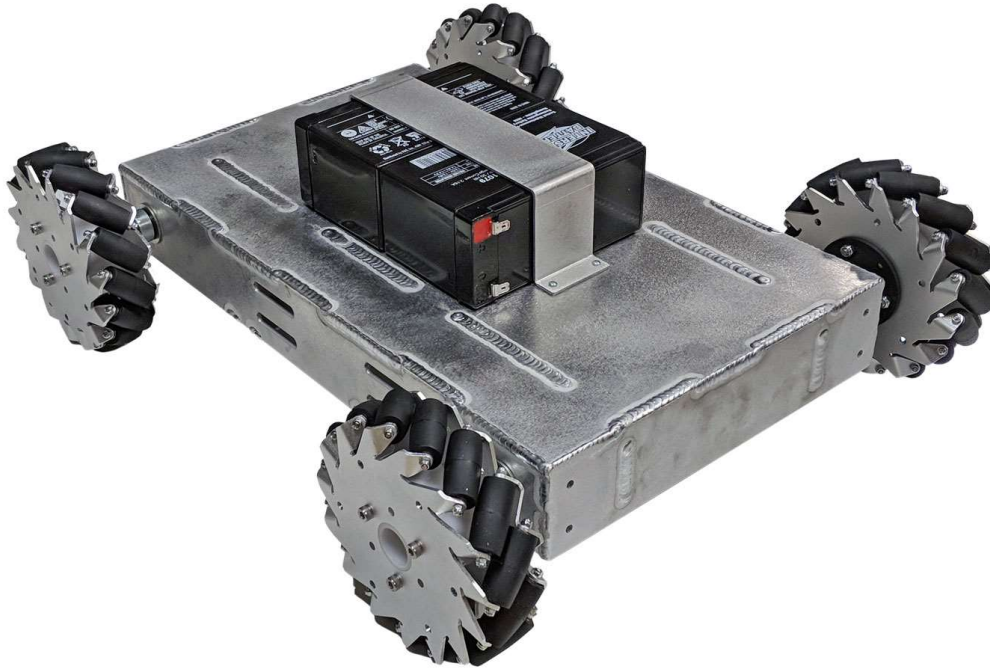




IG42-DB4, 4WD Programmable Mecanum Wheel Vectoring Robot

Assembly and Operation

This is a Mecanum Wheel Vectoring Robot with 42mm gear motors, built to navigate smooth surfaces. The wheels are chain driven and supported by two bearings, allowing it to support larger payloads.

Images shown may not be an exact representation of the robot's features listed in this document



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Mechanical Assembly

1. Start by mounting the motors as shown in the figure below, with the motor spacer plate between the motor and the chassis. Make sure to use Loctite on the screws. Once the motor is mounted, the small D-shaft sprockets can be mounted on the motor shaft. The hub should face the motor and they should be pushed all the way against the inside plate with just a small clearance for rotation.

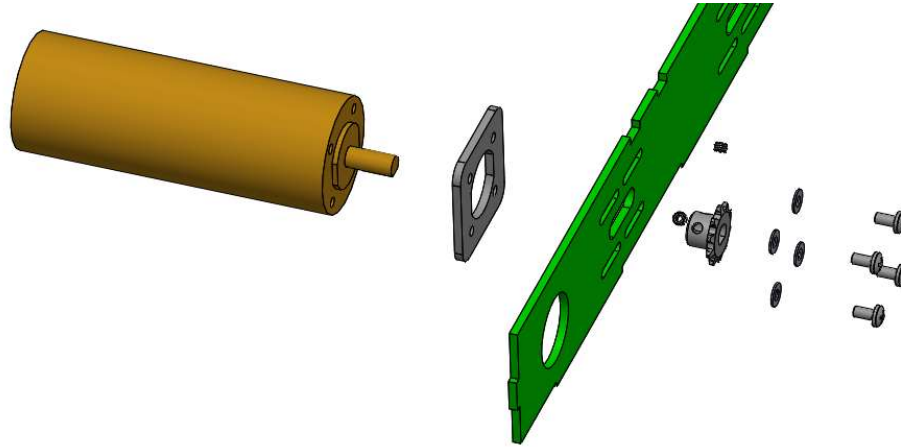


Figure 1: Install Motors

2. Mount the mecanum wheels to the axles by removing the 6 inner socket head screws on one side of the wheels, sliding the axle through the wheel, and bolting it to the wheel. The axle should face the outside of the robot.



