screwdriver 	
<p>2.</p>	<p>Check for Small Hardware Bag You should have one small bag of hardware that contains:</p> <ul style="list-style-type: none"> • (A) 6 Short Silver Posts • (B) 10 Mini Screws • (C) 6 Gold Posts 	
<p>3.</p>	<p>Check for Large Hardware Bag You should have one large bag of hardware that contains:</p> <ul style="list-style-type: none"> • (D) 24 Short Screws • (E) 30 Washers • (F) 10 Nuts • (G) 6 Long Screws • (H) 6 Round Acrylic Spacers • (I) 3 Medium Silver Posts • (J) 6 Long Silver Posts 	
<p>4.</p>	<p>Find Acrylic Parts The clear acrylic pieces of the GoPiGo3 may come in a protective covering. If yours shipped with this coating, you should be able to peel them off easily. Peel the protective coating away from the 2 large acrylic</p>	

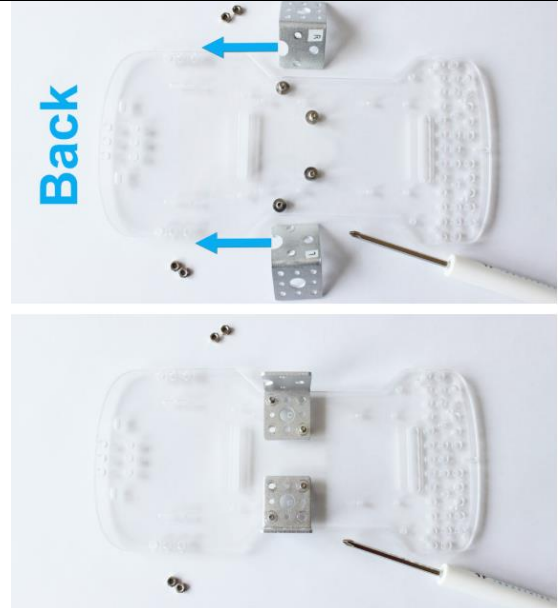
¹ <https://studio.dexterindustries.com/cwists/preview/1222-build-your-gopigo3x>

	<p>pieces. You may also want to peel the protective coating from the 2 small round acrylic spacers; they are in the large bag of hardware.</p>	
<p>5.</p>	<p>Attach the Motor Bracket What you'll need:</p> <ul style="list-style-type: none"> • The GoPiGo3 body – The largest piece of acrylic in your kit. • 2 Metal Motor Brackets – These come labeled with a “L” and “R”, meaning Left and Right. • Hardware from the large bag – (D) 4 short screws, (E) 4 washers, and (F) 4 nuts. 	
<p>6.</p>	<p>Set up for Bracket Assembly You'll assemble the brackets on the bottom, because they will hold motors which attach to the wheels, all on the underside of the GoPiGo3 robot.</p>	
<p>7.</p>	<p>Find 4 holes on Acrylic Find the 4 holes labeled “1” on the acrylic body as shown in the picture below. These are the holes you will use to assemble the metal motor brackets.</p>	
<p>8.</p>	<p>Place Washers on all 4 Screws Place washers on all four screws.</p>	
<p>9.</p>	<p>Insert short screws to Acrylic Insert two short screws (on each side) into the “1” holes through the acrylic body. The holes are tight, so you may need to screw the screws through the acrylic.</p>	

10.

Find Motor Brackets L & R

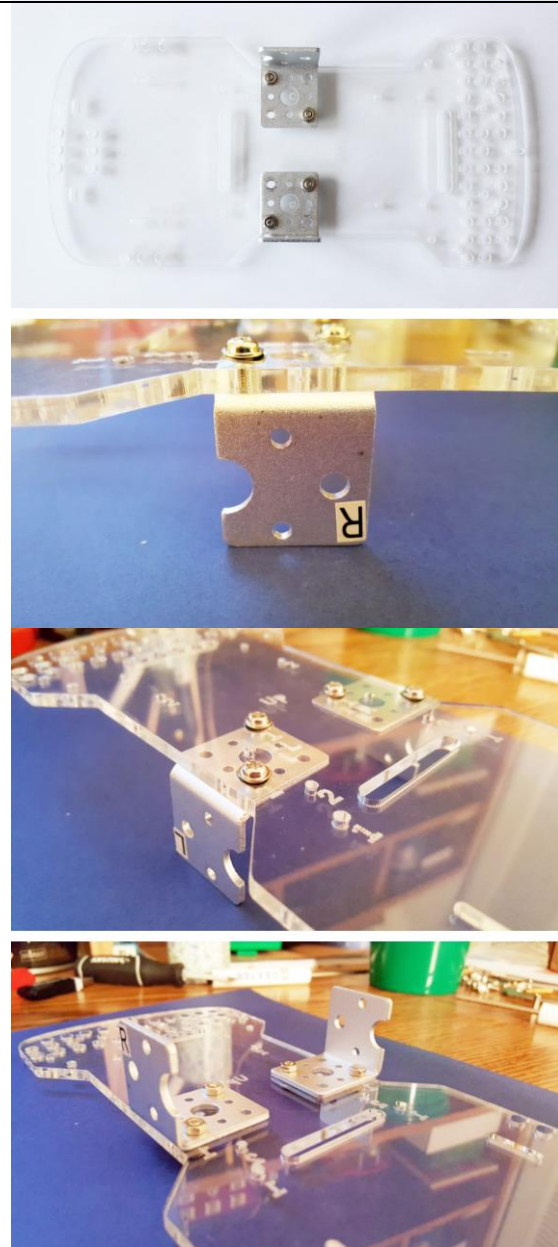
Match the metal brackets labeled “L” and “R” up with the “1” holes on the corresponding “R” and “L” etchings on the acrylic body. Slide the metal brackets onto the screws. The half-moon of the brackets should be pointing towards the back of the GoPiGo3 body. Place your fingers on the screws to hold them in place, and turn the body upside down. The metal bracket should be sticking up at you, as shown in the picture.

