



# Ozobot Bit

*A Guide for Parents and Educators*

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## About Ozobot Bit



Ozobot Bit is a programmable robot that can be used in the classroom or at home to help children learn to code. It is somewhat unique because it can be programmed with paper and a marker, as well as with sequences of light flashes emitted from a smart device. It can also be integrated into learning activities with a variety of other subjects, including (but not limited to) science, math, language arts, social studies, the arts, and more.

### Ozo-Stats

	Marker Programming	OzoBlockly & OzoGroove
<b>Best for Ages (Grades)</b>	4-11 (PreK-6)	6-17 (3-12)
<b>Motor &amp; Hand-Eye Skills Needed</b>	<ul style="list-style-type: none"> <li>Press physical button</li> <li>Draw lines with markers that are about ¼ inch (5mm) thick</li> </ul>	<ul style="list-style-type: none"> <li>Press physical button</li> <li>Press a touchscreen</li> <li>Drag &amp; drop on a touchscreen</li> </ul>
<b>Language Skills Needed</b>	<ul style="list-style-type: none"> <li>Read simple words</li> </ul>	<ul style="list-style-type: none"> <li>(Ozoblockly Level 1) Recognize and select symbols</li> <li>(Higher Levels) Read simple words</li> </ul>
<b>Cognitive Skills Needed</b>	<ul style="list-style-type: none"> <li>Recognize &amp; draw color patterns</li> <li>Recognize cause &amp; effect patterns</li> </ul>	<ul style="list-style-type: none"> <li>Recognize cause &amp; effect patterns</li> <li>Logical problem-solving</li> </ul>
<b>Use with a Smart Device</b>	N/A	Required
<b>Compatibility:</b> More Info: <a href="https://ozobot.com/support/faq">https://ozobot.com/support/faq</a>	N/A	<ul style="list-style-type: none"> <li>✓ iOS</li> <li>✓ Android</li> </ul>
<b>Connectivity Requirements</b>	None - uses marker codes	None - uses flashes of light on device
<b>Battery Recharge Time</b>	30-40 min.	

Battery Duration	90 minutes
Accessories	Yes ( <a href="http://bit.ly/2ILwiOE">http://bit.ly/2ILwiOE</a> )
Pricing	See store: <a href="http://bit.ly/2ILabDP">http://bit.ly/2ILabDP</a>

## Setup Instructions

### What's In the Box?

You can get a feel for the wide variety of accessories and instructional materials that come in an Ozobot box by watching this video:



**Video 1.** Camilla and Zane Unbox Bit. Click, copy, or type this link into your browser to view: <https://youtu.be/ZVDxWhdXKI8>. **Note:** This video is copyrighted by Ozobot under a Standard YouTube License. It is therefore not included in the CC-BY license of the rest of this document.

You may or may not have access to all of these materials when you check out Bit, but with the exception of the robot, you can get most of the essentials for free online, or substitute other common classroom materials. See the list below for resource ideas and links. Some of this information is taken from Ozobot's FAQ page (<https://ozobot.com/support/faq>).

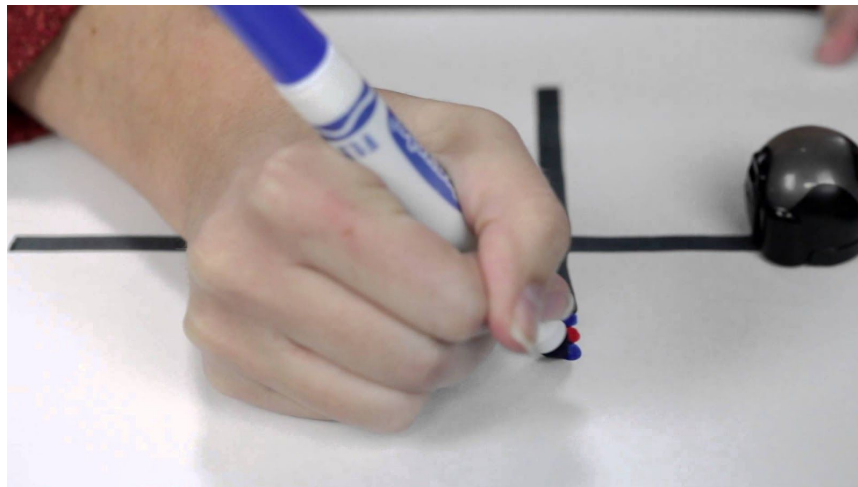
Ozobot Replacement Resources	
Replacement Markers	In addition to washable Ozobot markers, you can use classic Crayola markers or Sharpie wide chisel tips. You'll need black, blue, red, and green. For Sharpie markers, use the pastel shades of blue and green.