Figure 2: Wheel/axle assembly

- Before mounting the wheels, note that they need to be oriented correctly for the robot to work properly. See the figure below for the correct orientation.

Direction of Movement	Wheel Actuation
Forward	All wheels forward same speed
Reverse	All wheels backward same speed
Right Shift	Wheels 1, 4 forward; 2, 3 backward
Left Shift	Wheels 2, 3 forward; 1, 4 backward
CW Turn	Wheels 1, 3 forward; 2, 4 backward
CCW Turn	Wheels 2, 4 forward; 1, 3 backward

To the right: This is a top view looking down on the drive platform. Wheels in Positions 1, 4 should make X- pattern with Wheels 2, 3. If not set up like shown, wheels will not operate correctly.

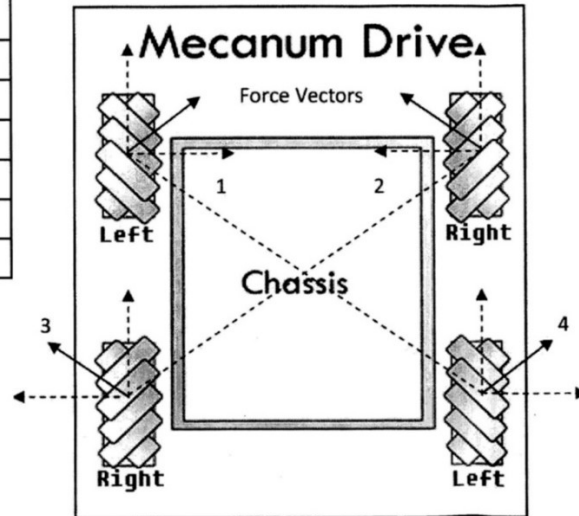


Figure 3: Wheel Orientation

- Slide all 8 bearings into place through the bearing holes in the chassis. Slide a lock collar onto the axle, then slide the axle through the first bearing. At this point, put the key in the shaft and slide on the wheel sprocket. Finally slide the shaft through the second bearing. Slide another lock collar on to secure the inside bearing and slide the outside lock collar over to secure the outside bearing. Use Loctite on all set screws.

