

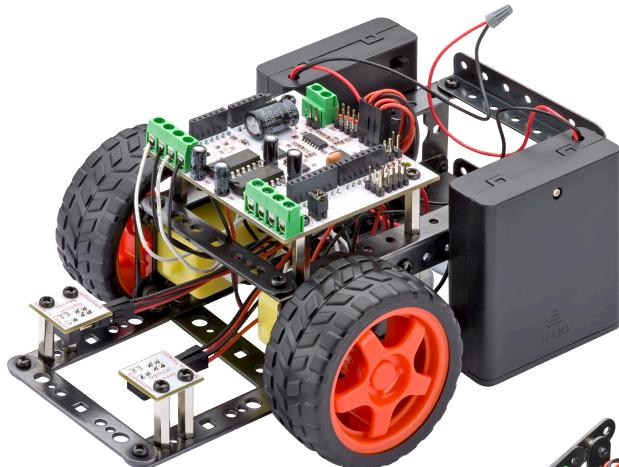
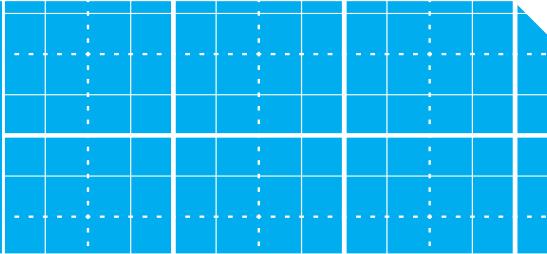


# Make: it

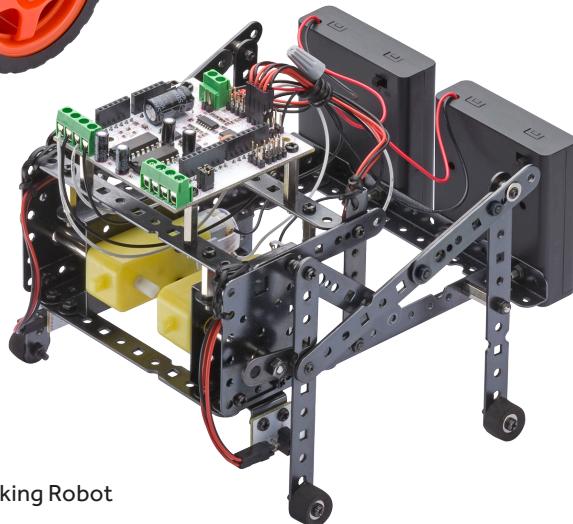
## Robotics Starter Kit

2770168

User's Guide



Line-Following Robot



Walking Robot

We hope you enjoy your Make: it Robotics Starter Kit from RadioShack.  
Please read this user's guide before using your new robotics kit.

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## Getting Started

This Make: it Robotics Starter Kit contains almost everything you need to build a line-following robot or a walking robot. Connect your Arduino Uno R3 (not included) to the robot's PCB, upload the example program, and watch as your creation comes to life. Change your robot's behavior by experimenting in the Arduino programming environment

### Warning!

- Adult supervision and assistance are required.
- **CHOKING HAZARD** — This product contains small parts and functional sharp points on components. Keep away from children under age 3.
- Read and follow all instructions in the user's guide before use.
- Retain this user's guide for future reference.

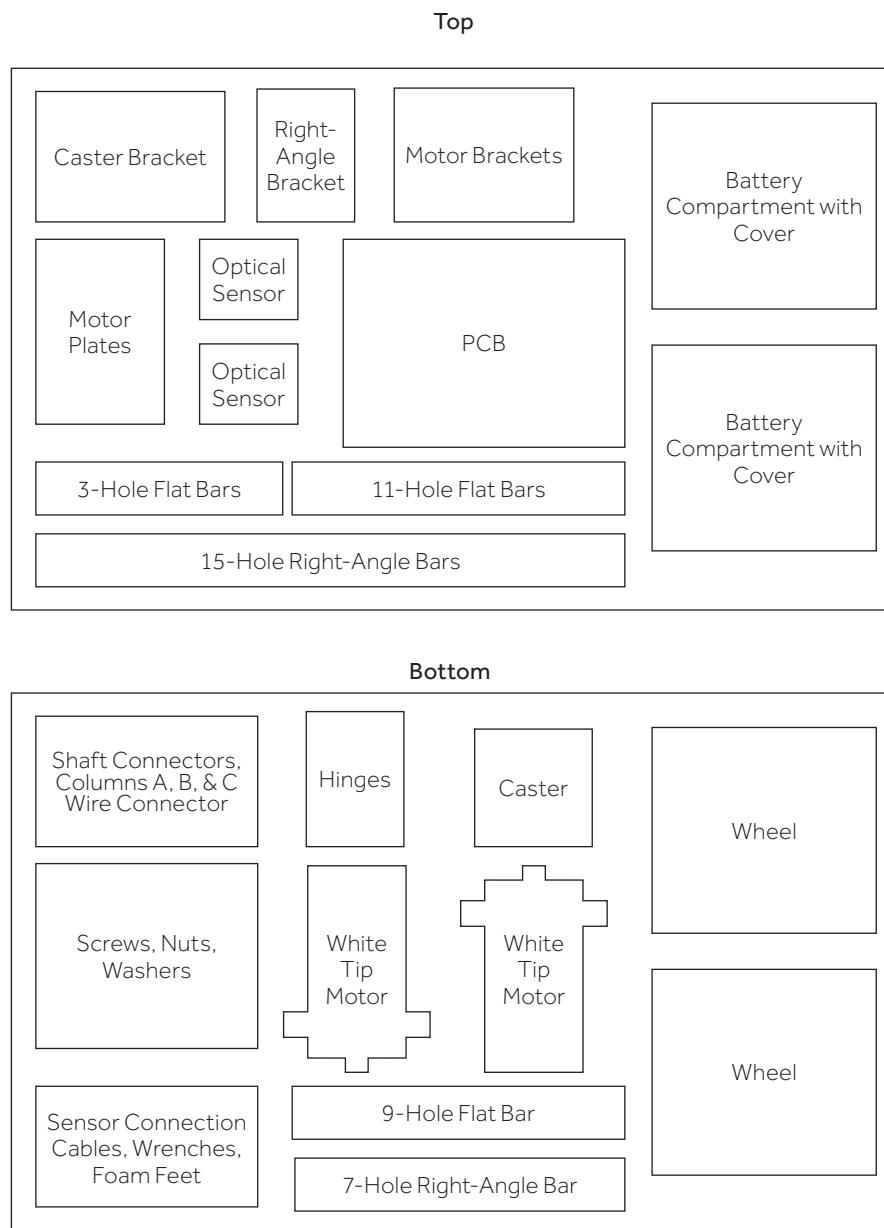
### Battery Notes

- Use only fresh batteries of the required size and type. Do not mix old and new batteries, different types of batteries (standard, alkaline, or rechargeable), or rechargeable batteries of different capacities.
- Dispose of batteries promptly and properly. Do not burn or bury them.
- If you do not plan to play with the robot for an extended period of time, remove the batteries.

### Caution!

- The wires are not to be inserted into socket outlets.
- As an extra precaution, check this product regularly for signs of wear or damage.
- Ensure all wiring connections are correct before inserting batteries and switching on the product. Failure to do so may result in damage to components and the product.
- Ensure all wires are correctly connected to the battery terminals and other connectors. If the circuit does not work, make sure the plastic insulation of the wire is not obstructing the connection to the connector.
- When you have finished playing, remove the batteries and switch off the unit before you disconnect the wires. Do not apply any components or parts to the unit other than those provided with this kit.
- **To prevent overheating and damage, do not short-circuit the battery terminals and connectors. Do not block or cover the motor or other moving parts.**

# Package Contents



Parts			
White Tip Motor (2)	PCB	Optical Sensor 1	Optical Sensor 2
Caster	Battery Compartment with Cover and Screw (2)	Left Wheel (2)	Right Wheel (2)
Sensor Connection Cable (4)	Paper Track	Wire Connector (1)	White Sticker (2)
Support Bars			
15-Hole Right-Angle Bar (4)	7-Hole Right-Angle Bar (3)	11-Hole Flat Bar (12)	9-Hole Flat Bar (10)
3-Hole Notched Flat Bar (8)	3-Hole Flat Bar (2)	Motor Plate (2)	Motor Bracket (2)

**Support Bars (Continued)**

			
Right-Angle Bracket (2)	Caster Bracket (1)		

			
Single Hinge (4)	Double Hinge (8)	Column A (12)	Column B (6)
			
Shaft Connector (2)	Column C (2)		

**Nuts**

			
M2 Nylon Nut (8)	M3 Nylon Nut (4)	M3 Nut (52)	M4 Nut (4)
			 M2 M3 M4
M4 Washer (2)	M3 Washer (10)	Spring Washer (4)	Wrench (2)

**Screws**

			
M2 x 5 Screw (4)	M3 x 6 Screw (50)	M3 x 10 Screw (10)	M3 x 28 Screw (4)

			
M3 x 15 Screw (4)	M3 x 10 Flat Screw (4)	M2 x 12 Washer Screw (8)	

**Required Tools**

- No. 1 Phillips crosspoint screwdriver
- No. 2 Phillips crosspoint screwdriver

**Required Accessories**

- AA batteries (8)
- Arduino Uno R3 board
- USB cable (type A connector to type B connector)

**Note:**

- Gather all the necessary components before you begin building your robot.
- You can build only one robot at a time.

**Helpful Hints**

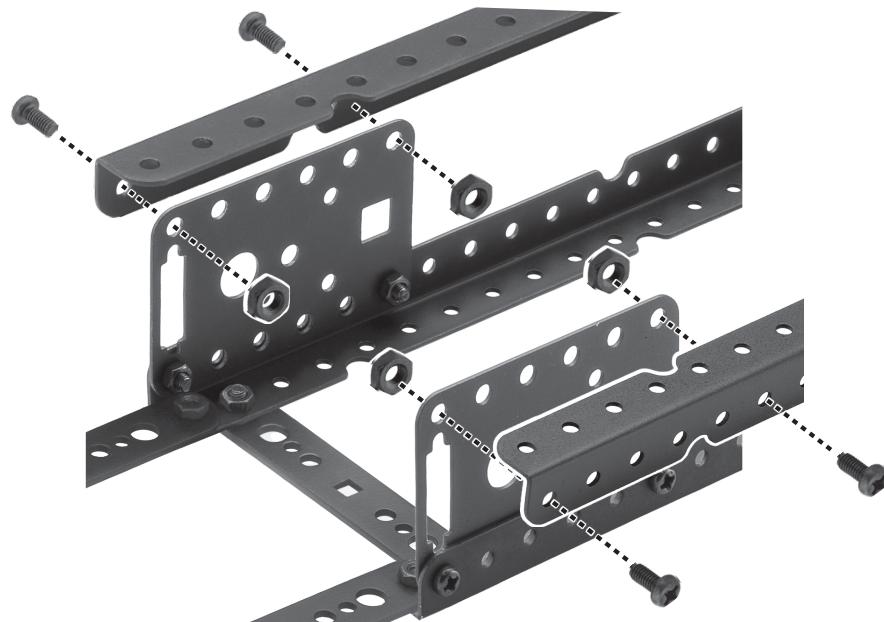
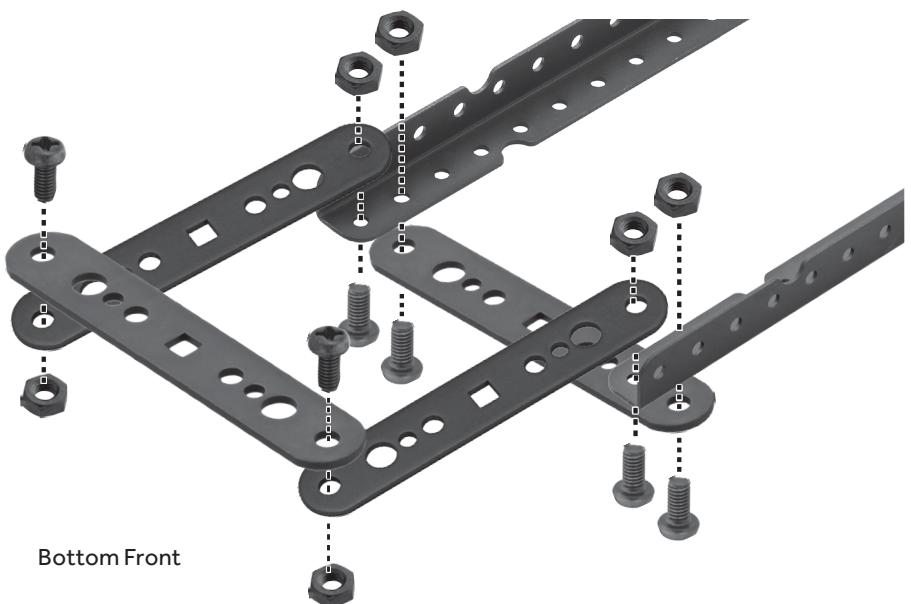
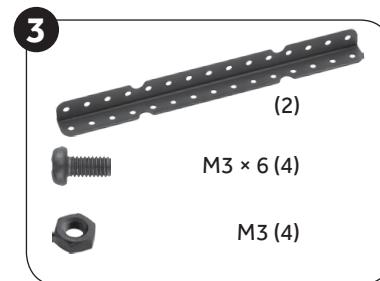
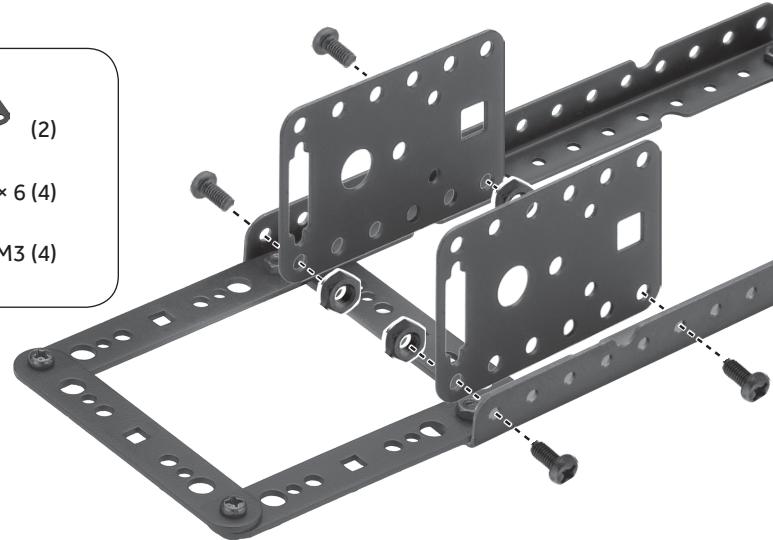
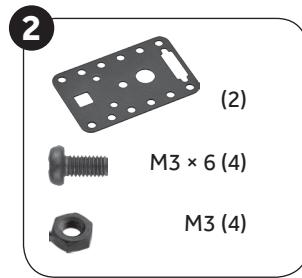
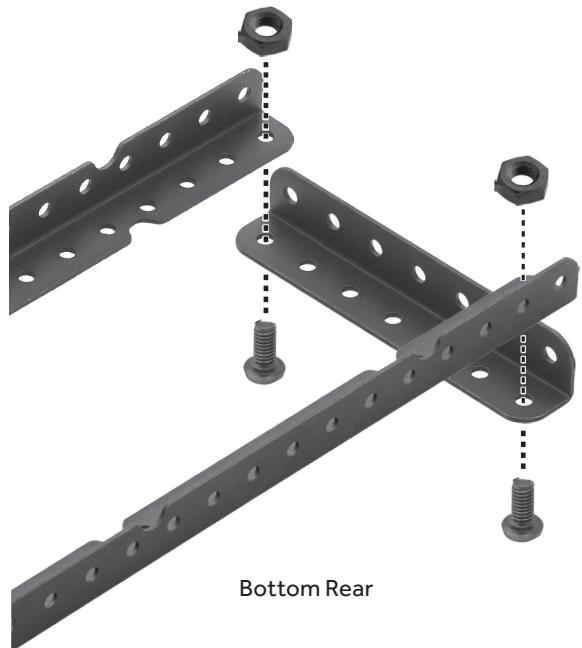
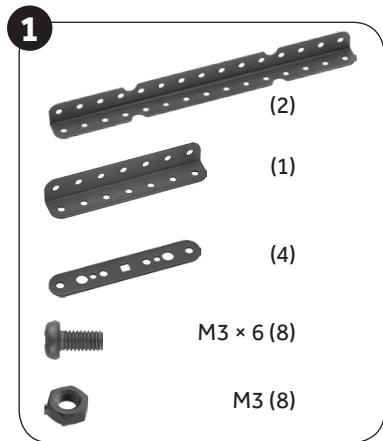
- For screw and nut connections at 90° from each other, partially tighten each screw before fully tightening both.
- When installing columns into nylon nuts, insert an M3 x 6 screw into the end of the column and screw tight into the nylon nut. Hold the column with an adjustable wrench (not included) and unscrew the M3 x 6 screw from the column.

