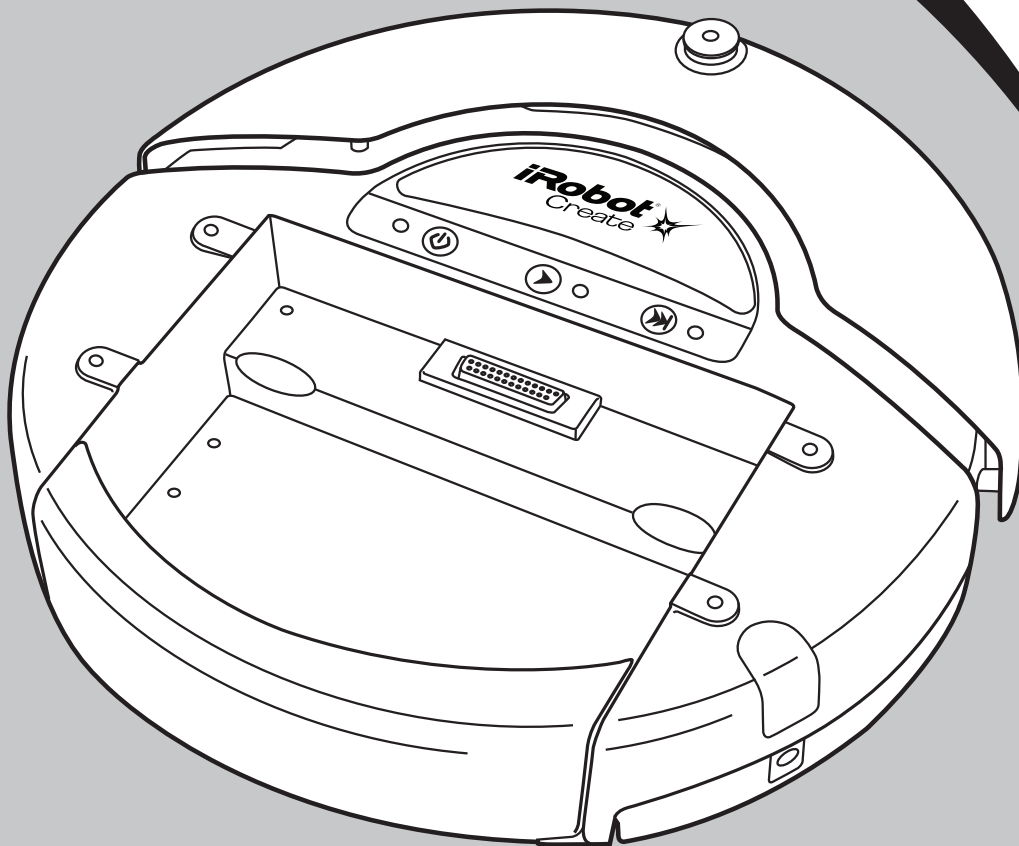# iRobot® Create

OWNER'S GUIDE

SAVE 15%
on accessories.
See back for details.

iRobot®

i♥Robots

www.irobot.com

iRobot

Important Safety Instructions

GENERAL SAFETY INSTRUCTIONS
- Read all safety and operating instructions before operating iRobot Create.
- Retain the safety and operating instructions for future reference.
- Heed all warnings on iRobot Create, battery, charger and in owner's manual.
- Follow all operating and use instructions.
- Refer all non-routine servicing to iRobot.

Create USE RESTRICTIONS
- Roomba is for indoor use only.
- Do not sit or stand on this device. Small children and pets should be supervised when iRobot Create is on.
- Do not pour or spray water onto iRobot Create.
- Do not use iRobot Create to pick up anything that is burning or smoking.
- Always remove the battery before long-term storage or transportation.
- iRobot Create has built-in safety sensors to keep it from falling down stairs and bumping hard into walls. iRobot is not responsible for any product issues that may arise if you disable those sensors.

iRobot BATTERY AND CHARGING
- Charge using a standard U.S. (120V AC) outlet only. Product may not be used with any type of power converter. Use of other power converters will immediately void the warranty.
- Use only the charger supplied by the manufacturer to charge this device.
- Do not use a charger with a damaged cord or plug.
- Charge indoors only.
- iRobot Create's power supply may be protected with a surge protector in the event of severe electrical storms.
- Never handle chargers with wet hands.