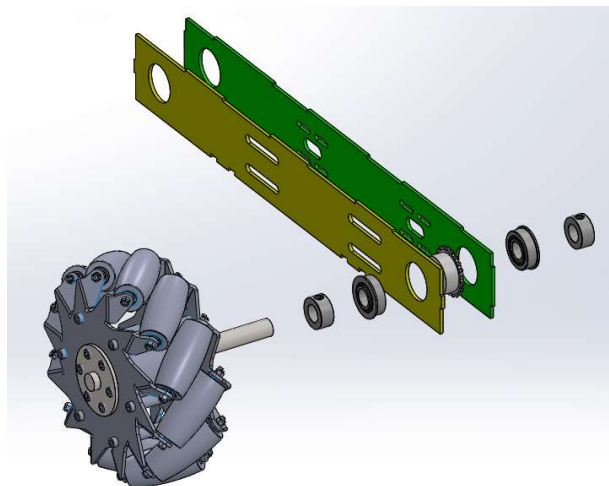


Figure 4: Wheel and Axle assembly

5. Measure, cut, and install the chain using the chain cutting instructions listed below.
6. Install roll pins in the axle sprockets. To do this, first make sure that the motor sprocket and the axle sprocket are lined up. It may help to loosen both set screws on the axle sprocket and power the motor so the sprocket spins on the axle but is free to move side to side. Once they are lined up, tighten one of the set screws and remove the other set screw. Drill a $\frac{5}{32}$ " hole through the shaft and the other side of the sprocket. Be careful not to damage the threads of the sprocket while doing so. Drill the hole as centered as possible. It may help to start with a $\frac{3}{16}$ " drill bit and only drill enough to make a dimple. This will help keep the $\frac{5}{32}$ " drill bit centered. Once the hole is drilled, hammer the roll pin in place making sure it goes all the way through the bottom of the sprocket.

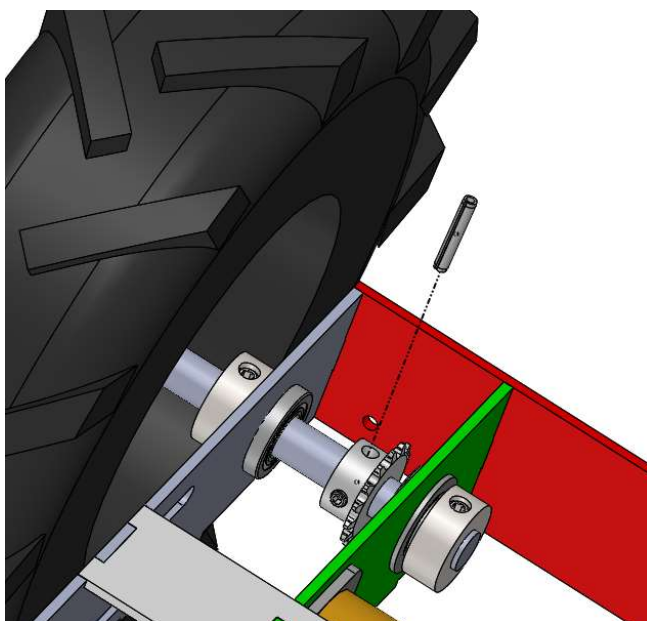


Figure 5: Add Roll Pin

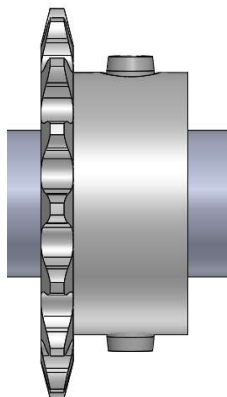
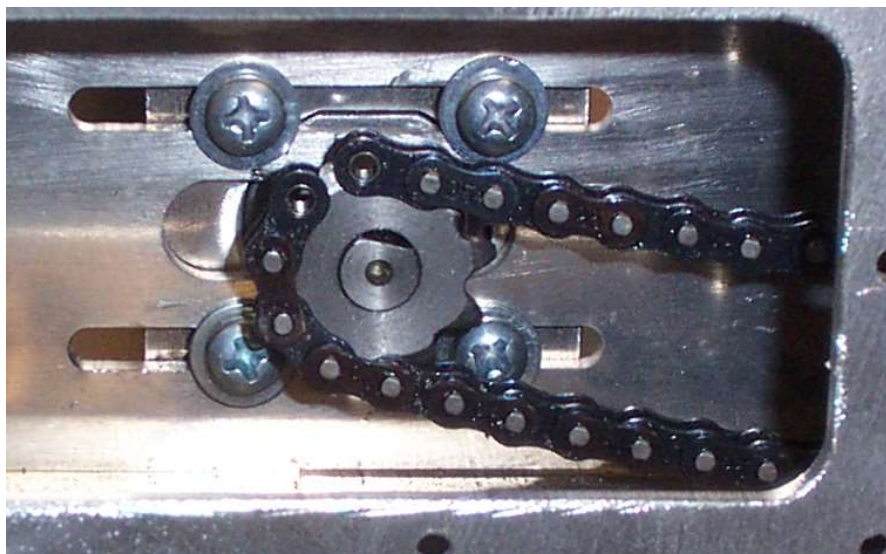