	You cannot use dry erase markers with Ozobots.
Activities & Lesson Plans	A wide variety of activities and lesson plans are available FREE at <a href="https://portal.ozobot.com/lessons">https://portal.ozobot.com/lessons</a> . You can also access the challenges and playground templates in the Ozobot app.
Calibration Paper	If you don't have the calibration paper, you can use a regular paper and markers to do the job. See this video ( <a href="https://youtu.be/Y6QZtey0grg">https://youtu.be/Y6QZtey0grg</a> ) for instructions.
Color Codes Reference Chart	You can get extra/replacement color code reference charts here ( <a href="http://bit.ly/2J2YoUK">http://bit.ly/2J2YoUK</a> ).

## Using Ozobot Bit with Markers

Ozobot Bit uses a special color code language to interpret and execute commands.

The following resources from Ozobot will help you learn how to code with markers using Ozobot Bit. Depending on the age of your students, you may also use some of these materials during instruction.



**Video 2.** How To: Use Your Ozobot Bit - Part 1. Click, copy, or type this link into your browser to view: <https://youtu.be/m5d4iXGblGs>. *Note: This video is copyrighted by Ozobot under a Standard YouTube License. It is therefore not included in the CC-BY license of the rest of this document.*

Ozobot Color Codes - Additional Resources	
Resource/Link	Description
Drawing with Ozobot web page. ( <a href="https://ozobot.com/play/drawing-games">https://ozobot.com/play/drawing-games</a> )	This web page contains specific tips and videos for how to draw a perfect path, draw intersections, and draw color codes.
Ozobot Drawing Tips (PDF) ( <a href="http://bit.ly/2kpiMpf">http://bit.ly/2kpiMpf</a> )	This PDF makes a fantastic quick reference for you and your students when first getting started or when you just need a refresher.
Color Codes Reference Chart (PDF) ( <a href="http://bit.ly/2J2YoUK">http://bit.ly/2J2YoUK</a> )	This is a great reference to have around whenever you are using Ozobot. You should probably have at least one for each robot in your classroom.

## Using Ozobot Bit with Apps & Flash Codes

Unlike some other robots (including Ozobot's own Evo device), Ozobot Bit does NOT connect directly with smart devices via Bluetooth or Wifi. You can, however, use *flash codes* to utilize a wide variety of programming structures with Ozobot Bit. A flash code consists of rapidly blinking lights on a device's screen which, when Bit is placed on top of them in the ON position, will be transferred into Bit's program.

Watch the following video for an introduction to flash codes and how they work with the OzoGroove app.



**Video 3.** How To: Use Your Ozobot Bit - Part 2. Click, copy, or type this link into your browser to view: <https://youtu.be/00C2D98SSpQ>. **Note:** This video is copyrighted by Ozobot under a Standard YouTube License. It is therefore not included in the CC-BY license of the rest of this document.

You can use two of Ozobot’s mobile apps – Ozobot and OzoGroove, to do flash code programming with Bit.

You can also use the browser-based OzoBlockly app to program Bit using flash codes and Google’s Blockly language. For more information on how to use OzoBlockly, see the [Teaching Coding with Ozobot Bit](#) section below.

## Charging, Care, & Maintenance of Ozobot Bit

The following facts may be useful as you consider how to use Ozobot Bit in your home or classroom and how to ensure that it is cared for properly. The following points come from the Ozobot FAQ page (<https://ozobot.com/support/faq>).