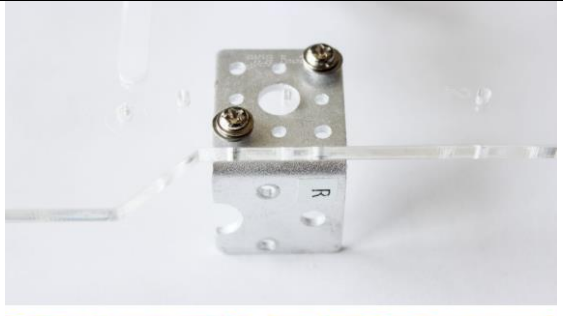
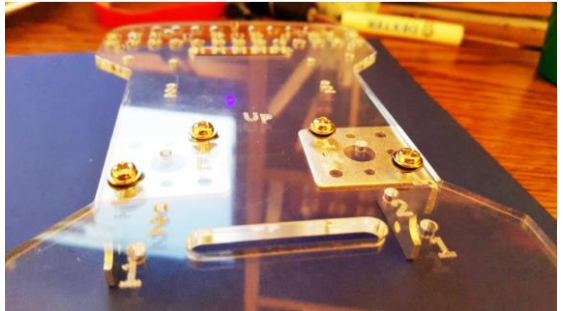
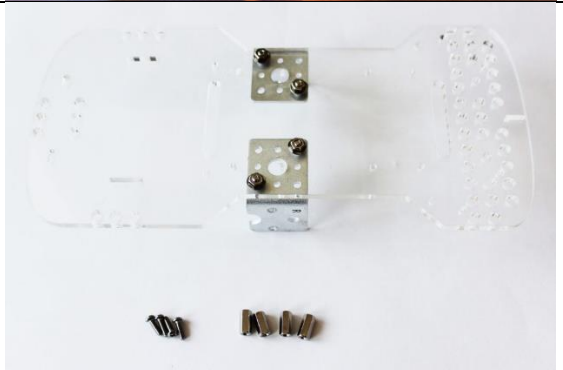
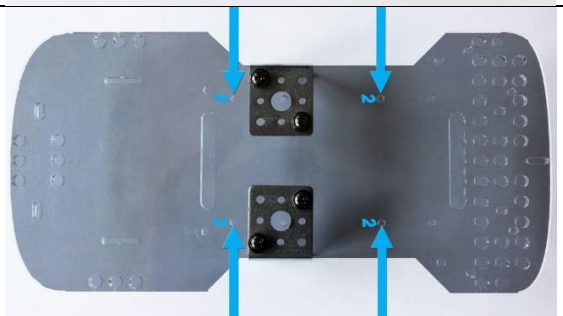