Figure 6: Roll Pin Installed

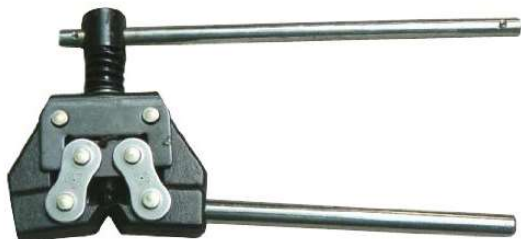
7. Mount the batteries with the provided hardware. Foam is included if needed for a tight fit. Simply stick it to the underside of the battery bracket before bolting down. The foam can also be used underneath the batteries to space them up over the weld.

Chain Measuring, cutting, and installation

8. With the motor in its approximate middle position, measure out the required length of chain. You will want full links as shown in the figure below to insert the master link through. You will be removing the outer cross-links.



9. The easiest way to cut the chain is with a chain breaker tool, illustrated in the figure below.



10. Alternatively, clamp the chain in a vise and grind/file the ends of the pins down. Then drive the pin through the chain.



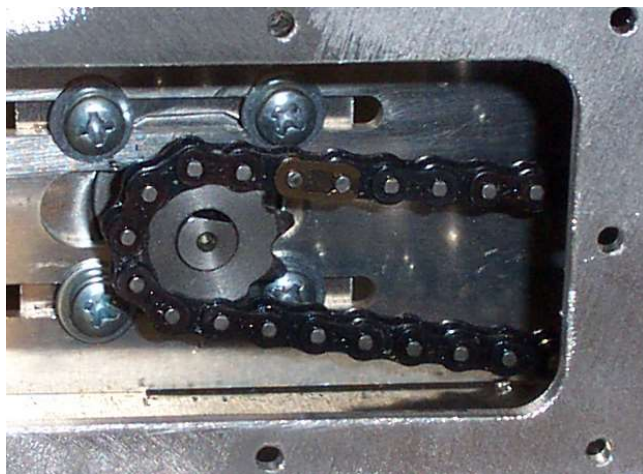


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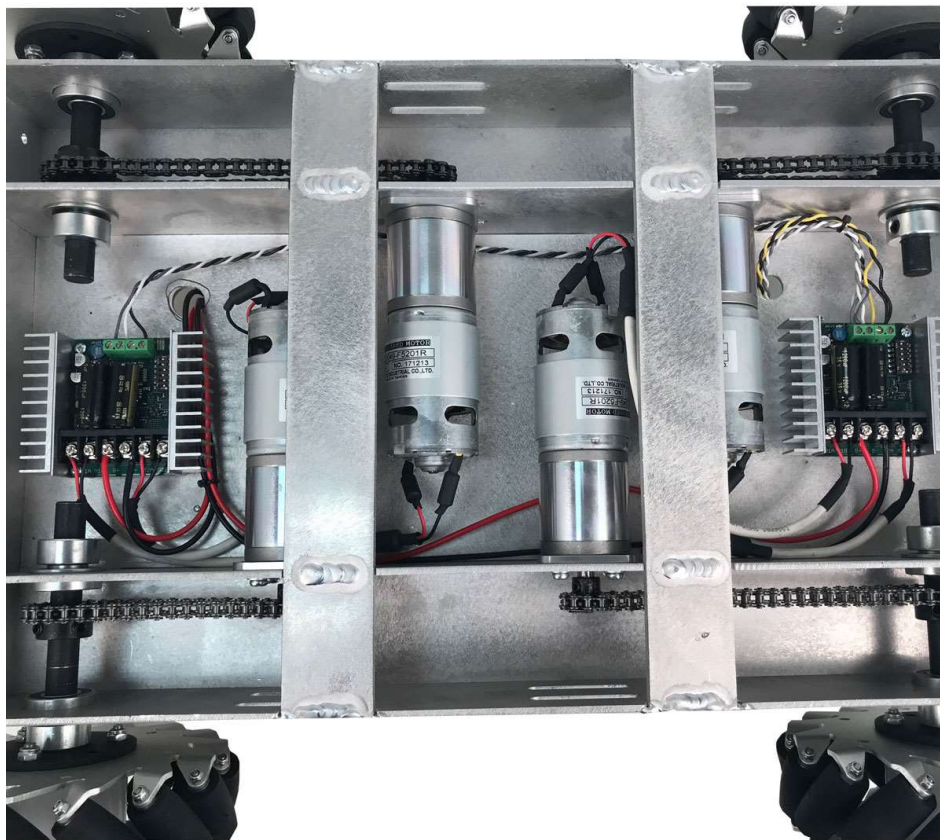
11. Install the master link as shown in the figure below, and tension chain by sliding the motor away from the axle. The chain should be tight enough so there isn't much slack but loose enough so that it isn't adding extra strain on the motor shaft. Listen when running the robot to notice if there is an uneven sound coming from the motor. If so, the chain is probably too tight.