- Ozobot Bit has a rechargeable Li-PO battery that lasts about 90 minutes and takes approximately 30-40 minutes to fully charge. You can keep it plugged in overnight, or even whenever it is not in use. Bit powers down automatically after 30 seconds, 90 seconds, or 180 seconds of non-use, depending on your settings.
- Liquids, dirt, and other contaminants can permanently damage your robot. Keep it away from these things and wipe it gently with a clean, dry cloth as needed.
- Bit is equipped with a strong polycarbonate shell and can withstand occasional drops. But don’t drop it on purpose!

- Clean Bit's wheels regularly. While Bit is turned off, roll its wheels several times on a sheet of clean, white paper.
- If one of Bit's wheels seems to be out of alignment, tune the robot's wheels. On a tablet that measures 9 in. or larger, open the Bit by Ozobot app and go to the Ozobot TuneUp screen. Follow the instructions on-screen.

## Troubleshooting Ozobot Bit

If you're having trouble getting Ozobot to work, please refer to the manufacturer's FAQ (<https://ozobot.com/support/faq>). It has some excellent resources! Some common problems it addresses are the following:

- Bit doesn't read color codes.
- Bit drives crooked (not aligned)

## Teacher-to-Teacher Tips for Using Ozobot Bit in the Classroom

- Ozobot Bit works best on a clean, dry, flat indoor surface. Inclines, bright glares, glossy finishes, etc. can interfere with Ozobot's functionality (ipad/phone surfaces are ok as long as they are flat)
- Use clean white paper for color code creation. If Bit senses any color, it will start to move.
- Always re-calibrate the robot when you move from paper to a device or vice versa. (See this [video](https://youtu.be/Y6QZtey0grg) (<https://youtu.be/Y6QZtey0grg>) for calibration instructions.

## Using Ozobot Bit in Developmentally-Appropriate Ways

If you are using Bit with young children, it is important to recognize how developmentally-appropriate practice (DAP) applies to the use of this robot. For most of the decisions you make, you will need to rely on your informed professional judgment to determine if the practice is developmentally-appropriate for your students (NAEYC and Fred Rogers, p. 6). You may find the following guidelines useful.

- **Interactive Use.** Activities in which children use Bit, like activities with any other technology, should be structured to be *interactive*. In other words, they should encourage both active creativity and "social engagement with other children and



adults” (NAEYC and Fred Rogers, p. 1). You may consider using strategies such as pair programming (<https://youtu.be/vgkahOzFH2Q>) to encourage such interaction. Furthermore, you may consider using the following types of student-teacher interaction, which have been documented in past research studies to produce effective results:

- **Modeling.** Teachers demonstrate tasks (Highfield, 2015).
  - **Releasing Responsibility Gradually.** Start with direct instruction, move to a simple guided activity, then issue an open-ended challenge or problem (Buss and Gamboa, 2017). Continue to guide behavior, even while working/playing as a team (Highfield, 2015).
  - **Encouraging.** Insofar as possible, teachers should provide “encouragement and problem-solving hints and tips,” rather than outright answers (Buss and Gamboa, 2017).
  - **Questioning.** Rather than providing answers directly, teachers should ask “probing questions” before, during, and after learning activities (Buss and Gamboa, 2017; See also Highfield, 2015) These questions should encourage students to reflect on their learning (Buss and Gamboa, 2017):
  - **Fostering alternative problem-solving.** Teachers should promote alternative ways of modeling a problem (Buss and Gamboa, 2017), such as drawing out solutions on paper, discussing alternative solutions as teams, or relating challenges to more familiar circumstances.
- **Social Coaching.** Since use of technology such as the Ozobot robot needs to be interactive to be developmentally-appropriate, teachers should be aware that they may need to provide social coaching to children in these collaborative activities (Bredekamp and Copple, 116).
  - **Time for Exploration.** Younger children may be able to manipulate the robot and explore its features, but not necessarily to produce complete coded programs. (cf Bredekamp and Copple, 85). Older children can code complete programs once they are ready. Even for older children, it may be important to provide time to explore and “play” with the robots, allowing them to “follow their own interests” (Bredekamp and Copple, 127-128).