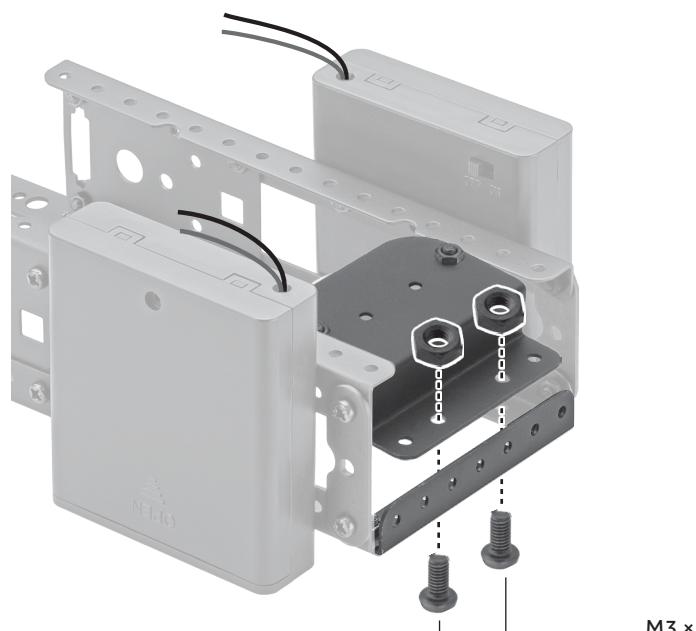
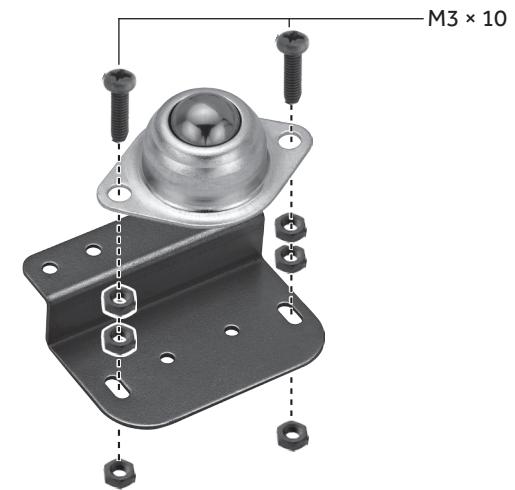
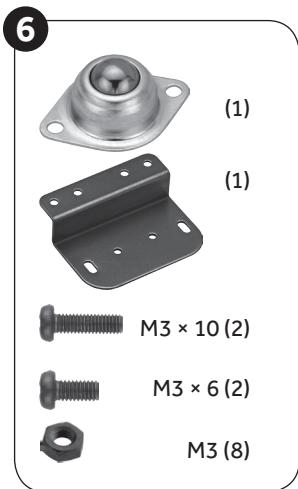
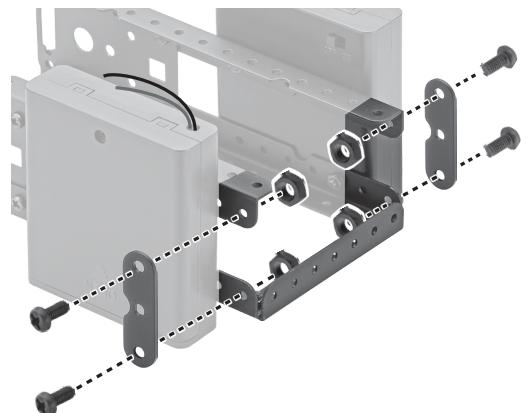
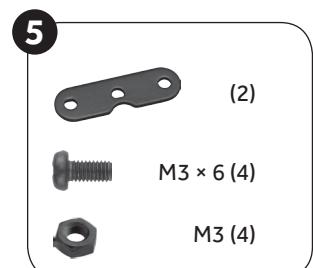
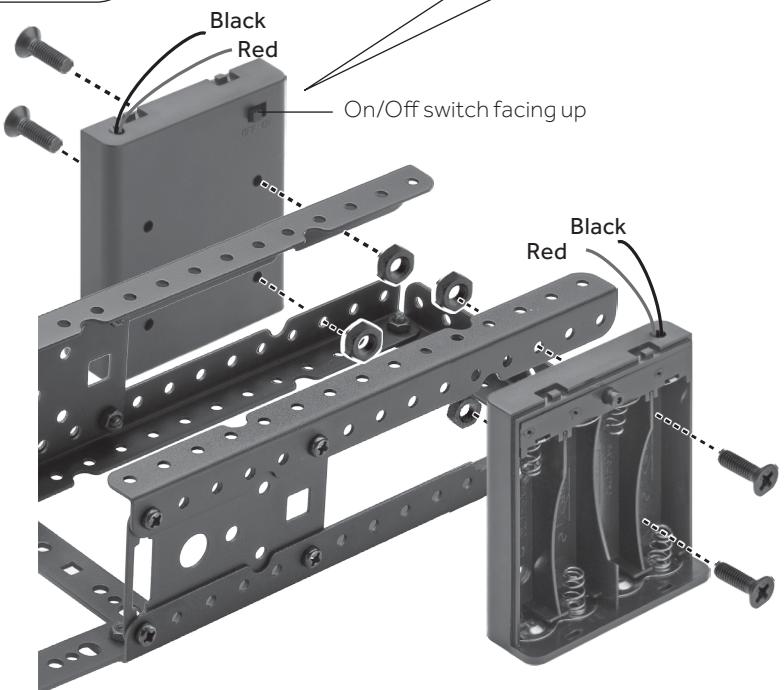
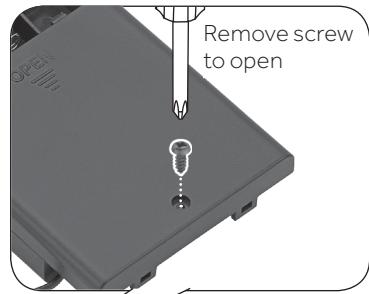
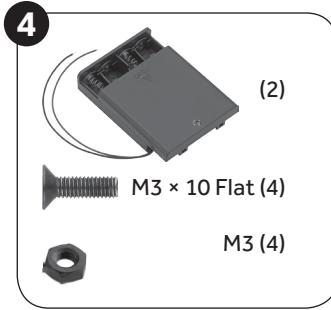
**Nylon Nut**

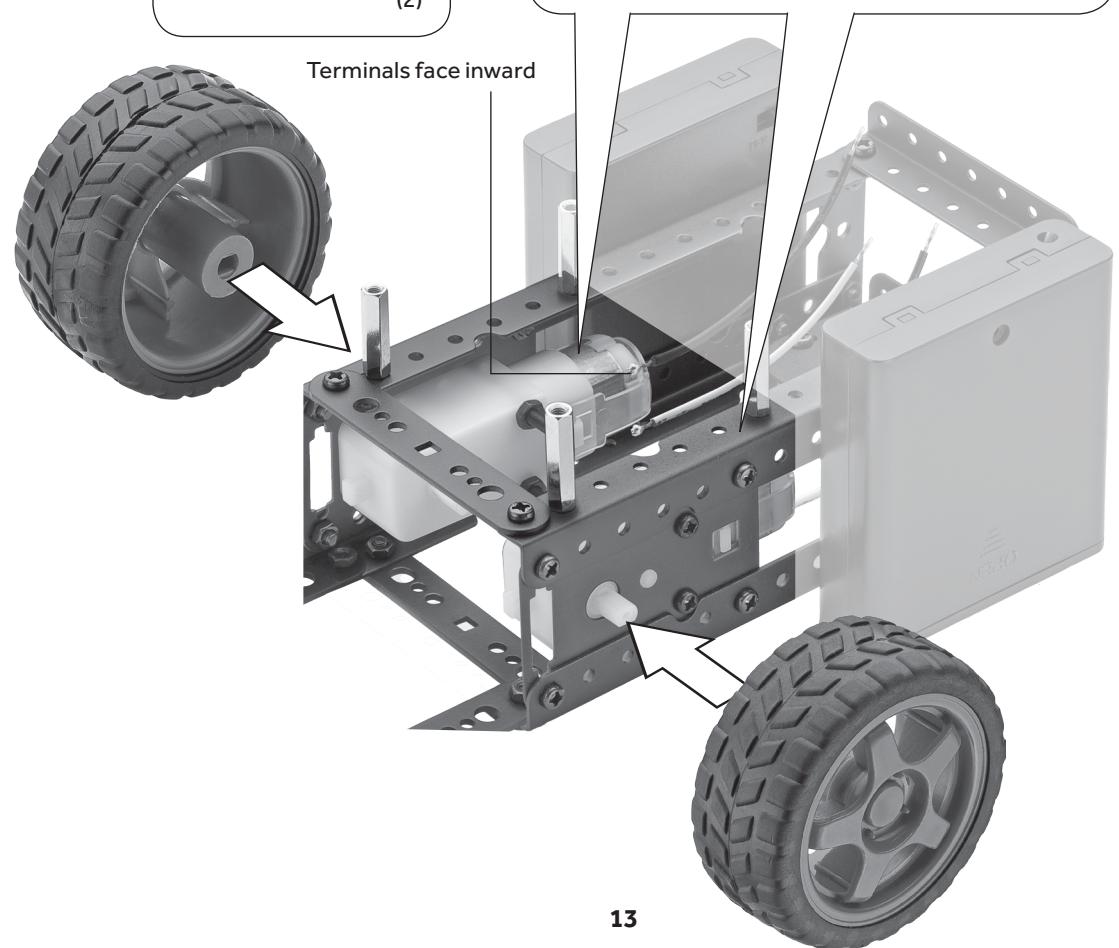
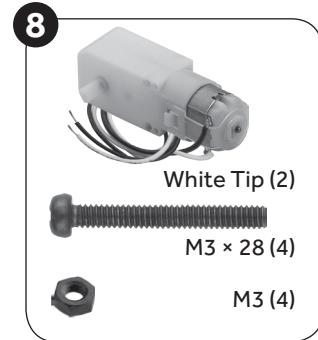
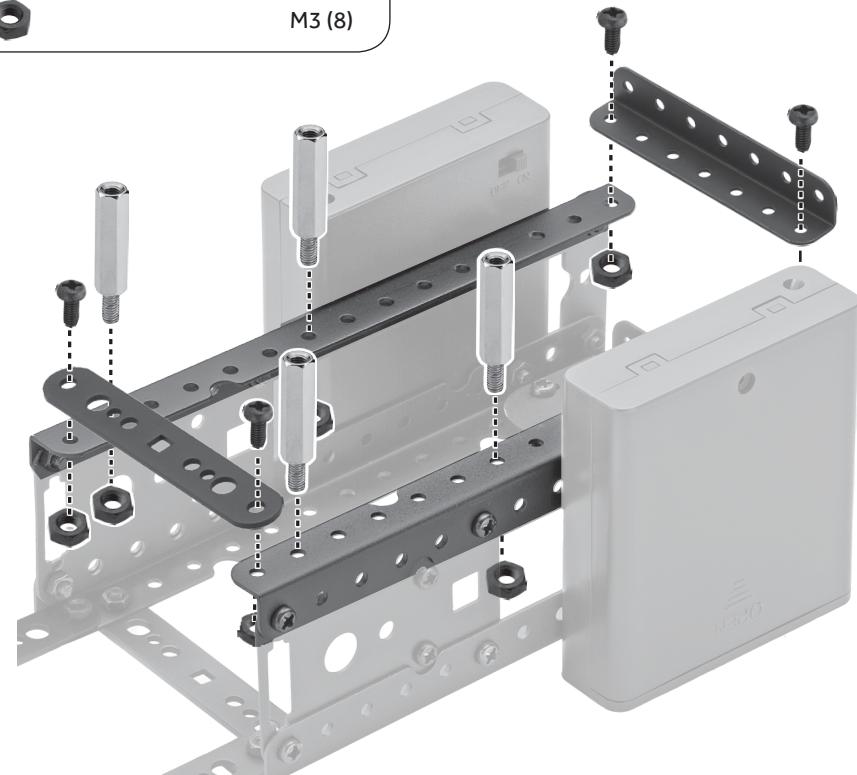
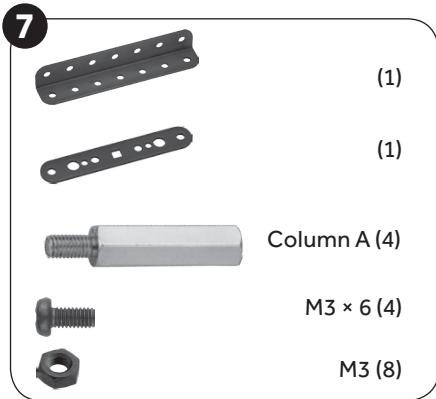
- Optical sensors are sensitive to ambient light intensity. If your robot is not functioning properly, lower the ambient light intensity by moving the robot away from windows or turning off lights.