Table of Contents

About iRobot® Create

iRobot® Create is a complete robot development kit that allows you to program new robot behaviors without having to worry about mechanical assembly and low-level code. iRobot Create's Open Interface (OI) provides you with a set of commands, such as "drive" commands, demo commands, song commands and sensor commands, that encourage your own inventiveness. With iRobot Create, you can develop new behaviors and add third party electronics, all without having to worry about mechanical robustness or low-level control.

When you first begin working with iRobot Create you may find its ten built in demos useful as inspirations for your own ideas. As you become more comfortable with its abilities and interface you will want to write your own Open Interface-based programs to control iRobot Create using a serial connection from a PC or microprocessor such as the iRobot Command Module.

You can attach and control other hardware and electronic devices to iRobot Create; such as a robotic arm, light display, or a ranging sensor. It can also become a musical instrument! By using the Song command you can write and save up to 16 songs in iRobot Create. For more information on iRobot Create's OI commands, including demos and songs, refer to the iRobot® Create Open Interface (OI) Specification found at www.irobot.com/create.
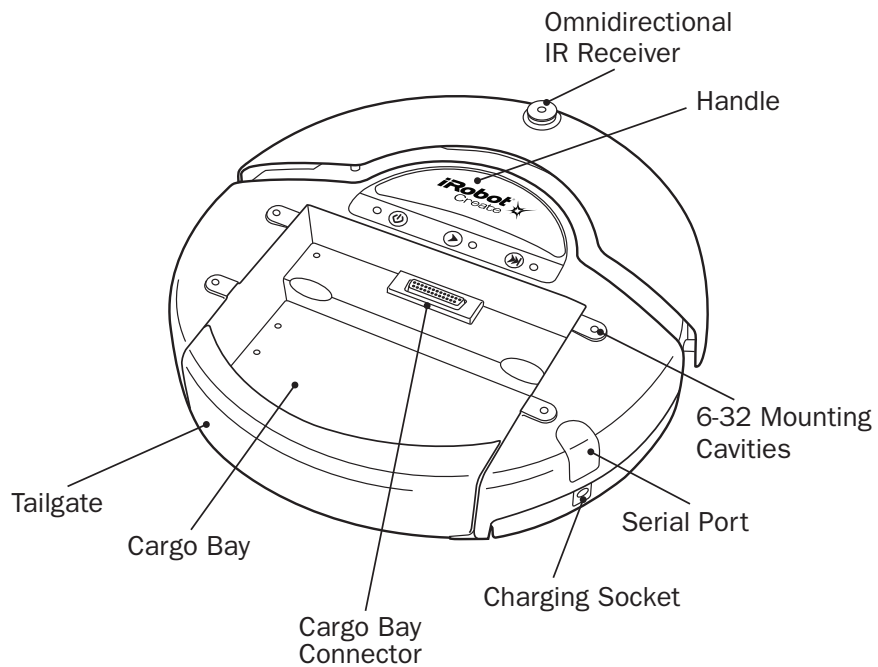
Thank you for purchasing iRobot Create. We hope you enjoy working with it and we look forward to hearing about your experiences.