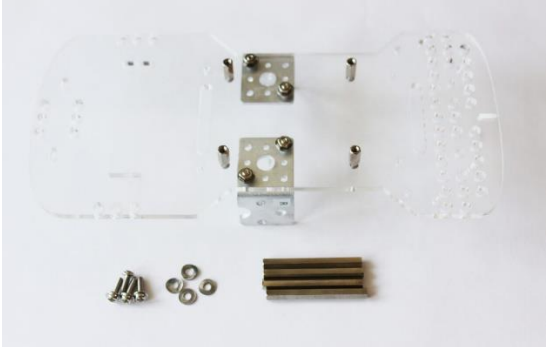
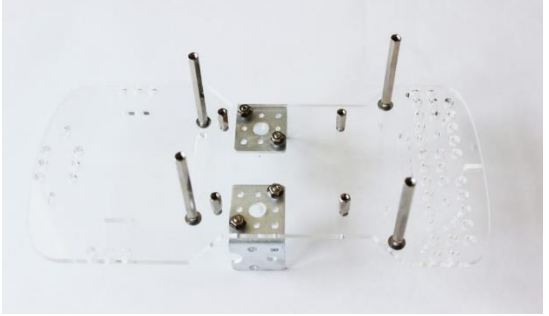
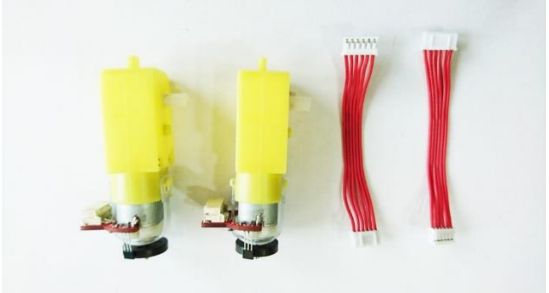
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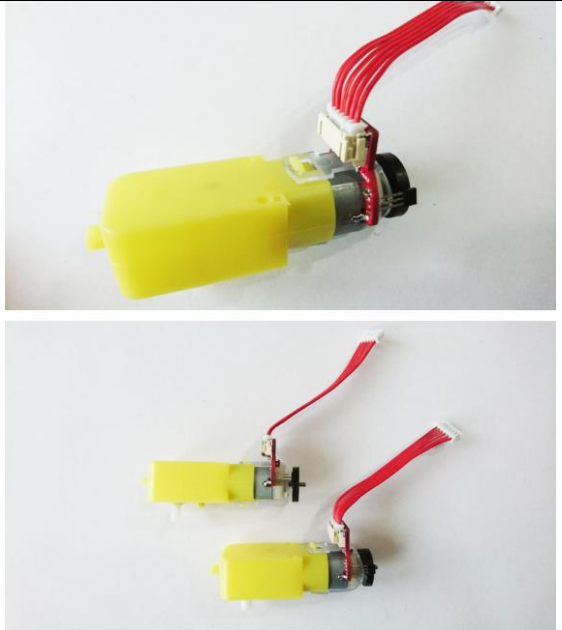
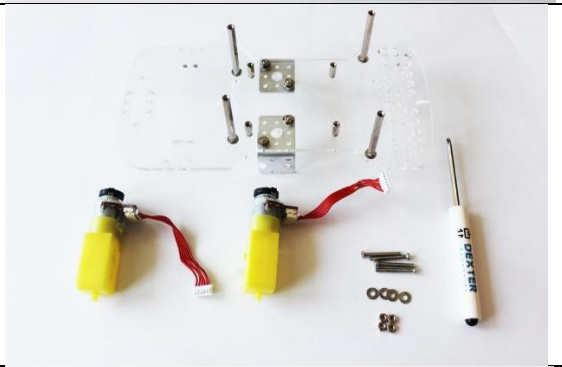
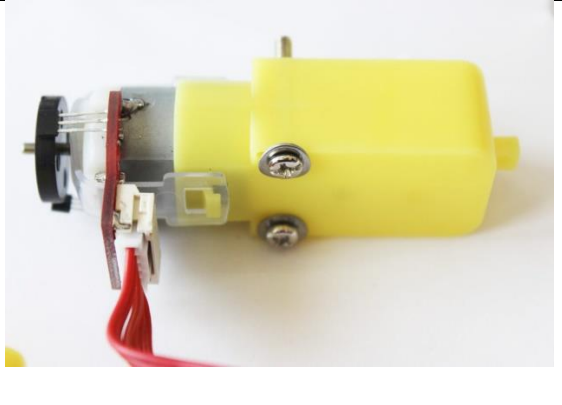
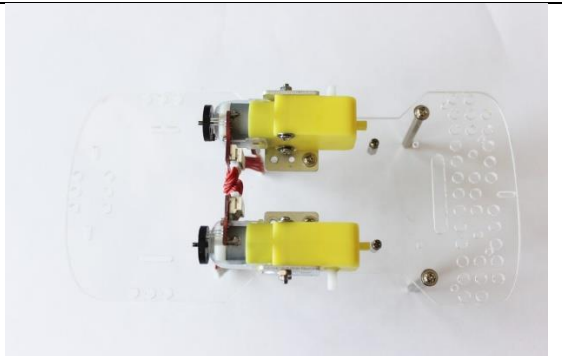
Put Nuts on Screws

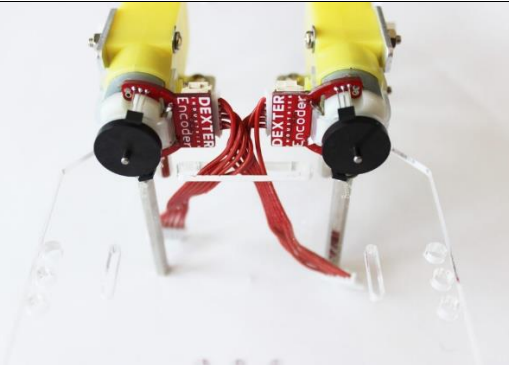
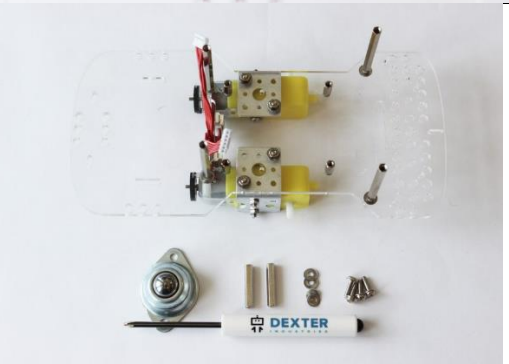

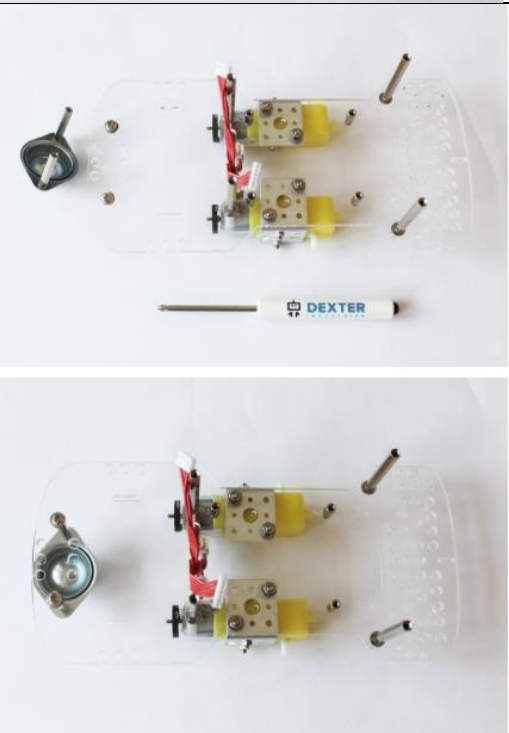
Place the nuts on the screws.