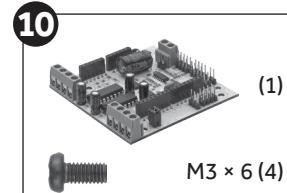
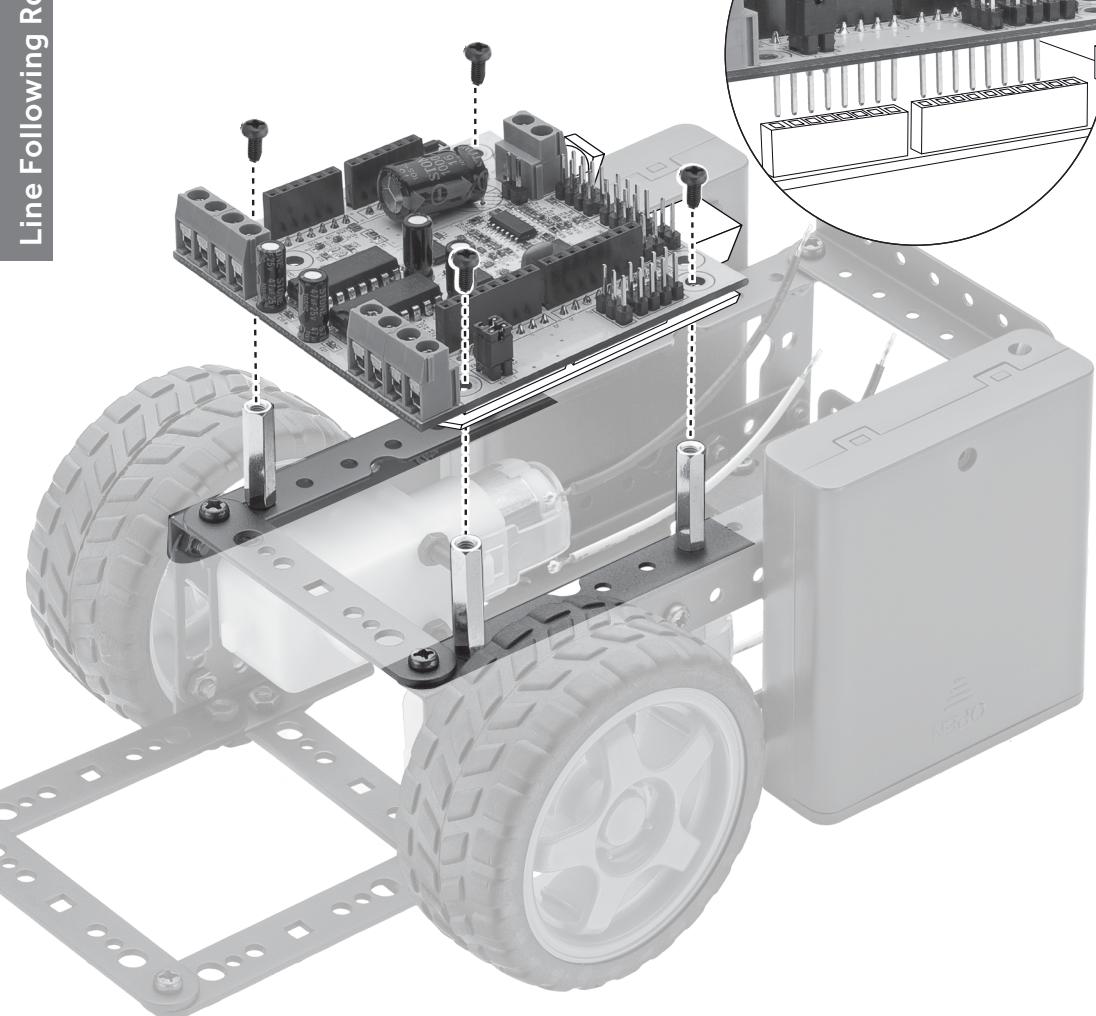
# Line-Following Robot

## Line Following Robot

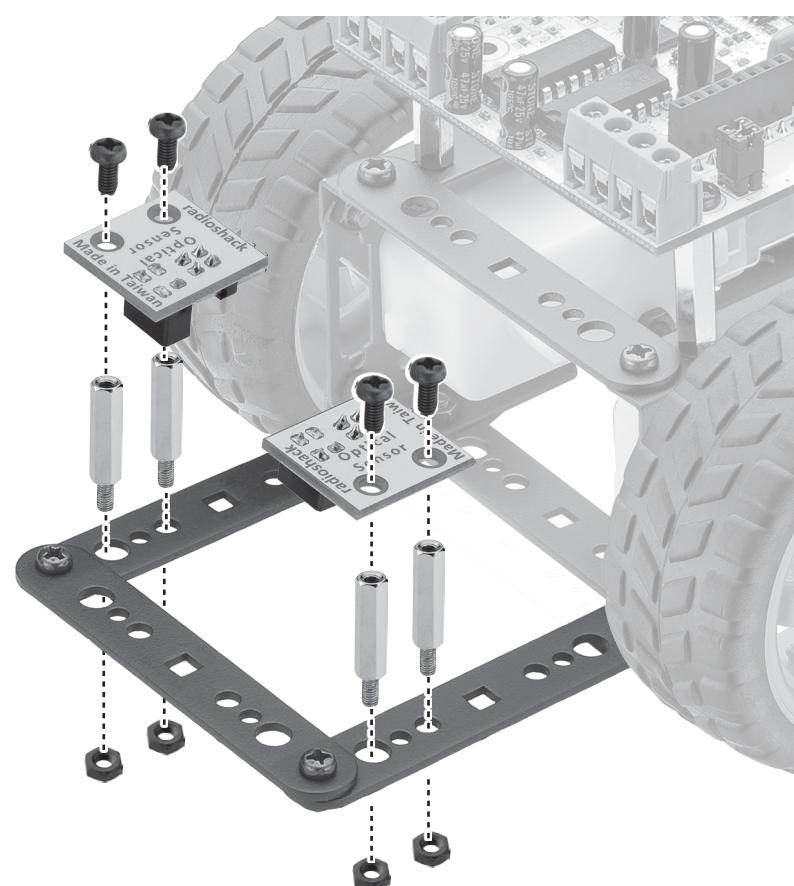
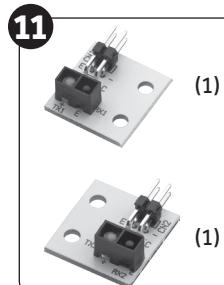
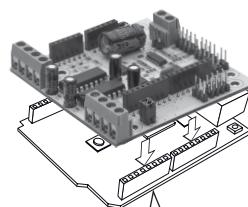


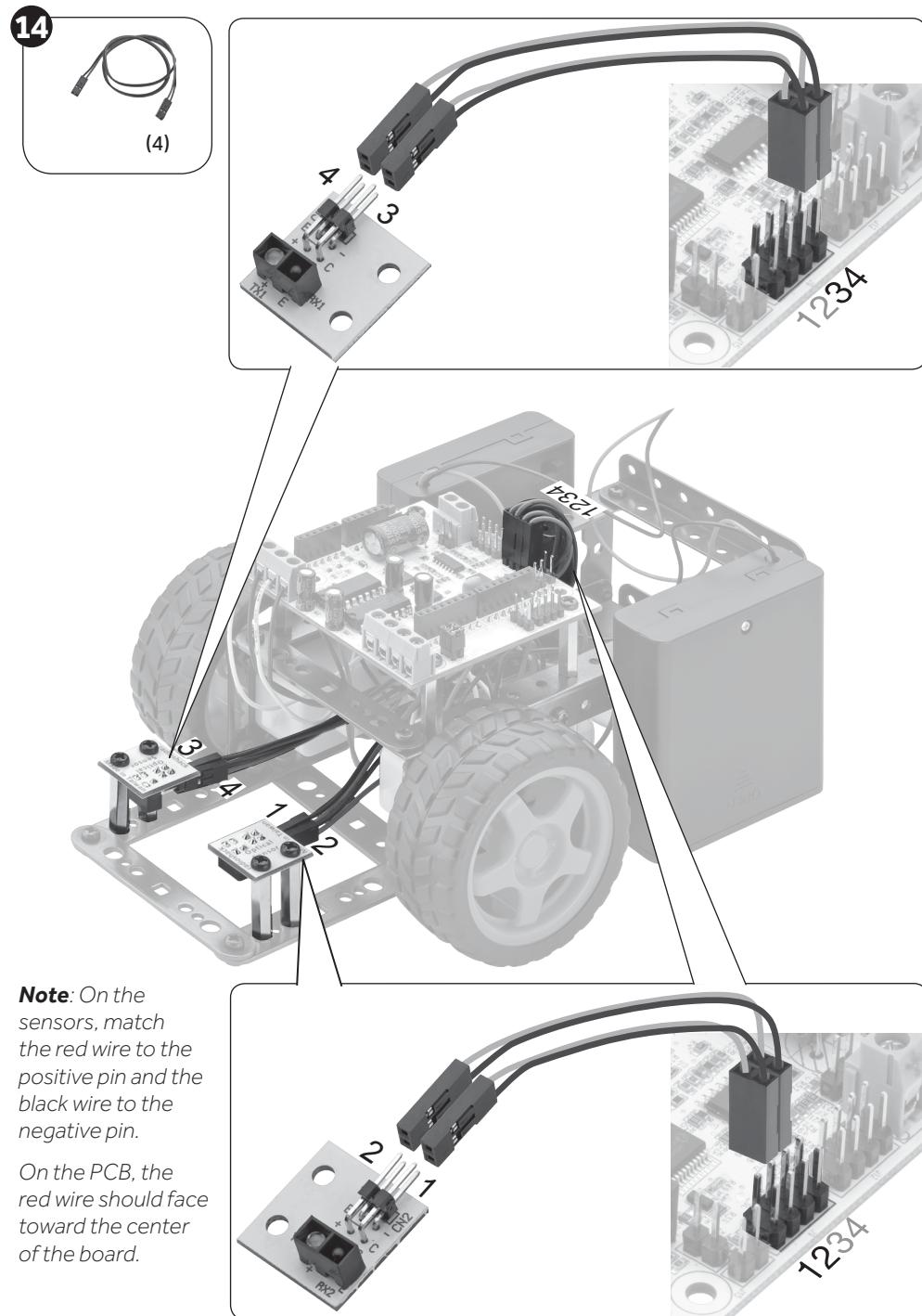
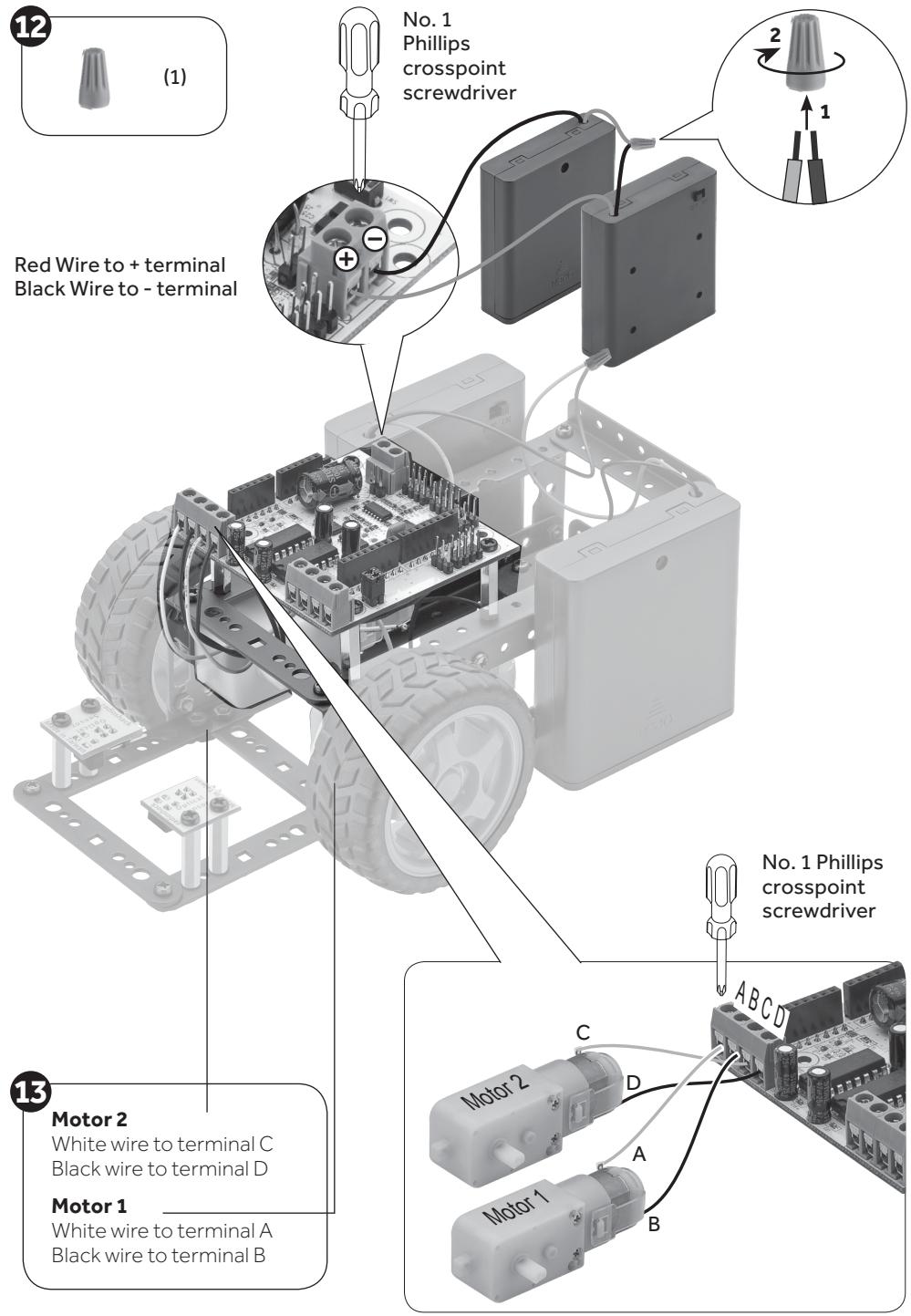