Sincerely,

The iRobot Create Team

Anatomy

Top View

Omnidirectional
IR Receiver

Handle

6-32 Mounting
Cavities

Tailgate

Serial Port

Cargo Bay

Charging Socket

Cargo Bay
Connector

Buttons and Lights

Power Button

Play
Button

Advance Button

Power LED

Play LED

Advance LED

Bottom View

Cliff Sensor
Openings

Contact
Points for
Home Base

Wheel Clips

Battery

Fourth Wheel
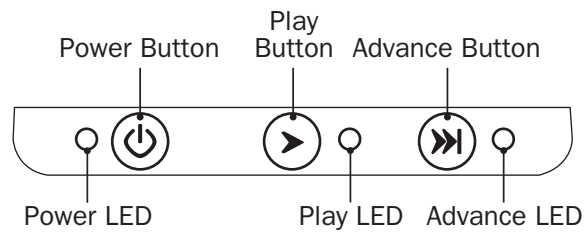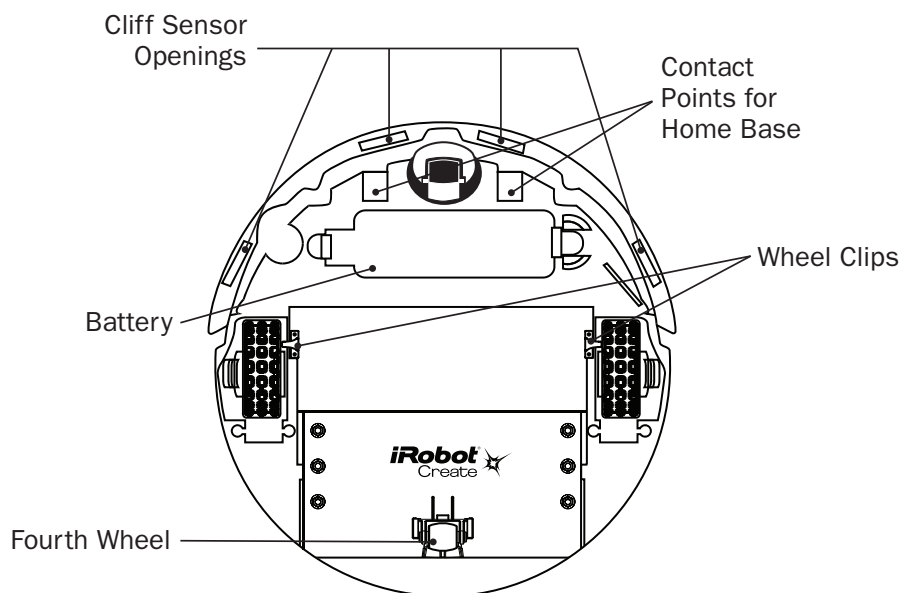
Wheel Clips

iRobot Create comes equipped with wheel clips that hold its main wheels in the Retracted position. You can remove the wheel clips, which automatically places the wheels into the Released position. Save them in case you later want to use iRobot Create with the wheels in the Retracted position. There are advantages to both the Retracted and Released wheel positions.

- The Retracted wheel position (clips in place) provides iRobot Create with greater stability. This is useful if you are running iRobot Create with a payload.

- The Released wheel position (clips removed) provides iRobot Create with greater mobility. This is useful if you want iRobot Create to travel over uneven surfaces.

Adding the Fourth Wheel

iRobot Create comes with an additional unattached fourth wheel that allows for greater stability and prevents the back of the robot from dragging when you add payloads. The fourth wheel is not necessary unless iRobot Create is running with a payload.

To attach the fourth wheel, remove all payloads from iRobot Create and turn it over so you can see the underside. Slide the fourth wheel into the grooves at the back of the robot, with the wheel angled toward the back (see figure 1). Push it in until it clicks into place. To remove it, depress the tab in front of the grooves and slide the wheel out.
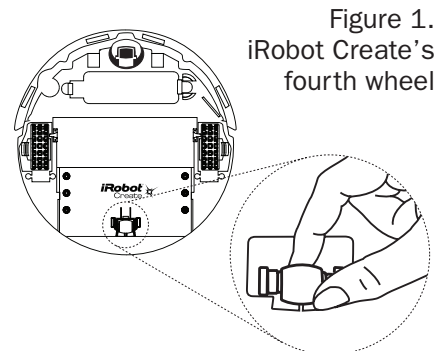

Figure 1. iRobot Create's fourth wheel

Adding Weight to the Tailgate

iRobot Create comes with a tailgate that enables you to change the center of gravity of the robot by adding weight to the back portion of the robot. This is useful when running iRobot Create with a payload.

To add weight:

- Remove the 2 screws that are securing the tailgate to the robot.

- Remove the 5 screws holding down the cover of the tailgate.

- Insert pennies (or other weights) into the inside tailgate slots.

- Screw the cover back on the tailgate and screw the tailgate back on the robot.

Tailgate
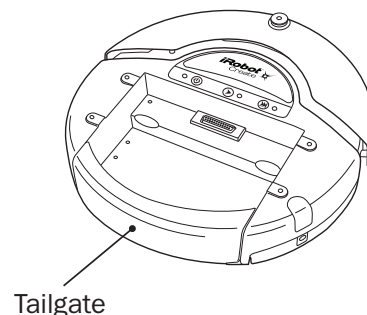
Demos

iRobot Create comes with ten built-in demos to provide inspiration for your own robot programming adventures.