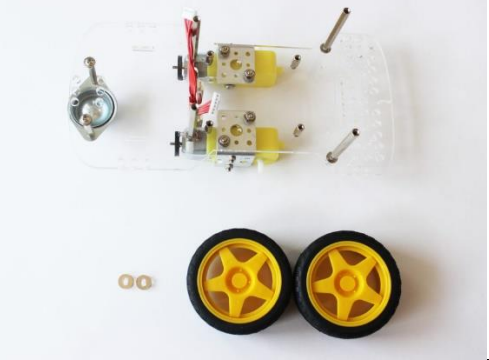
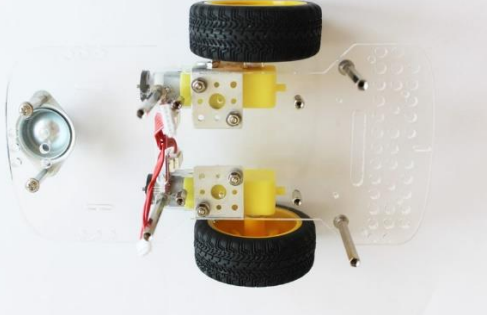


<p>12.</p>	<p>Tighten Screws Tighten the screws until the washers flatten.</p>	 
<p>13.</p>	<p>Attach Short Silver Posts Hardware from the small bag:</p> <ul style="list-style-type: none"> • (B) 4 mini screws • (A) 4 short silver posts 	
<p>14.</p>	<p>Find #2 holes on acrylic Find the 4 holes that make a square in the middle of the acrylic. Two of these holes are labeled "2" on the acrylic body.</p>	
<p>15.</p>	<p>Attach Short Silver Posts Place screws up through the acrylic body and attach four short silver posts (so they are sticking up towards you). Hand tighten the posts.</p>	

16.	<p>Attach the 4 Long Posts (Canopy supports)</p> <p>What you'll need:</p> <ul style="list-style-type: none"> • Hardware from the large bag: <ul style="list-style-type: none"> ○ (D) 4 short screws ○ (E) 4 washers ○ (J) 4 long silver posts 	
17.	<p>Attach Posts</p> <ol style="list-style-type: none"> 1. Slide the washers onto the screws. 2. Find the four holes for the canopy support posts. Two of them will be labeled "1" on the GoPiGo3 acrylic body. 3. The board should be facing UP. Insert the screws (with washers on them) up through the bottom of the board and screw them into the metal posts. 4. Screw the posts onto the body and tighten until the washers flatten. 	
18.	<p>Prepare Motors for Assembly</p> <p>What you'll need:</p> <ul style="list-style-type: none"> • 2 yellow motors • 2 red cables 	

<p>19.</p>	<p>Attach Cable to Motors Prepare the 2 motors for the next step by attaching the two red motor cables to the motors. Insert the motor cable into the white female port on the motor. Bend the cable as shown in the picture below to make it easier when assembling in the next few steps. The cables will only go into the motor ports one way (they can not be put in backwards).</p>	
<p>20.</p>	<p>Attach Motors What you'll need:</p> <ul style="list-style-type: none"> • Hardware from the large bag: (G) 4 long screws, (E) 4 washers, (F) 4 nuts. • Two motors and encoders from the previous part. 	
<p>21.</p>	<p>Assemble the Motors</p> <ol style="list-style-type: none"> 1. Turn the GoPiGo3 over so the metal motor brackets are pointing up. 2. Put the washers on the screws. 3. Slide the long screws into the motors from the side where the wire is connected as shown in the picture. 	
<p>22.</p>	<p>Attach the washers and then nuts to the screws, tighten until the washers flatten.</p>	

23.	<p>Insert Motor Wires through Slot in Acrylic</p> <p>Slide the motor cable through the GoPiGo3 board in the rectangular slot (from the bottom up so they are coming out the top when you flip it over).</p>	
24.	<p>Attach the Caster Wheel</p> <p>What you'll need:</p> <ul style="list-style-type: none"> • Hardware from the large bag: (D) 4 short screws, (E) 4 washers, (I) 2 medium metal posts. • Caster Wheel 	
25.	<p>Put Washers on Screws</p> <p>Place a washer on each screw, and screw the two medium silver posts into the caster wheel. Tighten until the washers are flat.</p>	
26.	<p>There are two short oval holes in the back of the GoPiGo3 acrylic body. Screw the caster wheel into the GoPiGo3 acrylic body. Tighten the screws until the washers are flat.</p>	

27.	Attach Wheels to the Motors What you'll need: <ul style="list-style-type: none">• Hardware from the large bag: (H) 2 small round acrylic spacers• 2 wheels	 A photograph showing the components for step 27. At the top is a white plastic motor housing with two yellow gears and two white plastic axles. Below it are two small round acrylic spacers and two yellow wheels with black tires.
28.	Assemble Acrylic Spacers and Wheels <ol style="list-style-type: none">1. Slide the two acrylic spacers onto the white plastic axles on the motors.2. Slide the two yellow wheels onto the axles of the motors.	 A photograph showing the assembly for step 28. The white plastic motor housing is shown with the two acrylic spacers and the two yellow wheels attached to the axles.

29.