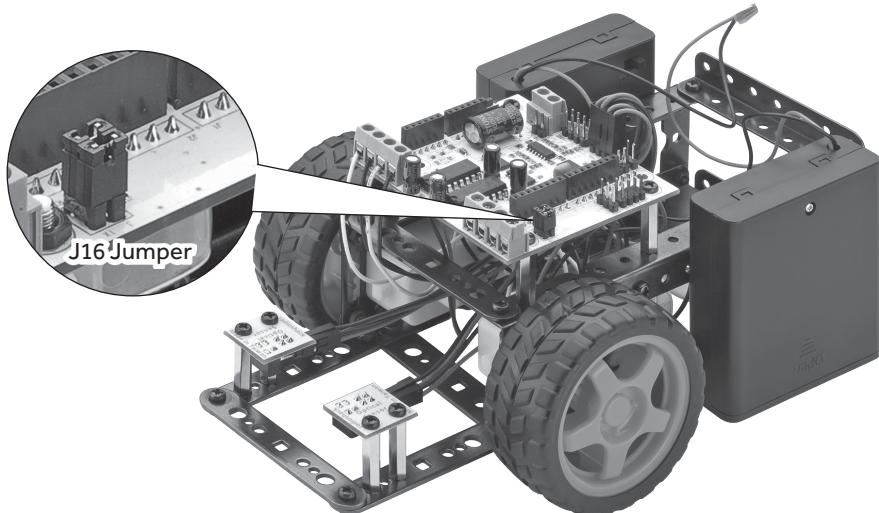
Not Included:  
Arduino Uno R3 (1)





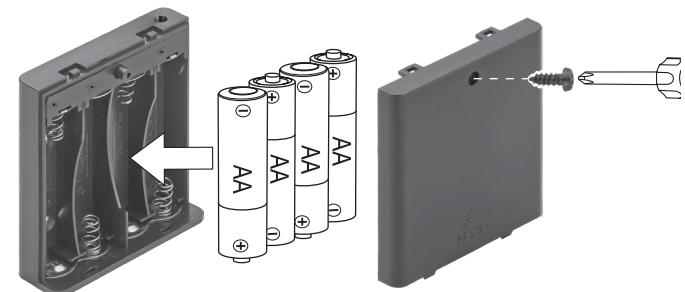
## Download the Support Files

1. For the Arduino program and libraries, go to <http://shack.net/MakeItRobotics>.
2. At the end of the blog post, click **Make: it Robotics Starter Kit Support Files** and save the folder to your computer.
3. If you have not created a directory in your Arduino folder for the Make: it Robotics programs, open READ\_ME.txt and follow the directions.
4. Connect your Arduino Uno R3 to your computer with a USB cable.
5. Remove the jumpers from J16 on the PCB to allow your Arduino's USB port to communicate with your computer.
6. Open **linetfollow.ino** in the Arduino programming environment.
7. Verify and upload the program to your Arduino Uno R3.
8. Remove the USB cable from your Arduino Uno R3.
9. Put the jumpers back onto J16. When the PCB is connected to your Arduino and the jumpers on J16 are in place, your Arduino's serial port will be unavailable.

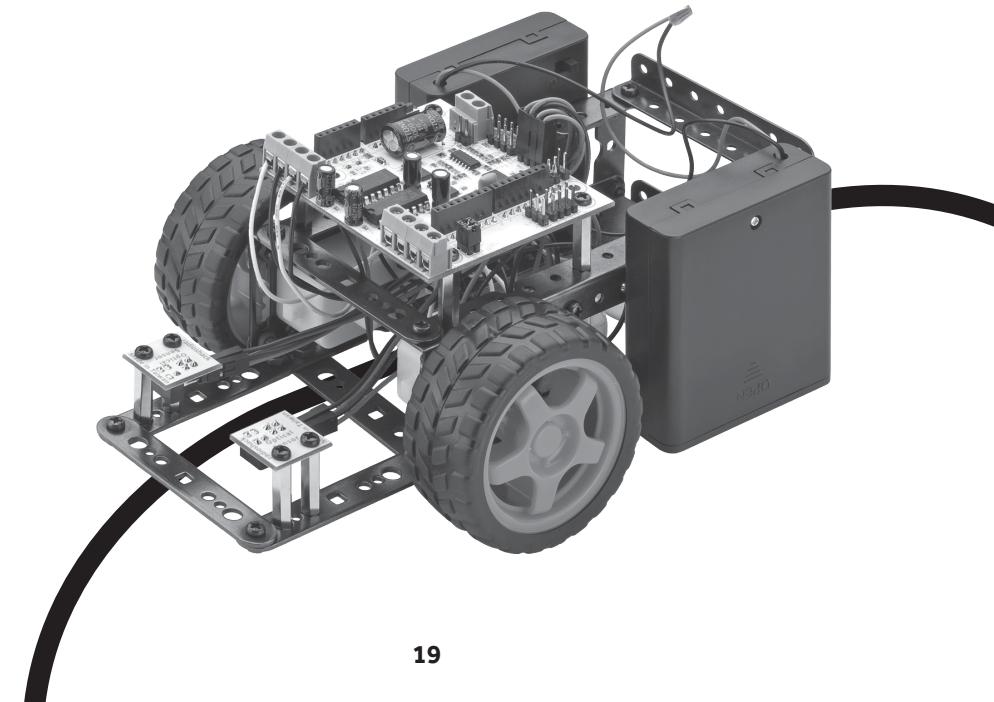


## Play

1. Lay out the enclosed paper path on a flat surface. To create your own path, use black tape on a large, flat, white surface. For best results, avoid creating sharp angles (such as a 90-degree turn).
2. Install batteries into the battery compartments on the robot matching the polarities marked inside. Replace the covers and the screws.

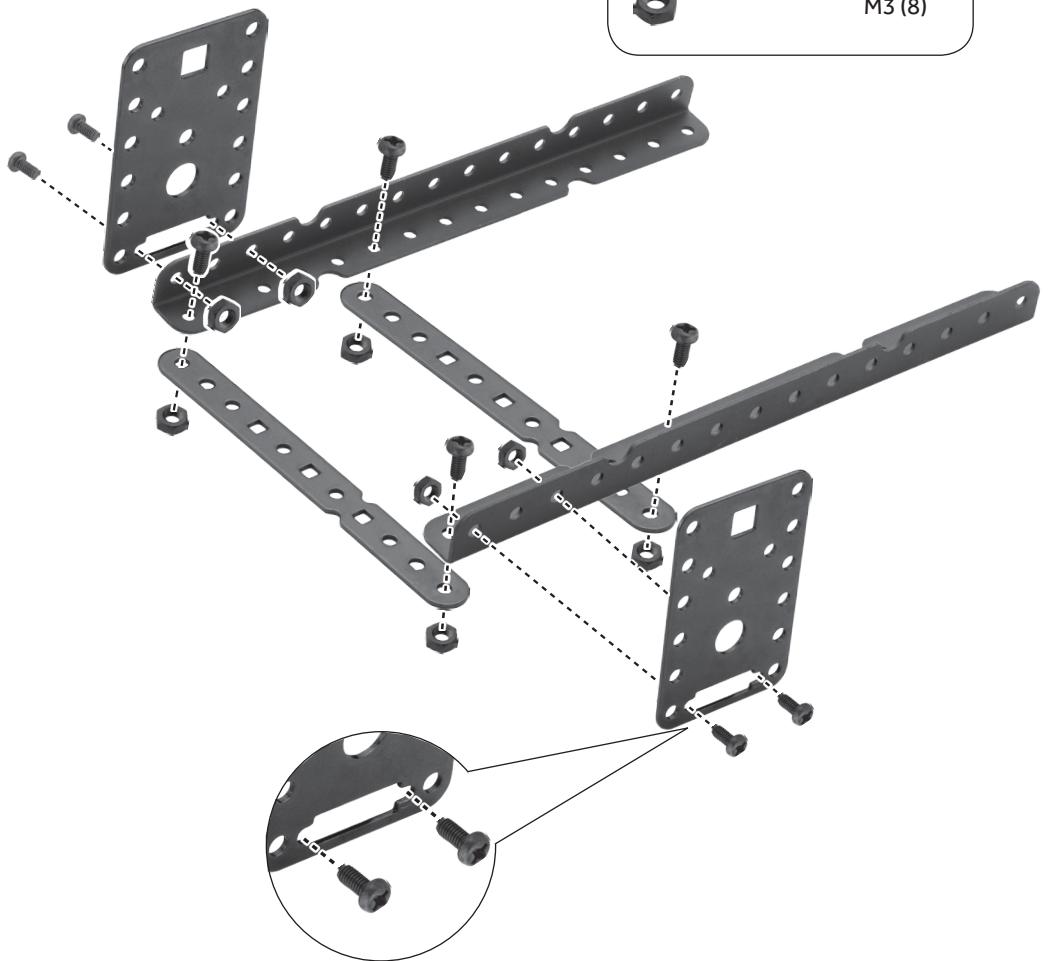


3. Slide the battery compartment switches to ON. Your robot will begin following the path.
4. Experiment! Many online resources as well as books like *Make: Getting Started with Arduino* and *Make: Arduino Bots and Gadgets* (available at your local RadioShack store and [RadioShack.com](http://RadioShack.com)) can help you learn about Arduino programming.

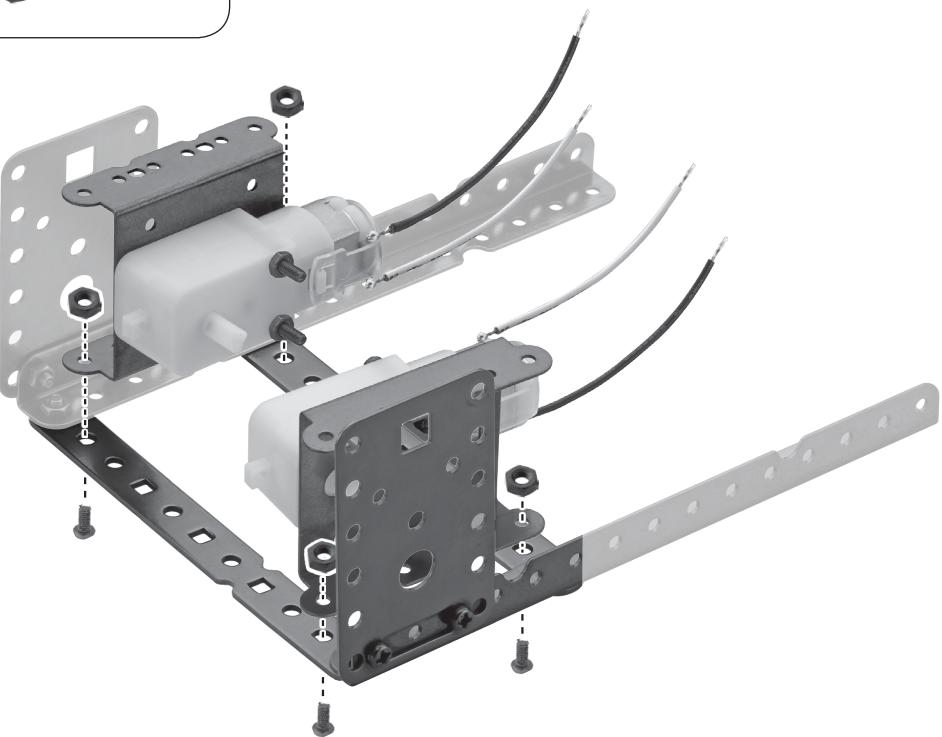
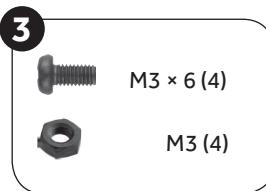
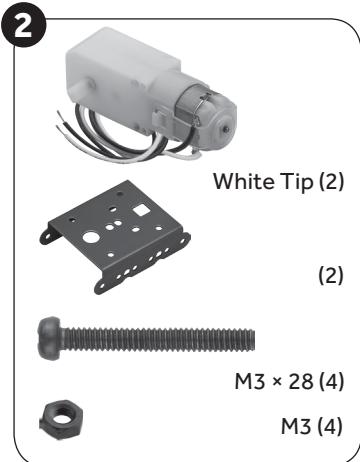
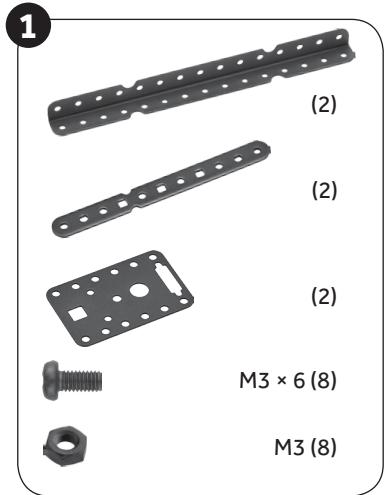