- Press the power button and wait for the power LED to stop flashing.
- To select a demo, press the Advance button ⏩. iRobot Create beeps the number of the selected demo. One long, low beep is equal to five short, high beeps. For example, when you select demo number 8, iRobot Create plays long-short-short-short (—···).
- iRobot Create's Advance LED blinks in the same pattern while a demo is running or paused.
- Press the Play button ▷ to start the currently selected demo.
- To stop the demo, press the Play button or the Advance button.

Demo Descriptions

Demo	Description	Demo #	Demo Beep Pattern
Cover	iRobot Create covers an entire room using a combination of behaviors, such as bouncing off of walls, following walls, and spiraling.	1	·
Cover and Dock	Identical to the Cover demo, with one exception; if iRobot Create sees the Home Base's* infrared signals, it uses these to move towards the Home Base and dock with it.	2	··
Spot Cover	iRobot Create spirals outward, then inward, to cover an area around its starting position.	3	···
Mouse	iRobot Create tries to follow around the edges of a room using its wall sensor and bumper.	4	····
Figure Eight	iRobot Create continuously drives in a figure 8 pattern.	5	—
Wimp	iRobot Create drives forward when pushed from behind. If iRobot Create hits an obstacle while driving, it drives away from the obstacle.	6	—·
Home	iRobot Create drives toward a Virtual Wall* when the back and sides of its Omnidirectional IR Receiver are covered with black electrical tape. When it touches the Virtual Wall or another obstacle, it stops.	7	—··
Tag	Identical to the Home demo, except iRobot Create goes back and forth between multiple Virtual Walls by bumping into one, turning around, driving to the next Virtual Wall, bumping into it and turning around to bump into the next Virtual Wall.	8	—···
Pachelbel	iRobot Create plays the notes of Pachelbel's Canon in sequence when its cliff sensors are activated.	9	—····
Banjo	iRobot Create's four cliff sensors play the notes of a chord, depending on how the bumper is pressed: •No bumper: G major •Right or left bumper: D major7 •Both bumpers (center): C major	10	— —

*To find out more about the Home Base and Virtual Wall, see the Accessories section starting on page 14.

Demo Commands

You can also start a demo with iRobot Create's Open Interface serial protocol. For details, see the iRobot® Create Open Interface (OI) Specification found at www.irobot.com/create.

Powering iRobot Create

iRobot Create can be powered with the included alkaline battery pack, which takes "AA" alkaline batteries, or with any of the iRobot rechargeable batteries available for purchase at www.irobot.com.

iRobot Create's power light indicates the charge state of the batteries. It is green when the batteries are fully charged or new, and gradually turns red as the batteries discharge.

WARNING: Do not use rechargeable AA batteries in iRobot Create. Use Alkaline batteries or iRobot Rechargeable Batteries only.

| Color of Power Light	Battery Status
Slow Pulsing Orange	Charging (iRobot rechargeable battery only)
Fast Pulsing Orange	Reconditioning Charge (iRobot rechargeable battery only)
Green	Fully Charged
Amber	Partially Discharged
Red	Almost Fully Discharged
Flashing Red	Fully Discharged

Alkaline Battery Pack

The included alkaline battery pack requires 12 non-rechargeable "AA" batteries to power iRobot Create. iRobot Create's low-voltage shutoff is designed for alkaline batteries only; rechargeable batteries can be deeply discharged and damaged if they are used in the alkaline battery pack. iRobot Create does not attempt to charge batteries in the alkaline battery pack. Alkaline batteries will power the robot (on a hard floor with no payloads or attachments) for up to 1.5 hours if the robot is constantly moving. If you plan to have your robot moving continuously, iRobot recommends that you purchase a rechargeable battery pack at www.irobot.com.

Using the Alkaline Battery Pack

Use a Phillips head screwdriver to loosen the four screws on the underside of the green Alkaline Battery Pack. The screws will not come all the way out of the doors. Slide the doors up and out of the battery case. Insert six non-rechargeable alkaline "AA" batteries into each side of the battery case and then slide the doors back on. Tighten the screws.

Insert the battery case into iRobot Create's Battery Well, pushing until it clicks into place.