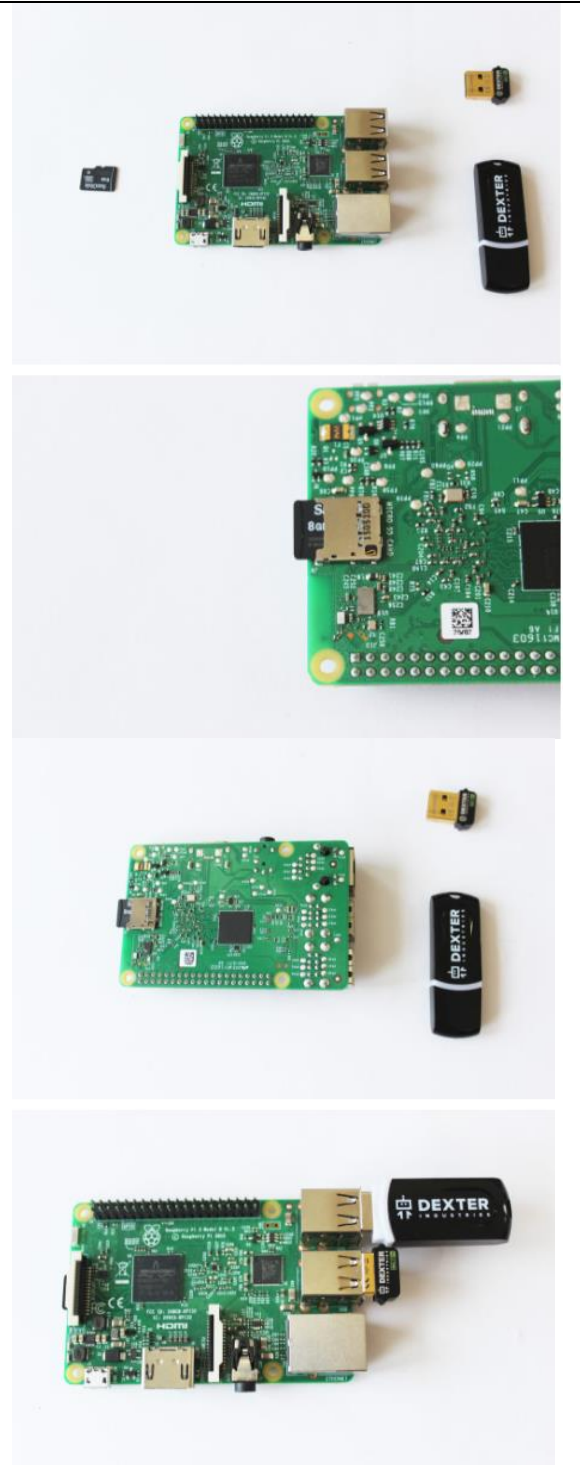
Prepare your Raspberry Pi (green board)

What you'll need:

- Raspberry Pi (the green board)
- Dexter Industries wifi dongle (not needed if you have a Raspberry Pi 3)
- microSD Card with DexterOS (or other Raspberry Pi operating system)
- Dexter Industries USB Drive (if using DexterOS)

Prepare your Pi:

1. Turn the Raspberry Pi upside down, so the metal pins coming out of the Raspberry Pi are pointing down.
2. First, slide the SD Card into the slot on the bottom of the Raspberry Pi. Make sure it is in all the way. The SD Card will only fit in one orientation: see the picture below for the proper orientation in the Raspberry Pi.
3. Turn the Raspberry Pi facing up.
4. Insert the Wifi Dongle into any USB port at the end of the Raspberry Pi (**not needed if you have a Raspberry Pi 3**).
5. Insert the USB Drive into any other USB port on the Raspberry Pi.



30.

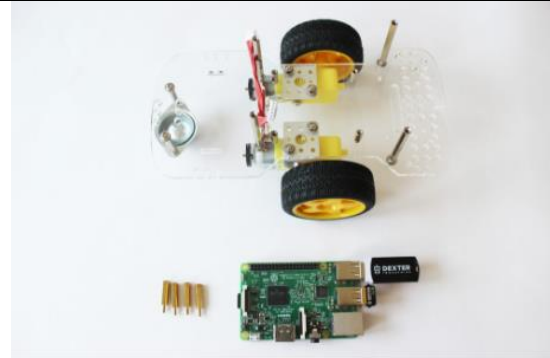
Attach Raspberry Pi

What you'll need:

- A Raspberry Pi
- (C) 4 gold posts (found in the small hardware bag)

To attach the Raspberry Pi to your robot:

1. Line the Raspberry Pi up over the short silver posts sticking up out of the acrylic body. The pins on the Raspberry Pi should be pointing upwards (as shown in the picture), and the end with the SD card you inserted in the previous step should face towards the red motor cables.
2. Screw the gold posts through the Raspberry Pi and into the short silver posts.



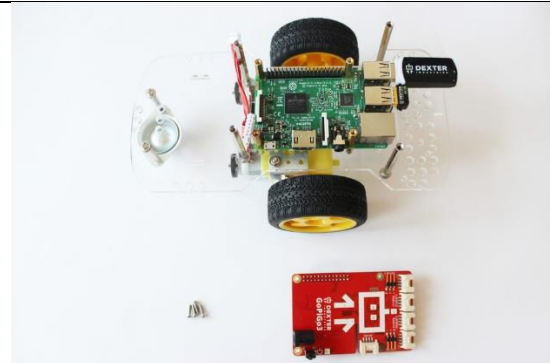
31.

Attach GoPiGo3 board (red board) to robot

What you'll need:

- **GoPiGo3 Circuit Board**
– The red board.
- **(B) 4 mini screws** – These are found in the *small* hardware bag.