# Walking Robot

Walking Robot

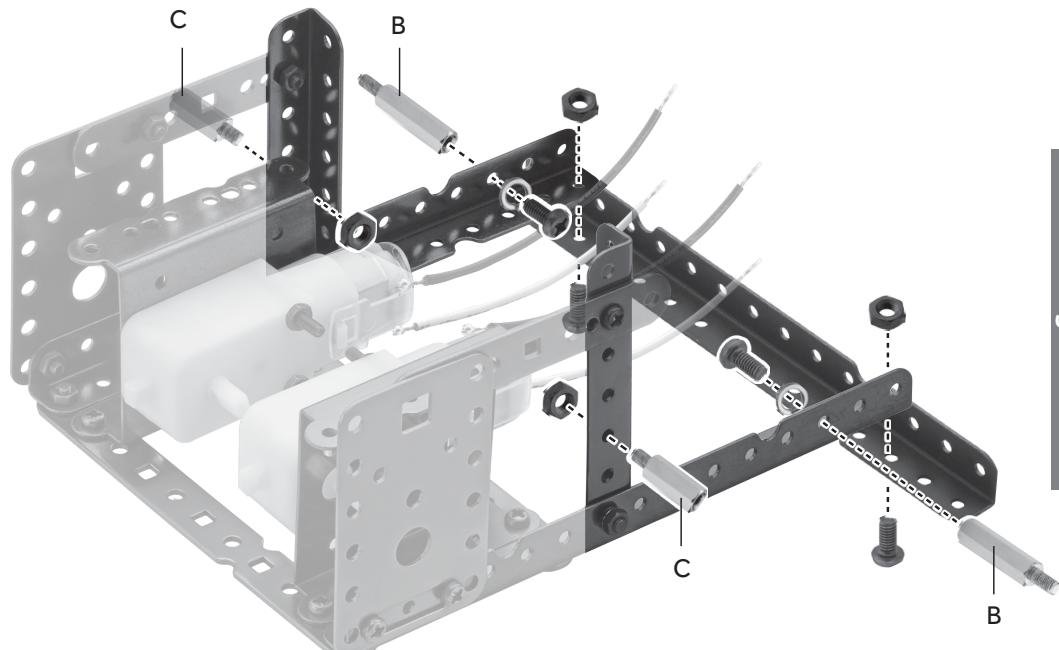
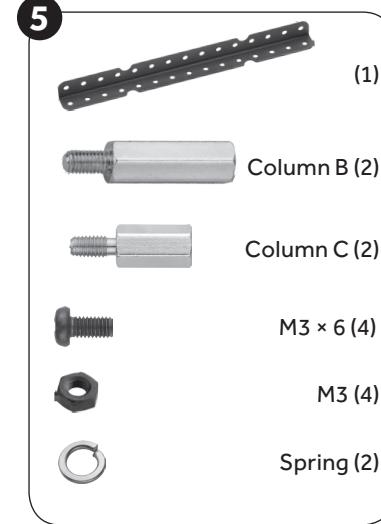
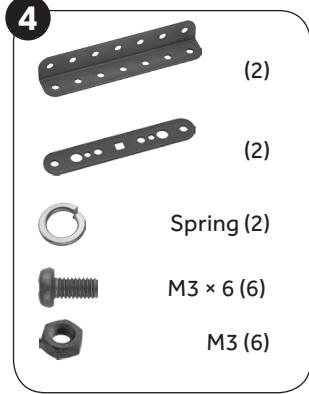
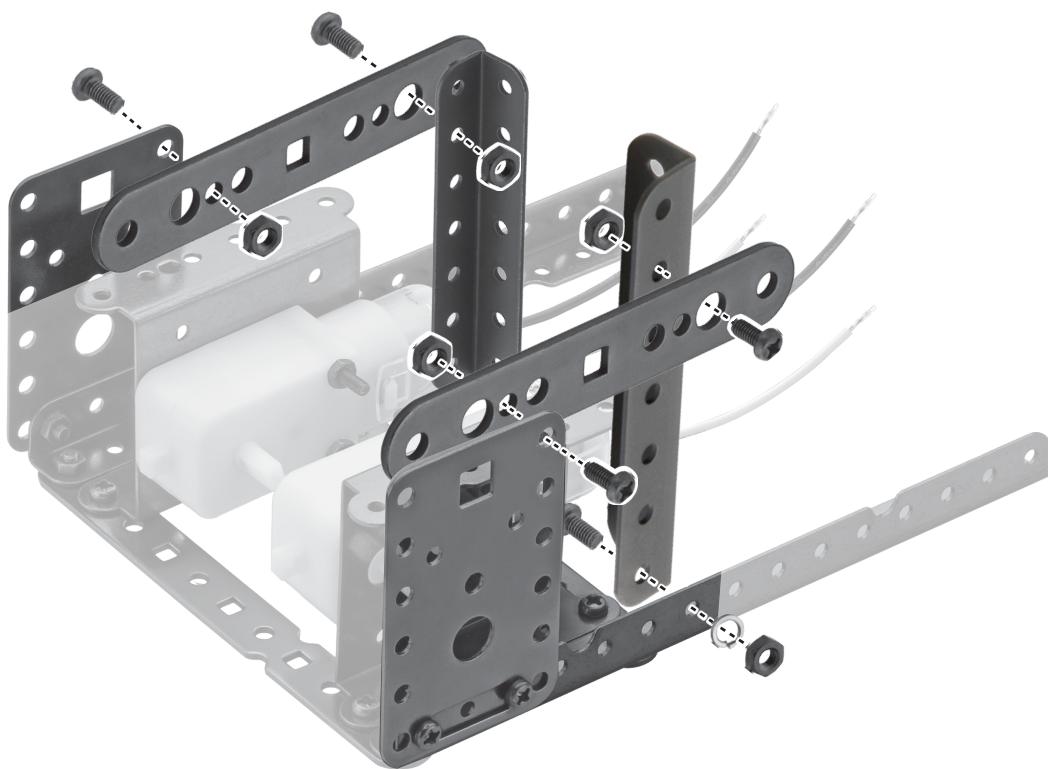


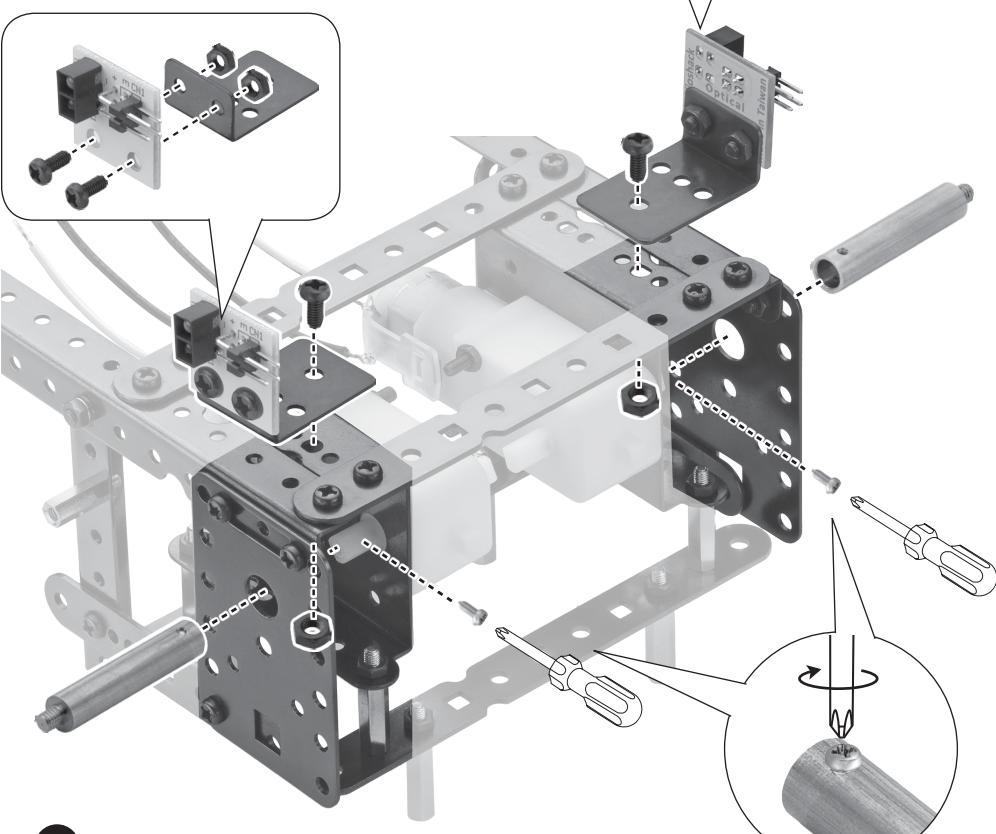
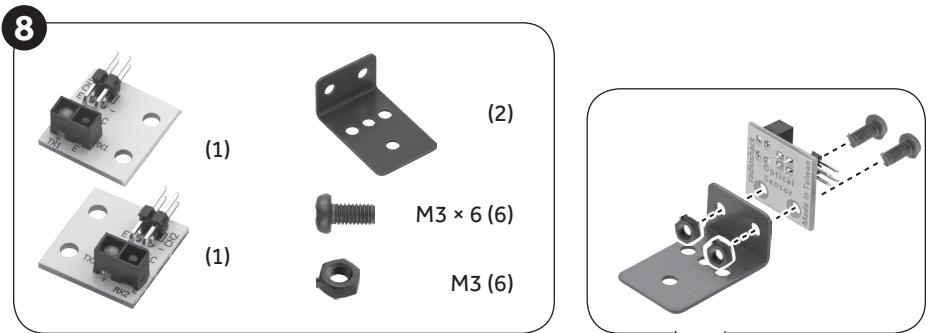
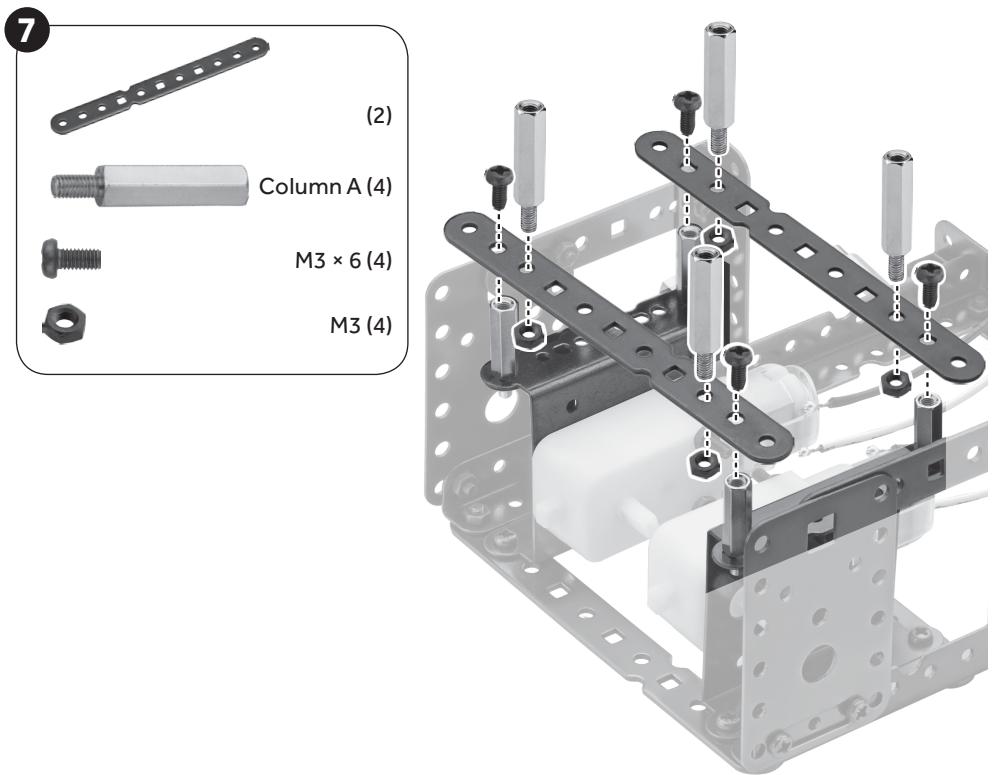
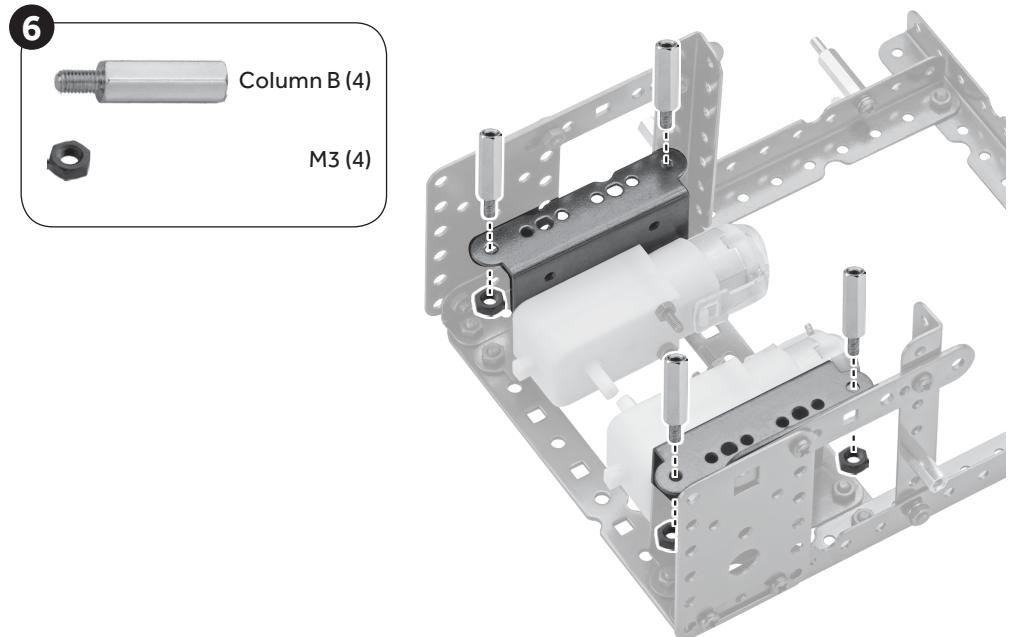
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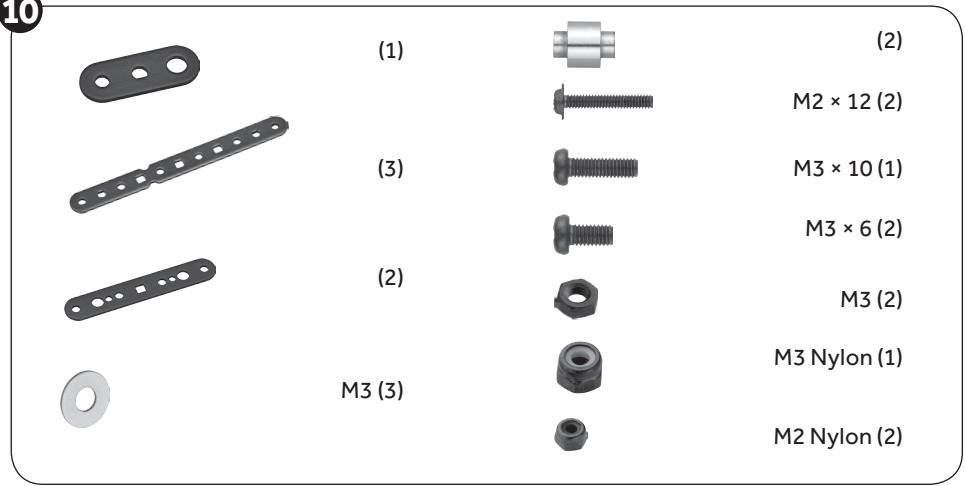
Walking Robot