Note: The Alkaline Battery Pack is not recommended for use in iRobot Roomba®.
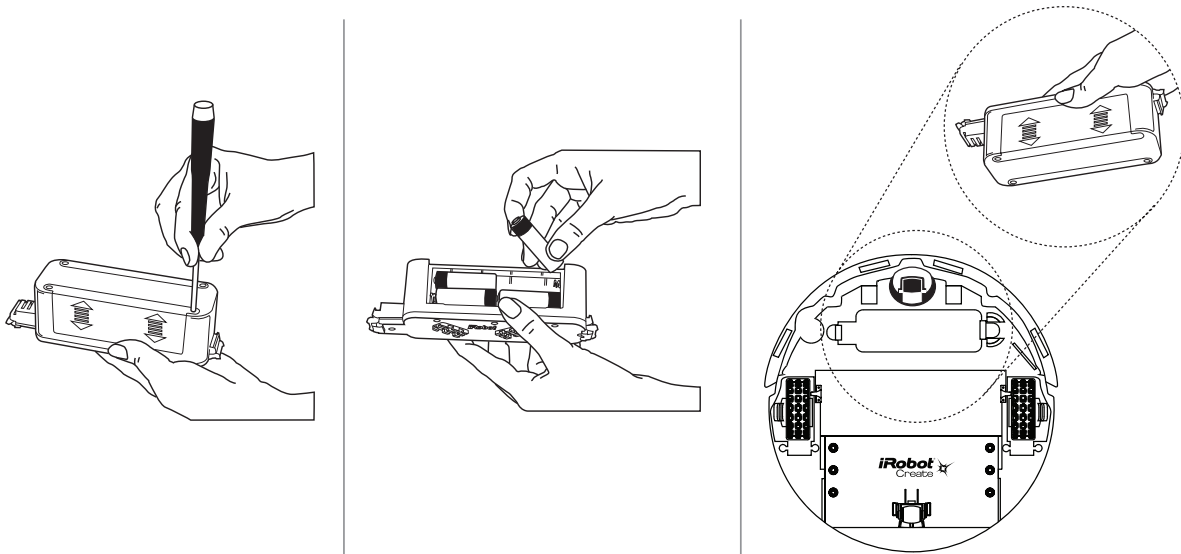
Cargo Bay Connector

The cargo bay connector, located in the front middle of the cargo bay contains 25 labeled pins that you can use to attach electronics and other peripheral devices such as additional sensors, lights, or motors to iRobot Create. The cargo bay connector provides four digital inputs, an analog input, three digital outputs, three low-side driver outputs (useful for driving motors), a charging indicator, a power toggle, serial Tx and Rx, a 5V reference, battery ground and battery voltage.

Cargo Bay Connector Pin Descriptions

Pin	Name	Description
1	RXD	0 – 5V Serial input to iRobot Create
2	TXD	0 – 5V Serial output from iRobot Create
3	Power control toggle	Turns iRobot Create on or off on a low-to-high transition
4	Analog input	0 - 5V analog input to iRobot Create
5	Digital input 1	0 - 5V digital input to iRobot Create
6	Digital input 3	0 - 5V digital input to iRobot Create
7	Digital output 1	0 - 5V, 20 mA digital output from iRobot Create
8	Switched 5V	Provides a regulated 5V 100 mA supply and analog reference voltage when iRobot Create is switched on
9	Vpwr	iRobot Create battery voltage (unregulated), 0.5A
10	Switched Vpwr	Provides battery power @ 1.5 A when iRobot Create is powered on.
11	Switched Vpwr	Provides battery power @ 1.5 A when iRobot Create is powered on.
12	Switched Vpwr	Provides battery power @ 1.5 A when iRobot Create is powered on.
13	Robot charging	When iRobot Create is charging, this pin is high (5V)
14	GND	iRobot Create battery ground
15	BRC	0-5V digital input to iRobot Create which can also be used to change the baud rate to 19200 (see below)
16	GND	iRobot Create battery ground
17	Digital input 0	0 - 5V digital input to iRobot Create
18	Digital input 2	0 - 5V digital input to iRobot Create
19	Digital output 0	0 - 5V, 20 mA digital output from iRobot Create
20	Digital output 2	0 - 5V, 20 mA digital output from iRobot Create
21	GND	iRobot Create battery ground
22	Low side driver 0	0.5A low side driver from Create
23	Low side driver 1	0.5A low side driver from Create
24	Low side driver 2	1.5A low side driver from Create
25	GND	iRobot Create battery ground

Open Interface Commands

iRobot Create comes with a serial protocol called the Open Interface (OI) which consists of a set of commands that you can use to control the robot and read its sensors. The types of commands available include:

- Demo commands
- Driving commands
- Song commands
- Sensor commands
- Cargo Bay Connector commands
- Scripting commands

A description of all the OI commands can be found in the iRobot® Create Open Interface (OI) Specification found at www.irobot.com/create.