Prepare the GoPiGo3 Board: Take the Protective Foam Off the Pins
Be sure to take the foam off of the pins on the GoPiGo3. The GoPiGo3 is shipped with foam on the GPIO pins to prevent them from being bent. *Be sure to remove the foam before proceeding to use your GoPiGo3!*



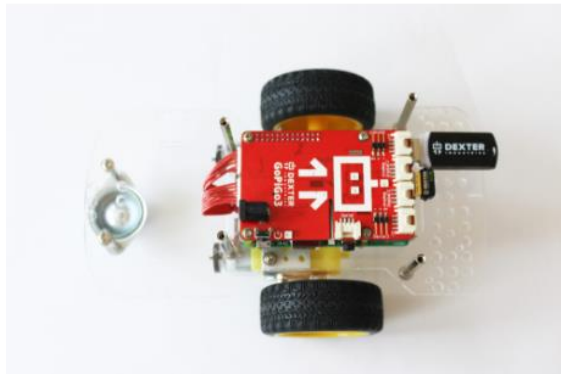
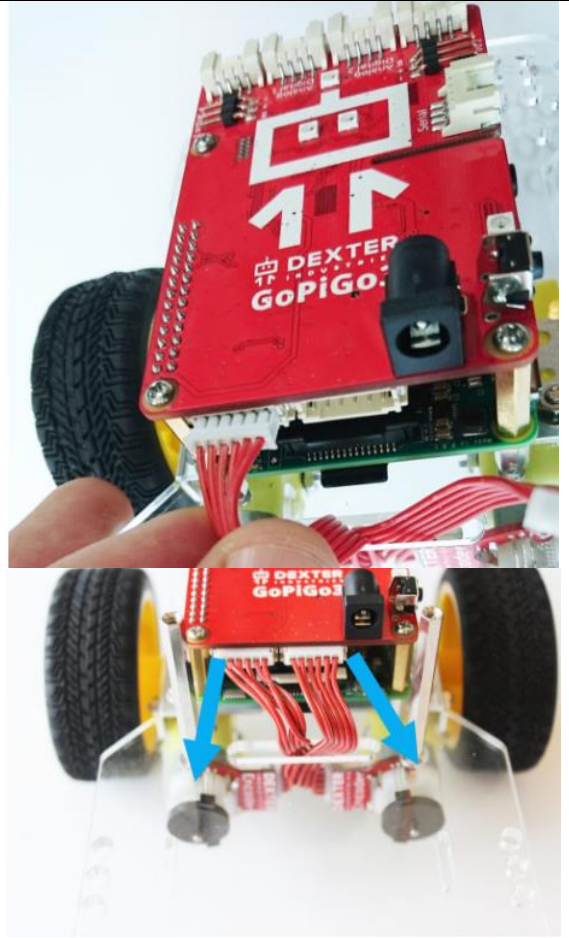
32. **Attaching the GoPiGo:**

1. Line the black female port on the GoPiGo3 red board up to the Raspberry Pi pins sticking up, and slide the GoPiGo3 board onto the Raspberry Pi. Press down until the board slides on securely.
2. Use the 4 screws to secure the GoPiGo3 board to the Raspberry Pi (through the Pi board and screwed into the gold posts).



33. **Attach Motor Cables to Board**

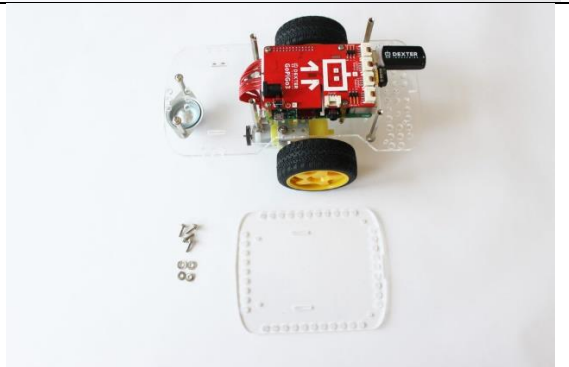
1. Connect the motor cables to the GoPiGo3 Board. Note that the cables can only be oriented in one direction. The connectors need to be pushed in fully.
2. It is very important to ensure that the right motor is connected to the right motor port on the board, and the left motor to the left motor port on the board.

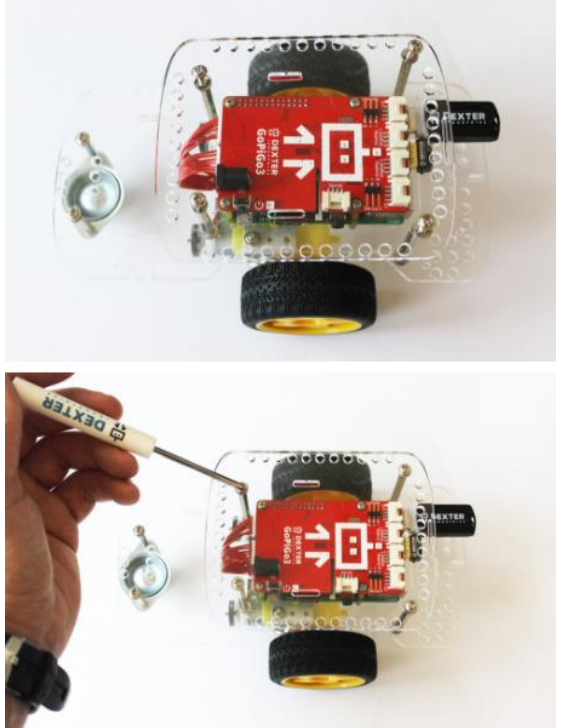
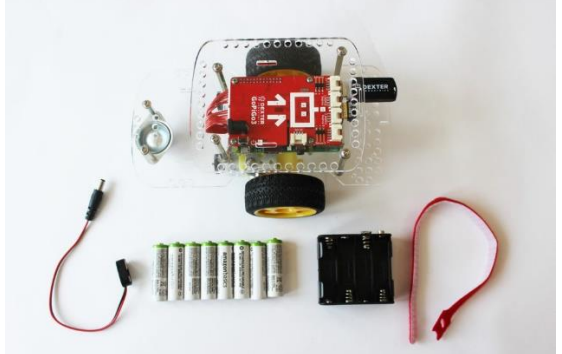
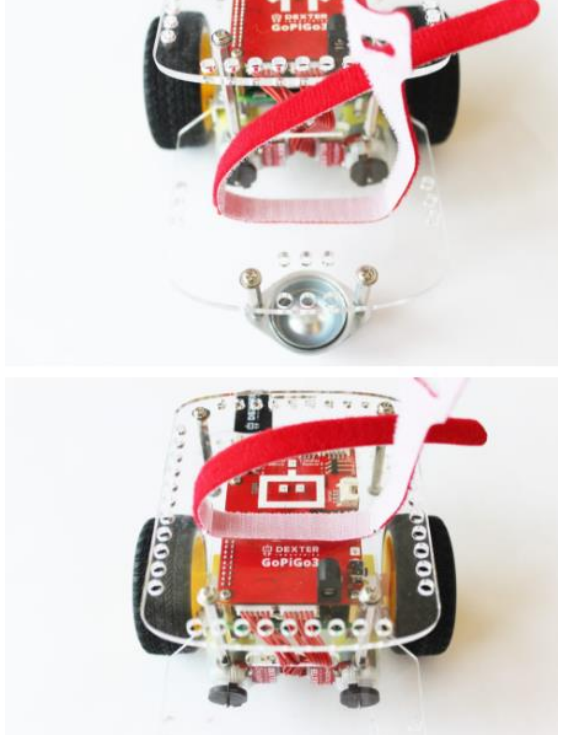