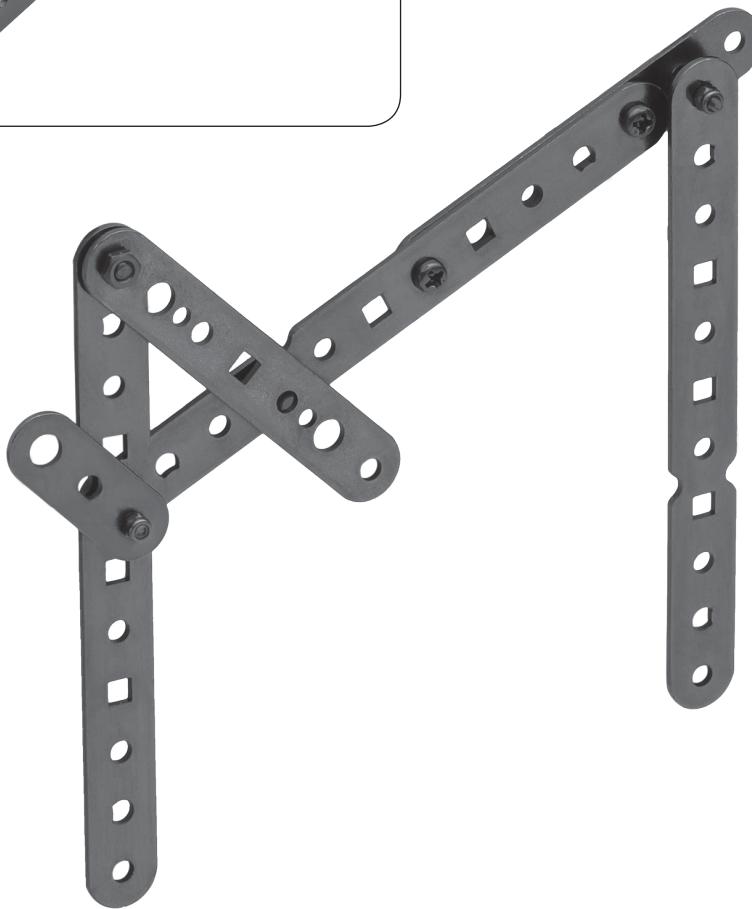
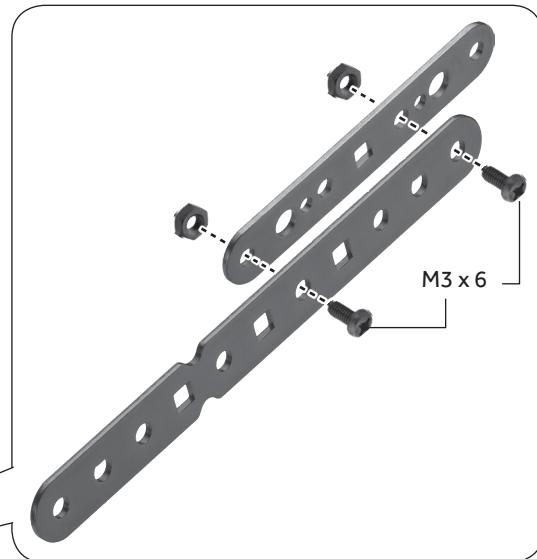
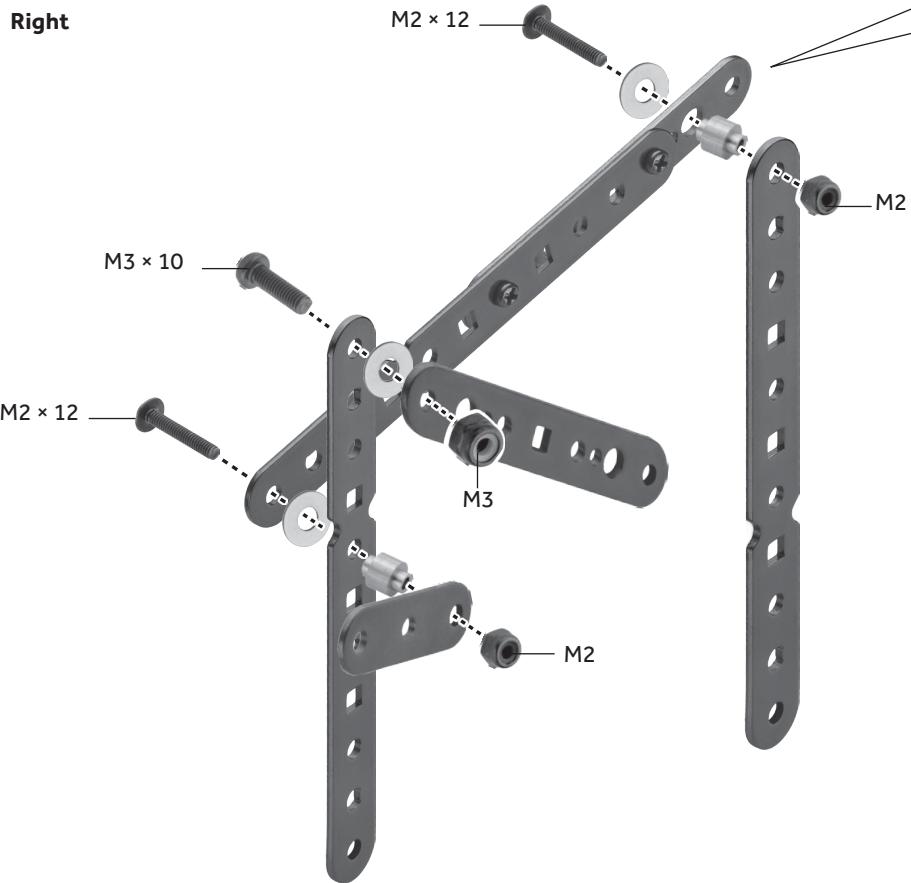


**Note:** Fully tighten the M2 x 5 screws to secure the shaft connectors to the flat surface of the motor shafts.

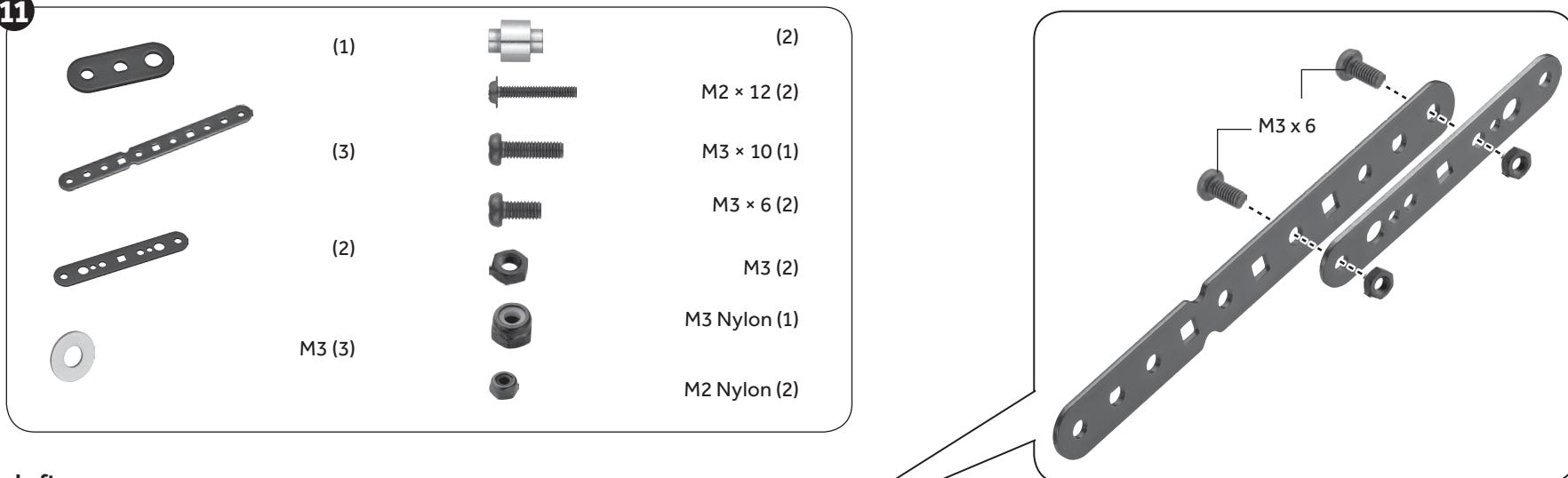
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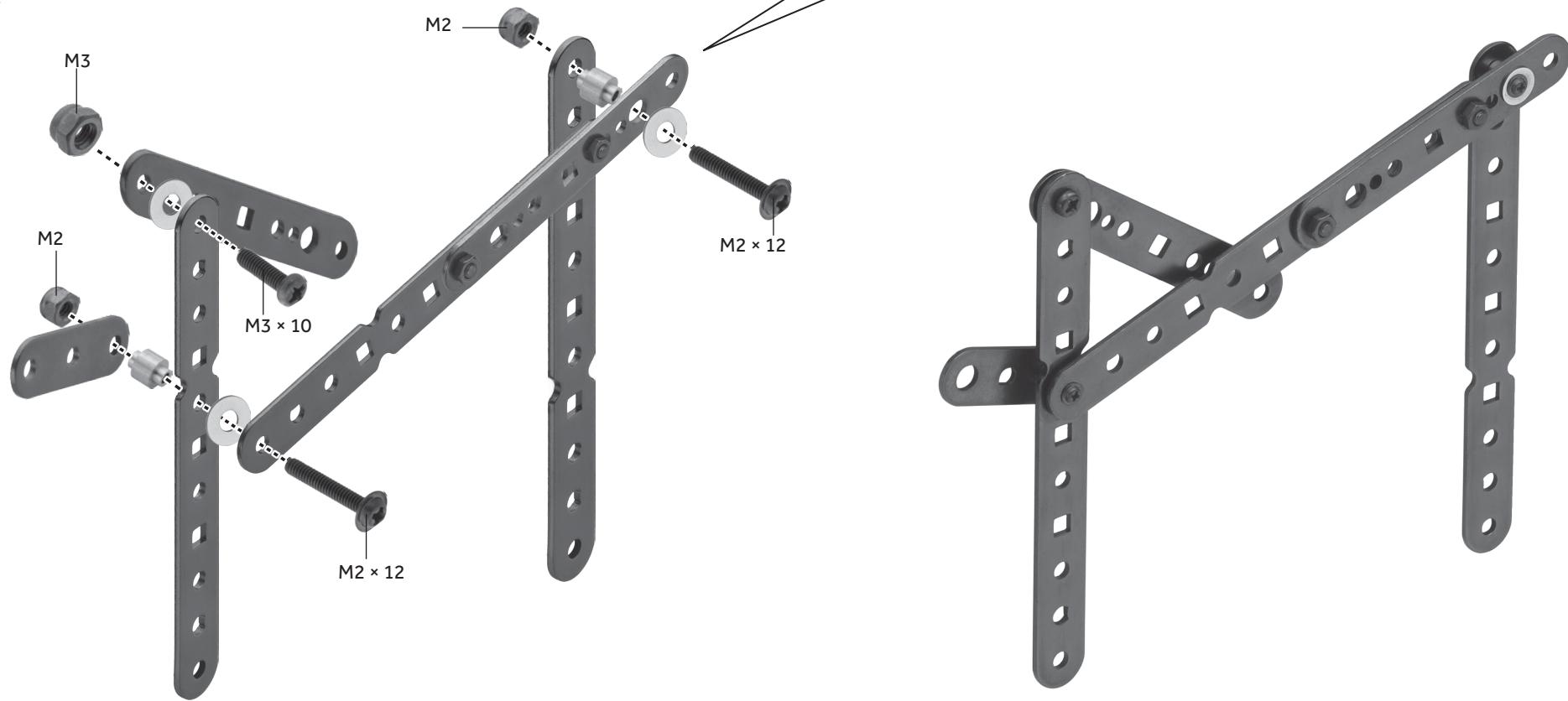
Right

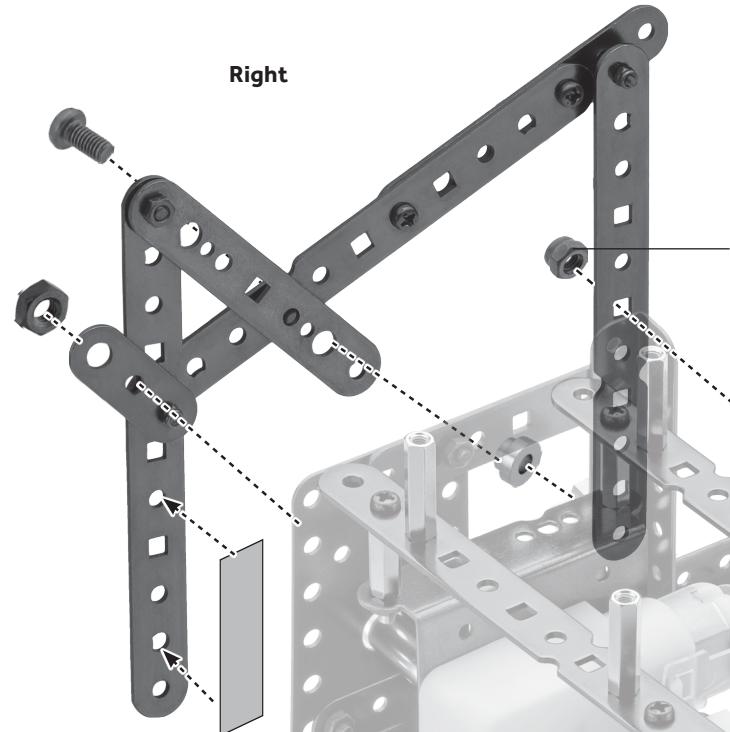
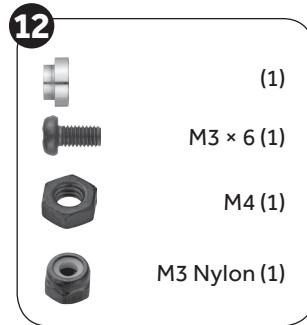


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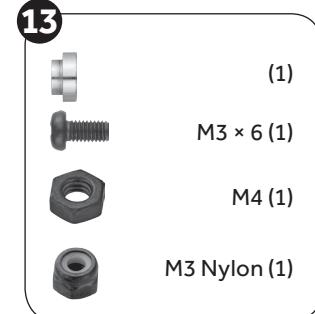