12. Repeat for the other four wheels.

Mounting Electrical Components

13. Mount batteries on top of the chassis using battery brackets and hardware provided. Use foam tape on the bracket and underneath the battery to ensure a snug fit.
14. Measure a place on the chassis to mount the switch. Drill a $\frac{1}{2}$ " hole. The top of the chassis is a good place for it so that the terminals are protected underneath the chassis and the switch is protected from being accidentally turned off in a collision. Another option is to use a [Switch Protector Bracket](#) and mounting the switch on the side of the chassis.
15. A hole will also be required to run the wires from the batteries down to the motor controller. Make sure this hole is free of burs so that it does not cut through the insulation of the wires.
16. Most of the motor controllers for this robot will fit inside of the chassis with the motors. If you select a big motor controller though it may need to be mounted on top of the chassis with the batteries.



Electrical Assembly

For electrical assembly please follow the schematic for your selected motor controller:

[Schematics](#)

For additional support on wiring, soldering, and crimping, please read the following support pages:

[Electric Motor Hookup Support](#)

[Electric Power Hookup Support](#)

[Soldering Tips](#)

[Crimping Wires](#)



Operation

1. Before powering on the robot make sure it is up on blocks so the wheels can spin freely. Occasionally some or all the wheels start as soon as the motor controller gets power. In this case the settings of the motor controller need to be changed.
2. Make sure to use the correct DIP switch settings. If using a Sabertooth motor controller in R/C mode switch 1 should be DOWN (closest to the number) and all other switches should be UP. If using a different mode see the manual for the motor controller you are using on Dimension Engineering's website.

Binding a Spektrum Remote

3. Insert the bind plug into the receiver and power on the robot.
4. While pressing the Bind button, power on the transmitter.
5. Release the Bind button after the receiver's LED stays illuminated. This indicates the receiver is bound to the transmitter.
6. While the robot and transmitter are still powered on, remove the bind plug from the receiver. The transmitter is now bound to the receiver and will connect automatically the next time both are powered on. Do not try to drive the robot before the transmitter connects to the receiver. Keep the drive joystick in the center position until it connects. The joystick is calibrated once a connection is made and will remember the position of the joystick as the center position. This will cause the robot to move erratically.
7. If the wheel aren't moving as desired, it may be necessary to swap the Aileron and Elevator plugs or to reverse the channels on the transmitter. To reverse channels see the instructions for "Servo Reversing" in the Spektrum documentation.

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4. In the event a dispute or controversy arises, such dispute or controversy (including claims of default) shall be brought in the courts of Wake County, North Carolina and the plaintiff hereby agrees to this choice of venue.