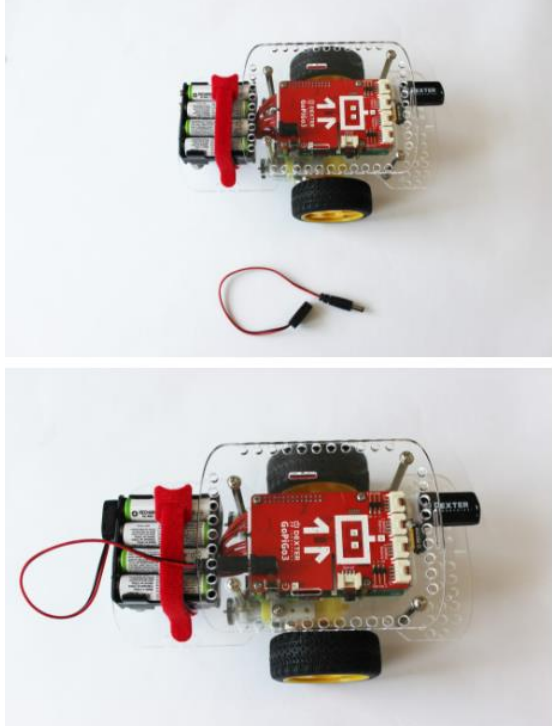
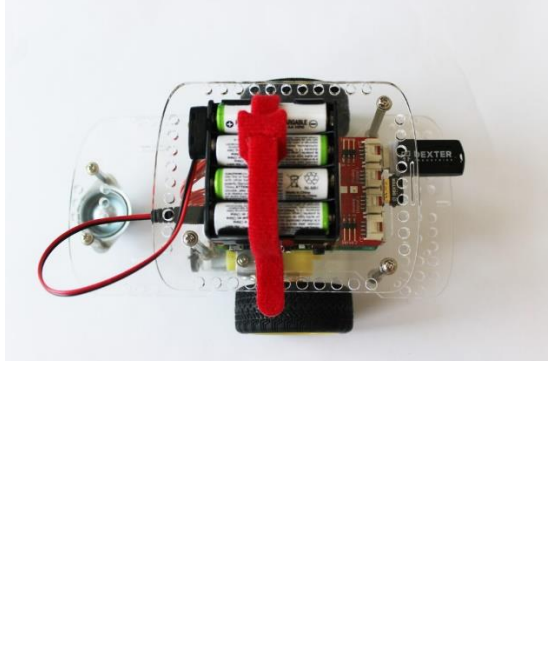
34. **Attach the Canopy (top acrylic)**

What you'll need:

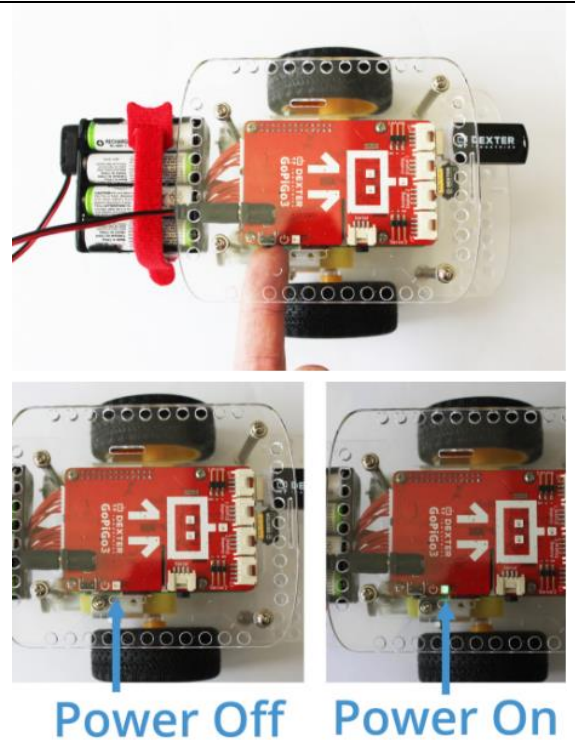
- Hardware from the large bag: (E) 4 washers, (D) 4 short screws
- Acrylic canopy