Left

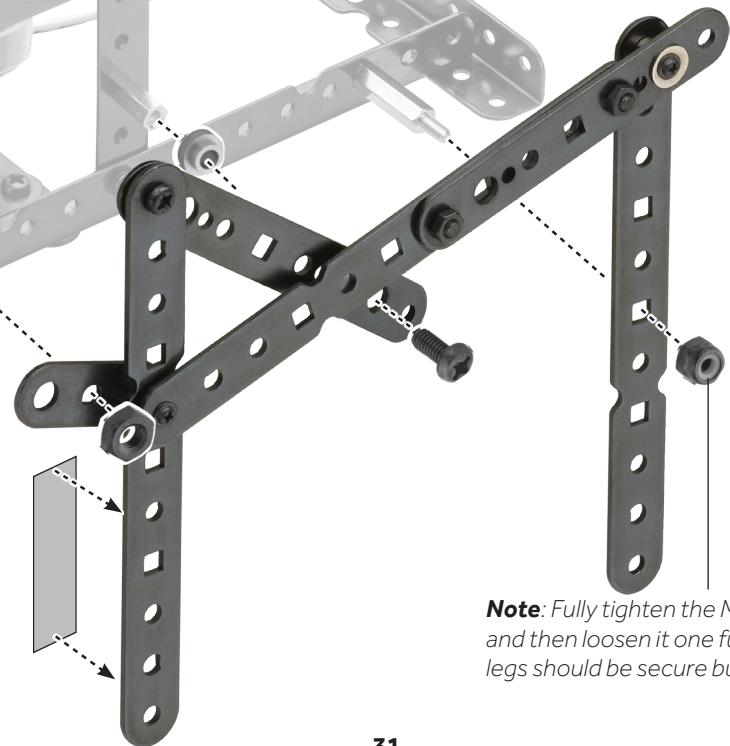




**Note:** Fully tighten the M3 nylon nut, and then loosen it one full turn. The legs should be secure but moveable.

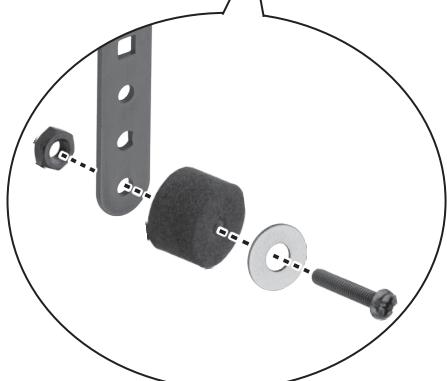
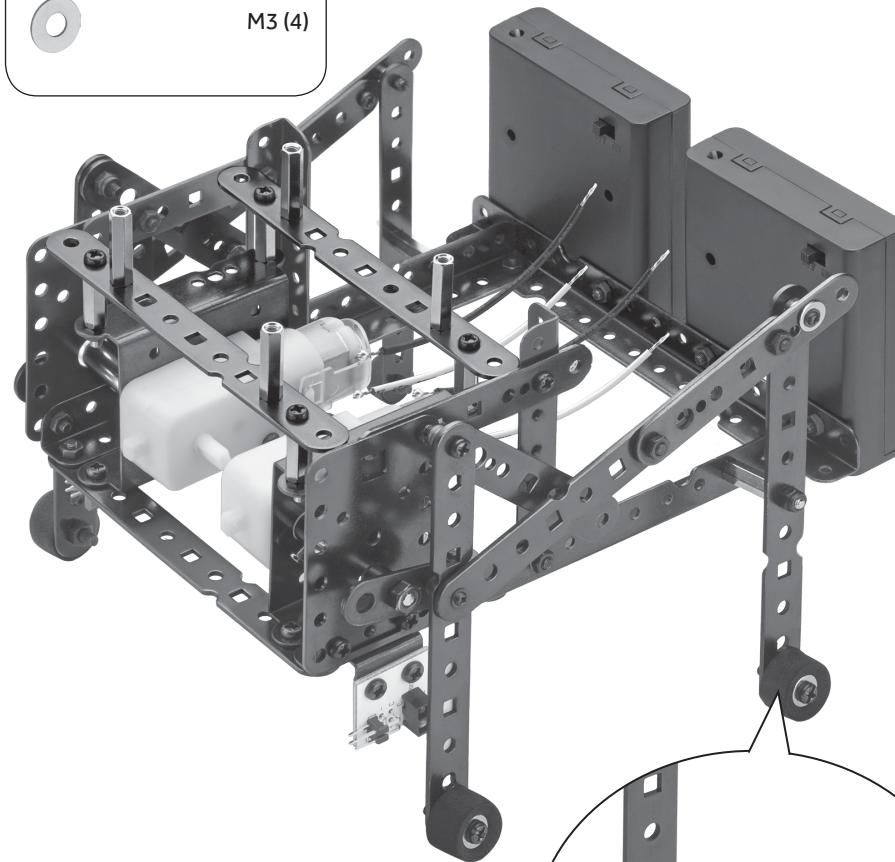
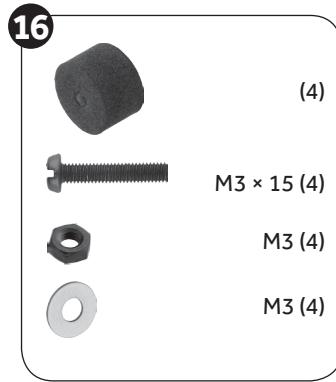
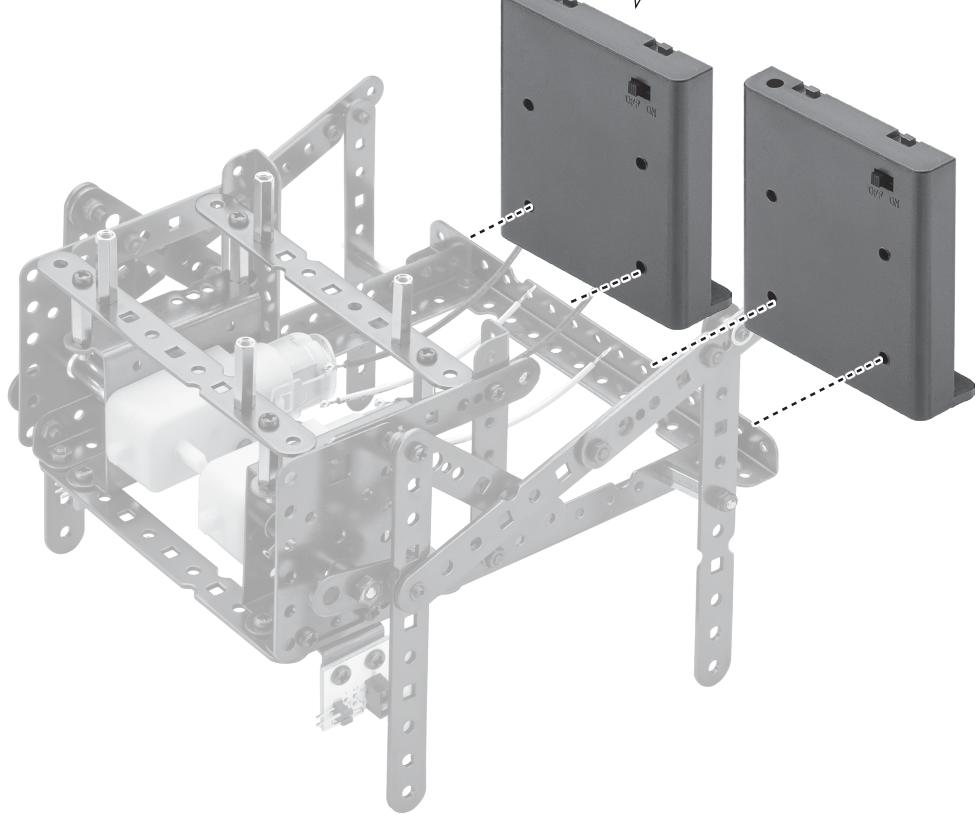
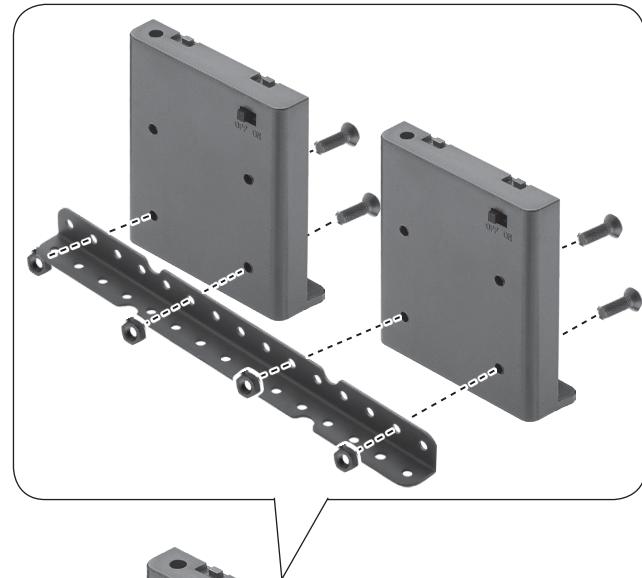
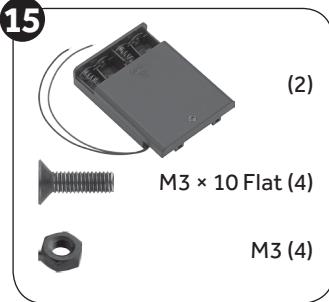


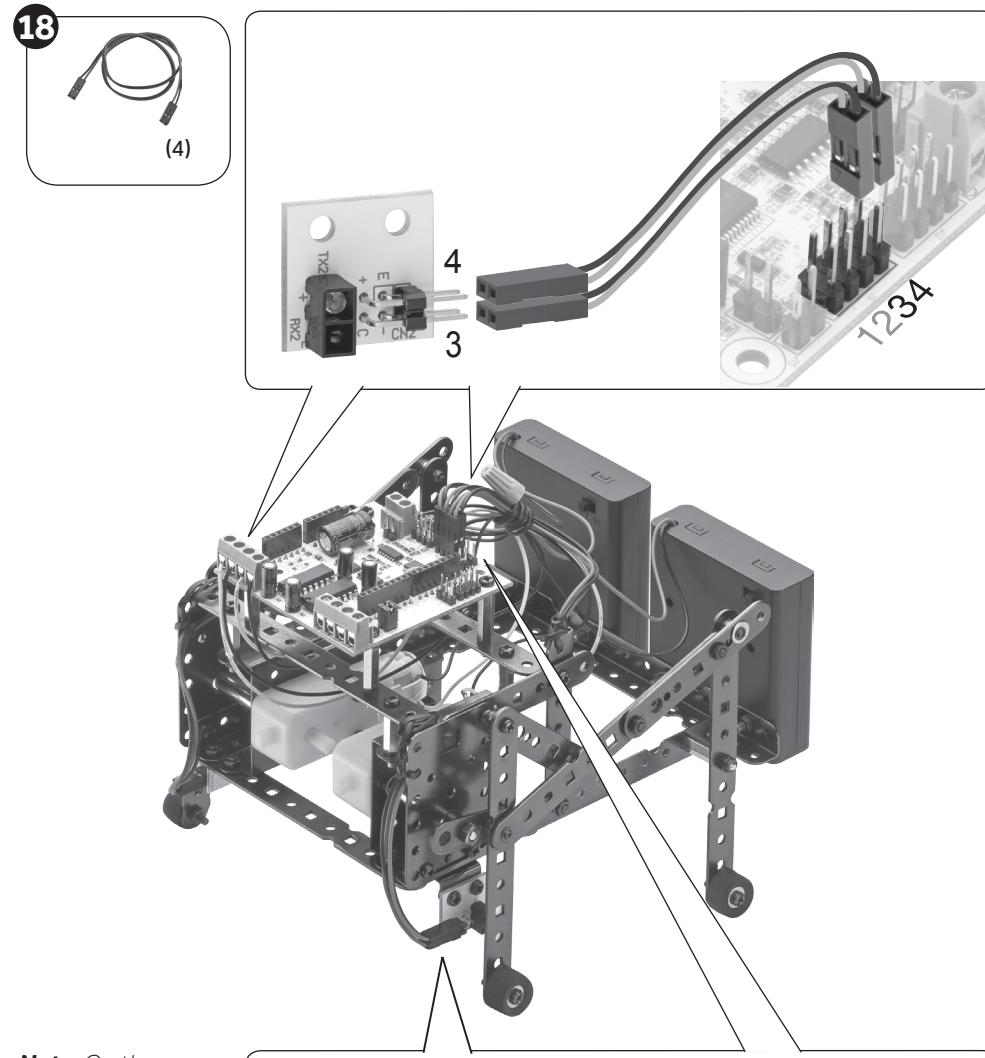
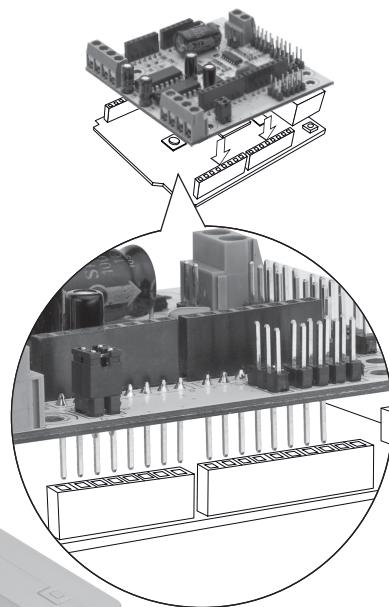
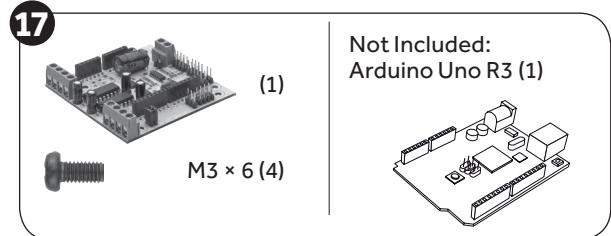
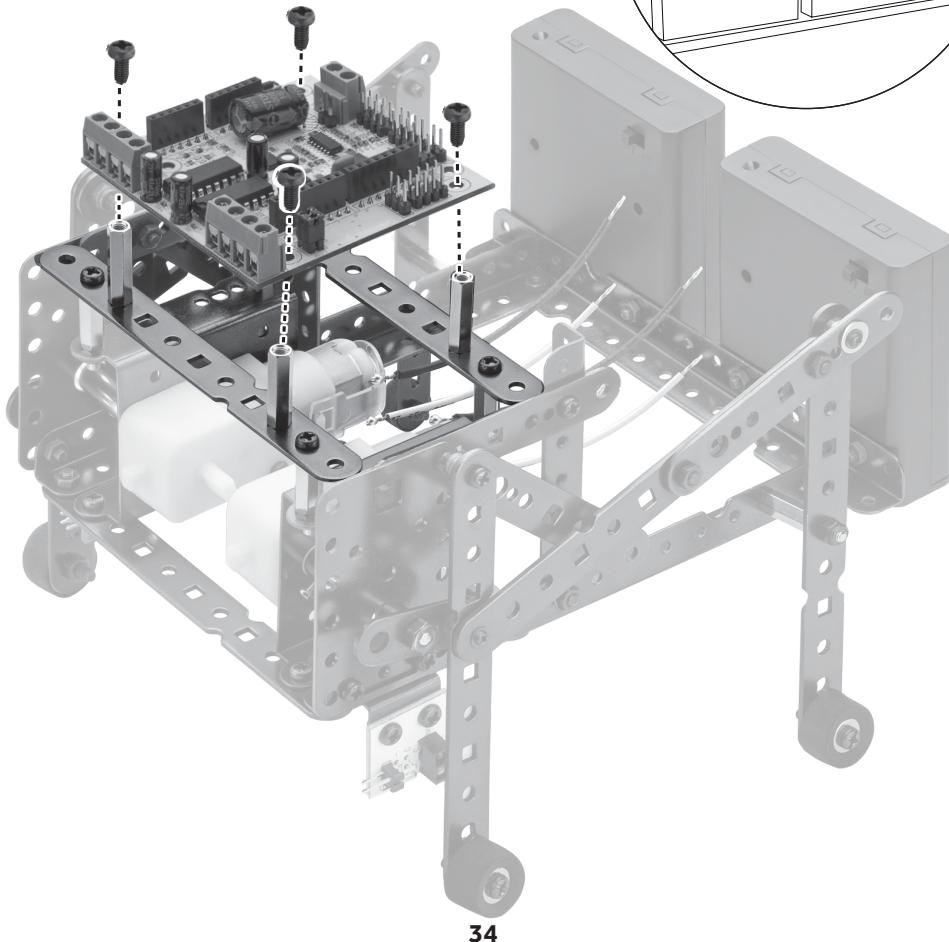
Left