- **Sanitation.** Robots and devices should be periodically cleaned appropriately for safety and sanitation (Bredenkamp and Copple, 88). See the [Charging, Care, & Maintenance](#) section above for details on how to clean the bot.
- **Device Regulation.** Smart devices used to control the robots should be configured so that children can only access specific, approved apps. This helps reduce distraction as well as potential problematic exposure to undesirable material and media.
- **Curriculum Integration.** Using Ozobot Bit should not be merely an isolated or “fun Friday” experience. Rather, teachers should integrate Bit into core subjects, and help students transfer their learning to other contexts and subject areas (Bredenkamp and Copple, 130). Several ideas for integration with other subject areas can be found in the [Cross-Curricular Connections with Ozobot Bit](#) section below.

## Teaching Coding with Ozobot Bit

You can teach a variety of coding concepts using Ozobot Bit. What you can teach varies by the app that you use. Refer to the table below for more information. To better understand the coding concepts highlighted below, you may consider earning the Teaching Early Coding - Level 1 (<http://bit.ly/2wlQjFN>) and Teaching Early Coding - Level 2 (<http://bit.ly/2xadOC4>) badges, or at least viewing the instructional guides for these badges on the Tech with Kids website (<http://bit.ly/2lO8wNL>).

Refer to the table below to reference which coding skills you may be able to effectively teach with different applications for Ozobot Bit.

	Color Code Language	Ozobot	OzoGroove	OzoBlockly
<i>Best for Ages</i>	<i>Early Readers</i>			
<i>Platform(s)</i>	<i>Unplugged/Markers</i>	<i>iOS/Android</i>		<i>Web Browser</i>
Commands	✓	✓	✓	✓
Loops	✓	✓		✓
Nested Loops				✓
Events				✓
Conditionals				✓
While Loops				✓
For Loops				✓
Variables	✓	✓		✓
Functions			✓	✓
Parameters				✗
Operators				✓

## Short Tutorials

Each of the following short video tutorials highlights how you can use particular coding concepts with Ozobot Bit. You may find them useful both for applying your own coding knowledge and for teaching students these concepts.

## Commands, Loops, and Variables with Ozobot's Color Code Language



**Video 4.** Commands, Loops, and Variables with Ozobot's Color Code Language. Click, copy, or type this link into your browser to view: <https://youtu.be/2fDSwa7bnCc>. **Note:** This video by IPT Instructor is released into the Creative Commons under a CC-BY license.

## Commands and Functions in OzoGroove

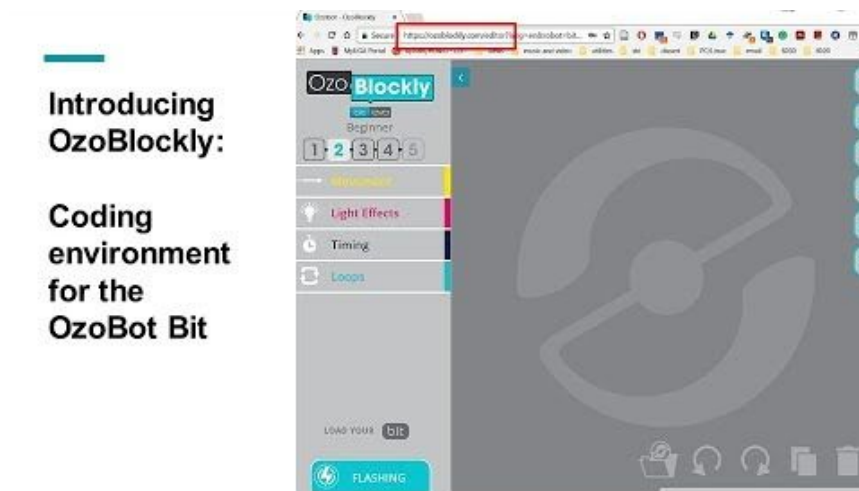


**Video 5.** Commands and Functions in OzoGroove. Click, copy, or type this link into your browser to view: <https://youtu.be/nWcsn-Hxnt8>. **Note:** This video by IPT Instructor is released into the Creative Commons under a CC-BY license.