You send these commands to iRobot Create using the included serial cable or any other serial connection to a PC.

The serial cable plugs into iRobot Create's Mini-Din connector, which is located in the rear right side of iRobot Create, beneath a snap-away plastic guard.

Sending OI Commands from a PC

Connect the serial cable between iRobot Create and your PC's serial port and start a serial terminal program that is capable of sending data. iRobot recommends the freeware RealTerm Serial Capture Program, available at http://realterm.sourceforge.net/.

Configure the serial settings to 57600 baud, 8 data bits, 1 stop bit, and no flow control. Select the "Send" tab on RealTerm. Enter commands and watch the robot perform!

Examples:

- **To turn on iRobot Create's Play LED only**:
  ```
  128 132 139 2 0 0
  ```

- **To read the state of iRobot Create's left cliff sensor**:
  ```
  128 142 9
  ```
  See how the robot's response changes when you lift it up.

- **To make iRobot Create sing**:
  Send these command sets separately:

  ```
  128 132  (Puts the robot in Full mode)
  140 0 4  62 12 66 12 69 12 74 36  (Defines the song)
  141 0  (Plays the song)
  ```

- **To make iRobot Create drive forward**:
  CAUTION - place iRobot Create on the ground and be ready to grab it when it reaches the end of its serial cable tether! Send these two command sets separately:

  ```
  128 131
  137 0 100 128 0
  ```

You can also write scripts of commands, freeing your robot from the serial cable tether. A script is a sequence of commands including commands that wait for events. With a script you can make the robot perform a "song-and-dance" routine that you create.

For more information on scripts, see the section Creating a Script for iRobot Create found on page 13.

To make the robot perform more complex behaviors, you can write software that runs on the PC and sends commands to the robot while reading its sensor data. Your software can communicate with iRobot Create over the included serial cable or a wireless serial accessory (not included).

For more information on the Open Interface commands, see the iRobot® Create Open Interface (OI) Specification at **www.irobot.com/create**.

Sending OI Commands from a Microprocessor
With a microprocessor like iRobot's Command Module attached to your robot, you can make it perform complex behaviors without a serial tether or wireless connection to a PC. See page 16 for details on the iRobot Command Module.

With the iRobot Command Module, which plugs into iRobot Create's Cargo Bay Connector, you can write your own programs in C or C++, that send OI commands to iRobot Create and read its sensor data.

You can also expand on the sensors and actuators that iRobot Create offers by adding your own custom hardware to the iRobot Command Module's four DB-9 expansion ports.

Creating a Script for iRobot Create

iRobot Create's Open Interface (OI) supports a simple scripting language. A script consists of a sequence of commands, including drive commands and commands that wait for an event such as a button press, elapsed time, or sensor trigger. These commands are documented in detail in the iRobot® Create Open Interface (OI) Specification. Scripts are stored in iRobot Create's RAM, which is cleared when the robot loses power.

Using the Script Command

To load a script onto iRobot Create, use the Script command (152), followed by the number of bytes in the script, followed by the series of commands and their arguments. Scripts can be up to 100 bytes long.

Example:

Drive in a square:

```
152 17 137 1 44 128 0 156 1 144 137 1 44 0 1 157 0 90 153
```

The meaning of the above string of numbers is:

Commands and Arguments	Values	
Script	152	
Number of bytes	17	
Drive	137	
300 mm/s	1	44
Straight	128	0
Wait for Distance	156	
400 mm	1	144
Drive	137	
300 mm/s	1	44
Spinning counterclockwise	0	1
Wait for Angle	157	
90 degrees	0	90
Restart Script	153	

Using the Play Script Command

When you are ready for iRobot Create to perform the script, send the Play Script command (153). This loads the script into the serial queue. iRobot Create then immediately begins executing the script's commands as if they had been sent directly to the serial port.

To download a copy of the iRobot Create Open Interface Specification, go to **www.irobot.com/create**.