**Note:** Fully tighten the M3 nylon nut, and then loosen it one full turn. The legs should be secure but moveable.

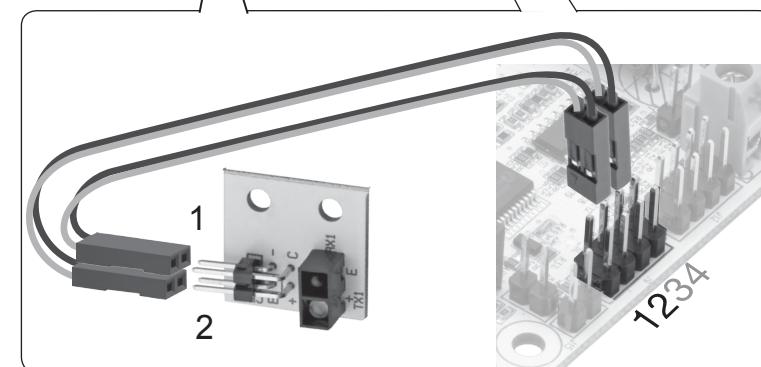


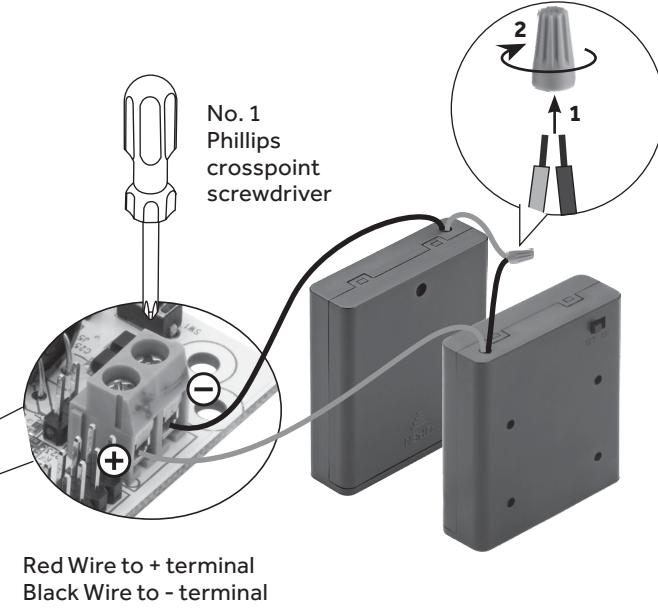
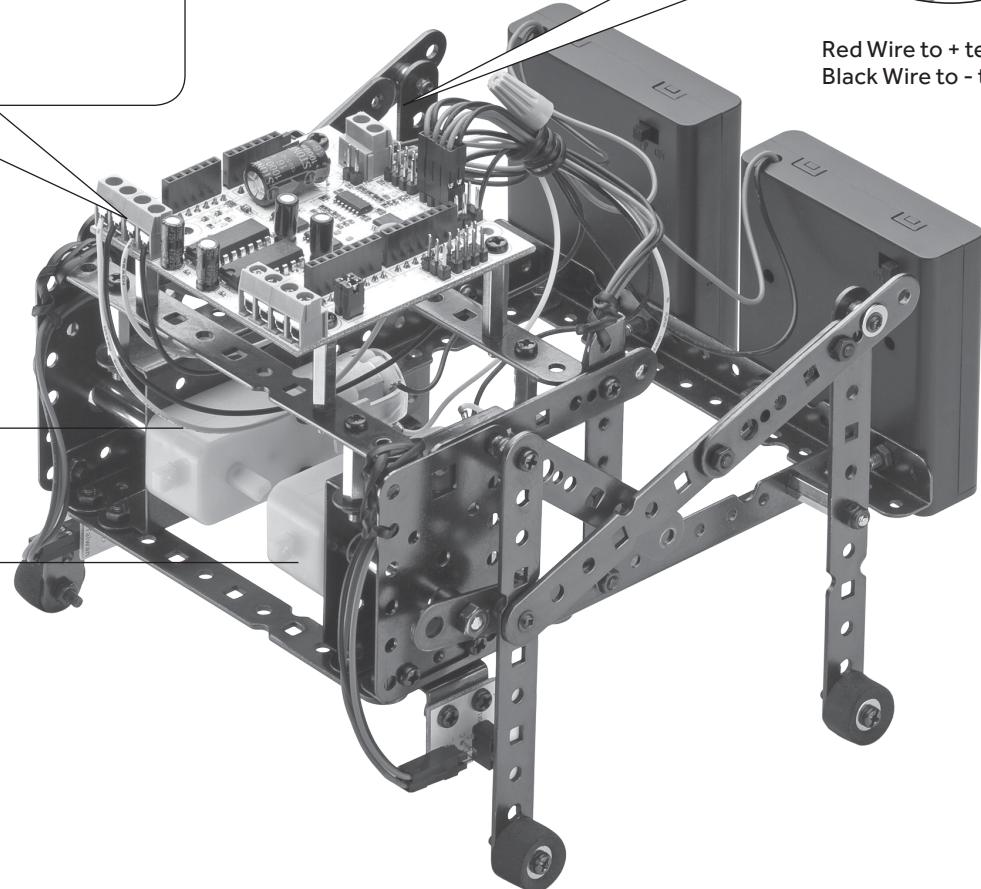
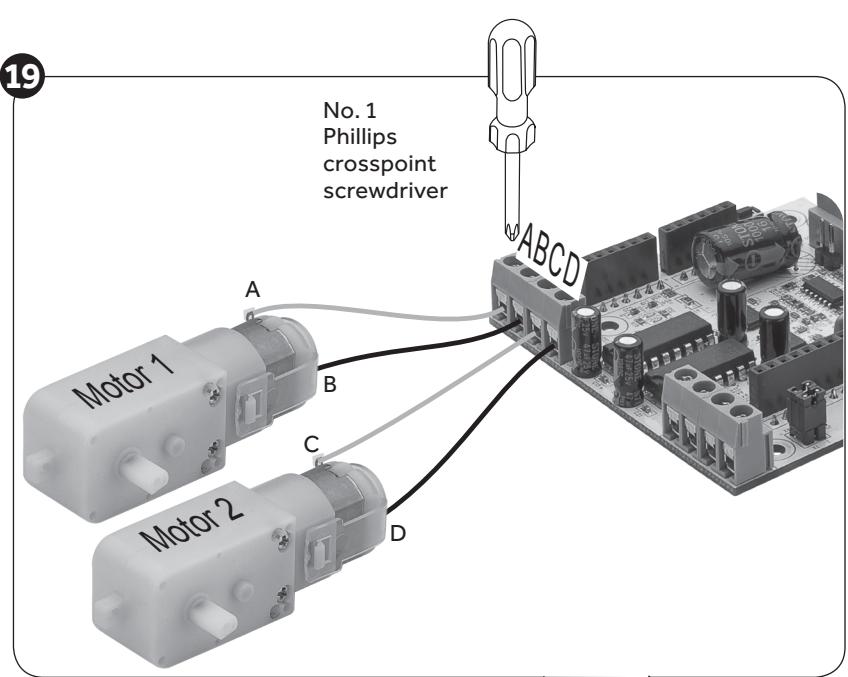




**Note:** On the sensors, match the red wire to the positive pin and the black wire to the negative pin.

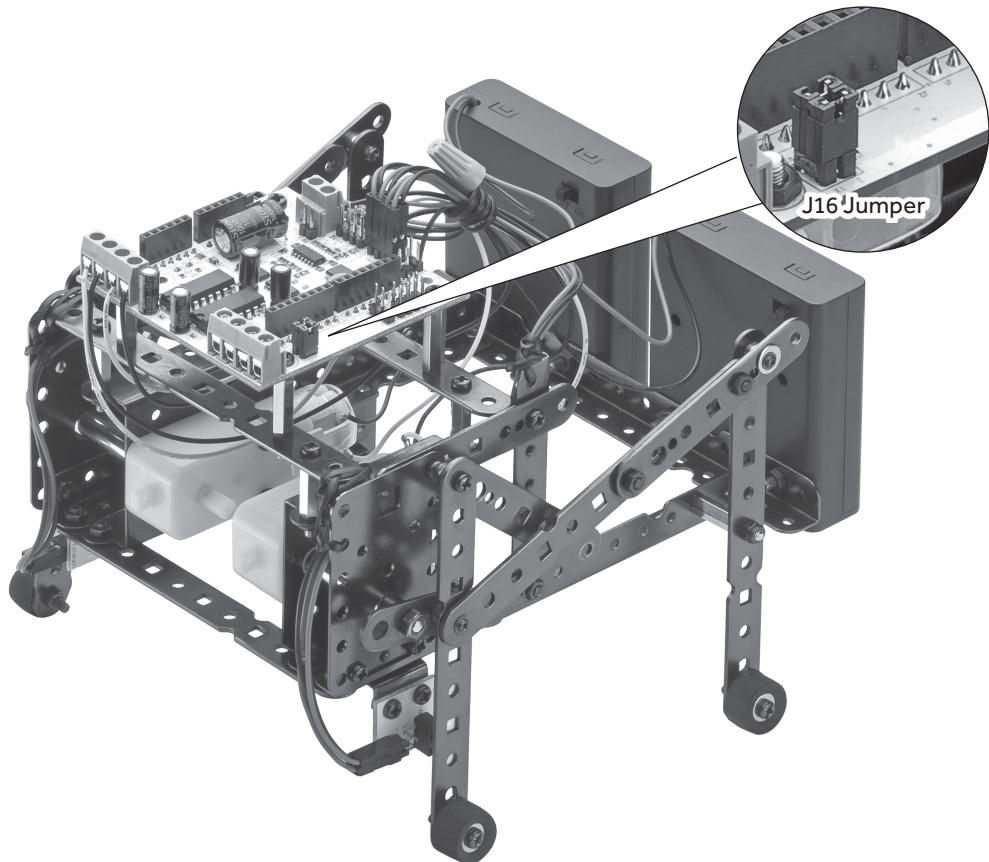
On the PCB, the red wire should face toward the center of the board.





## Download the Support Files

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2. At the end of the blog post, click **Make: it Robotics Starter Kit Support Files** and save the folder to your computer.
3. If you have not created a directory in your Arduino folder for the Make: it Robotics programs, open READ\_ME.txt and follow the directions.
4. Connect your Arduino Uno R3 to your computer with a USB cable.
5. Remove the jumpers from J16 on the PCB to allow your Arduino's USB port to communicate with your computer.
6. Open **walk.ino** in the Arduino programming environment.
7. Verify and upload the program to your Arduino Uno R3.
8. Remove the USB cable from your Arduino Uno R3.
9. Put the jumpers back onto J16. When the PCB is connected to your Arduino and the jumpers on J16 are in place, your Arduino's serial port will be unavailable.



## Play

1. Install batteries into the battery compartments on the robot matching the polarities marked inside. Replace the covers and the screws.



2. Slide the power switches to ON. The walking robot starts walking.
3. Experiment! Edit the Arduino program to change the robot's behavior. For example, you could add controls that make the robot walk forward for ten seconds and then turn right. Don't forget to upload your new program to the Arduino board.

## FCC Information

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## Limited Warranty

RadioShack warrants this product against defects in materials and workmanship under normal use by the original purchaser for **ninety (90) days** after the date of purchase from a RadioShack-owned store or an authorized RadioShack franchisee or dealer. **RADIOSHACK MAKES NO OTHER EXPRESS WARRANTIES.**

This warranty does not cover: (a) damage or failure caused by or attributable to abuse, misuse, failure to follow instructions, improper installation or maintenance, alteration, accident, Acts of God (such as floods or lightning), or excess voltage or current; (b) improper or incorrectly performed repairs by persons who are not a RadioShack Authorized Service Facility; (c) consumables such as fuses or batteries; (d) ordinary wear and tear or cosmetic damage; (e) transportation, shipping or insurance costs; (f) costs of product removal, installation, set-up service, adjustment or reinstallation; and (g) claims by persons other than the original purchaser.

Should a problem occur that is covered by this warranty, take the product and the RadioShack sales receipt as proof of purchase date to any RadioShack store in the U.S. RadioShack will, at its option, unless otherwise provided by law (a) replace the product with the same or a comparable product, or (b) refund the purchase price. All replaced products, and products on which a refund is made, become the property of RadioShack.

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300 RadioShack Circle, Fort Worth, TX 76102

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