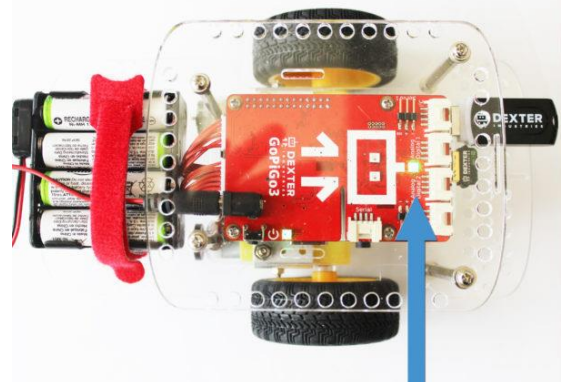
<p>35.</p>	<p>Assemble the canopy</p> <ol style="list-style-type: none"> 1. Place one washer on each screw. 2. Place the acrylic canopy on top of the four tall silver posts. There is a small slot cutout on the acrylic for a camera that should be towards the front of the GoPiGo, and the two battery pack slot cutouts should face towards the back. 3. Secure the acrylic canopy in place with the screws. 	
<p>36.</p>	<p>Attach Battery Pack</p> <p>What you'll need:</p> <ul style="list-style-type: none"> • Battery Pack • Battery Pack Cable • Velcro Strap • 8 AA batteries 	
<p>37.</p>	<p>Attach the Velcro Strap</p> <p>Connect the power:</p> <ol style="list-style-type: none"> 1. Place the 8 AA batteries into the battery pack. 2. Thread the velcro strap through the battery strap cutouts on the GoPiGo3 acrylic body. <ul style="list-style-type: none"> ○ There are two locations you can put the battery pack — either in the very back near the caster wheel, or on the top canopy. The top canopy location provides more traction for use on carpets or slippery floors. 	

<p>38.</p>	<p>Attach the Battery Cable</p> <ol style="list-style-type: none"> 1. Place the battery cable in the black power port of the GoPiGo3 Board (next to the power button). 2. Secure the battery pack to the GoPiGo3 with the velcro as shown. 3. Connect the battery pack to the battery cable. 	
<p>39.</p>	<p>Or Attach Battery Pack to the Top A Second Option:</p> <p>The battery pack can also be placed on top of the canopy of the GoPiGo3. You can see in the picture below, there are slots on the canopy for attaching the battery pack to the canopy. This places most of the GoPiGo3 weight on the front wheels and improves performance on rough surfaces (like carpet). Below is a picture of the GoPiGo3 with the batteries attached to the canopy.</p> <p>Now with your GoPiGo3 assembled, you are ready to move on to connecting to your robot.</p>	
<p>40.</p>	<p>Background Information</p> <p>Before you connect to the robot and start programming it, it is important to know that once your computer is connected to the robot, you will no longer be connected to the internet.</p> <p>You might want to use a second device to look at these instructions while you use your main device (tablet, laptop or chromebook) to connect to the robot.</p> <p>VERY IMPORTANT: These instructions are for running DexterOS Software. They will not work for standard Raspbian for Robots or Raspbian Software.</p>	

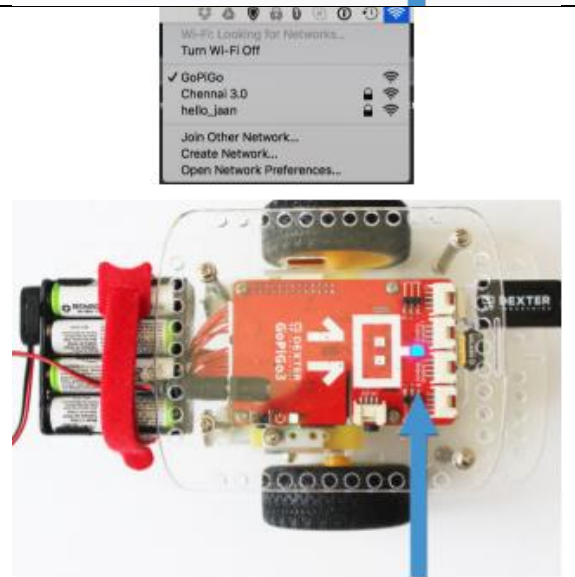
41. **Power On**
Make sure the batteries are fully charged and plugged into the robot. Then press the power button the side of the GoPiGo to turn it on. You'll know it is ready to go when the light next to the power button is solid green.



42. **Look for Wifi**
There is a little robot painted on the top of your robot who's name is Dex. Dex has an antenna LED, which will turn green when the robot is broadcasting the wifi network and is ready for you to connect.



43. **Connect to GoPiGo Wifi**
On your device (computer, laptop, chromebook or tablet), connect to the wifi network, GoPiGo. There is no password. Once you are connected, Dex's antenna light will turn blue. **IMPORTANT:** When you connect your device to the GoPiGo wifi network, you will no longer be on the internet. You will only be connected to the robot. So, you won't be able to access these instructions on Dexter Studio with the same device that is connected to the robot.



44.

Go to mygopigo.com

Open a web browser (preferably Chrome) and go to "mygopigo.com". You should see the screen below, which means you are ready to go!

DRIVE: The drive section allows you to drive the robot around and learn how to it moves.

LEARN: This section is full of lessons to teach you how to program the GoPiGo in Bloxter, our block-based language based on Google's Blockly. There are dozens of lessons that teach you from the ground up, so go in order and work your way through the lessons. There are also lessons that teach you how to program all the different sensors we offer, and that's a great way to get familiar with your hardware before you do other projects.

CODE in BLOXTER: This takes you to the main coding section where you can program the GoPiGo in Bloxter.

CODE in PYTHON: This takes you to a Python coding environment that allows you to run built-in sample python programs as well as write and run your own!