## Getting Started with OzoBlockly

The OzoBlockly language is essentially the same or very similar to the block-based languages used in Code.org and Scratch. If you need help understanding the coding

language, consider earning or referencing the instructional material for the Teaching Early Coding - Level 1 (<http://bit.ly/2wIQjFN>) and Teaching Early Coding - Level 2 (<http://bit.ly/2xadOC4>) badges. Additionally, the following video may be a very useful orientation for you and/or your students.



**Video 6.** Introducing OzoBlockly coding environment for the ozobot bit. Click, copy, or type this link into your browser to view: <https://youtu.be/b51oi0ZnDq8>. **Note:** This video is copyrighted by Admin admin under a Standard YouTube License. It is therefore not included in the CC-BY license of the rest of this document.

## Cross-Curricular Connections with Ozobot Bit

OzoBlockly Bit is fun on its own and is really great for helping kids learn to code. However, much of its potential involves integrating these robotic and coding concepts with other aspects of the core curriculum. Whether you are a parent, an elementary teacher, or even a secondary teacher trying to figure out how coding and robotics can apply in your classroom, learning how to integrate Bit within your regular core curriculum can be an enriching experience for both you and your students, and can help students to transfer their knowledge between domains.

One of the best ways to get ideas for how to integrate Bit into your subject area is to visit Ozobot's Lesson Library (<https://portal.ozobot.com/lessons>). Once you enter a search term, you should see advanced search options. Here, you can filter to view lessons for K-12 grade levels, as well as many subject areas including

- Art

- Biology
- Chemistry
- Citizenship
- Computer Science
- Earth Science
- History
- Language
- Literature
- Math
- Mathematics
- Music
- Physics
- Programming
- Robotics
- Science
- Social Studies
- Technology

## Key Links

- Ozobot’s FAQ page (<https://ozobot.com/support/faq>)
- OzoBlockly Editor (<https://ozoblockly.com>)
- Color Code References Chart (<http://bit.ly/2J2YoUK>)
- Ozobot Drawing Tips (PDF) (<http://bit.ly/2kpiMpf>)
- Ozobot Lesson Library (<https://portal.ozobot.com/lessons>)
- Ozobot’s “Bit How-To” Playlist on YouTube (<http://bit.ly/2xbRkk7>)

## Teaching with Ozobot Bit: Quick Start Guide



### About Ozobot Bit

<b>Best for Grades</b>	PreK-12
<b>Motor Skills Needed</b>	<ul style="list-style-type: none"> <li>● Press button</li> <li>● Draw 5mm-thick marker lines</li> <li>● Drag &amp; drop on a touchscreen</li> </ul>
<b>Language Skills Needed</b>	<ul style="list-style-type: none"> <li>● Read simple words</li> <li>● Recognize &amp; select symbols</li> <li>● Recognize &amp; draw color patterns</li> </ul>
<b>Cognitive Skills Needed</b>	<ul style="list-style-type: none"> <li>● Recognize cause &amp; effect patterns</li> </ul>
<b>Battery Duration</b>	90 minutes
<b>Recharge Time</b>	30-40 minutes
<b>Mobile Platforms</b>	Apple, Android
<b>Connectivity Req.</b>	N/A

### Coding with Markers/Color Codes

- Use the Color code reference chart (<http://bit.ly/2J2YoUK>)
- Draw lines at least ¼-inch (5mm) thick).
- Calibrate to paper before use.

### Coding with Apps/Flash Codes

- Calibrate to specific app before use.
- Flash Codes Demo Video: <https://youtu.be/00C2D98SSpQ>

### Choosing a Coding Method/App



**Markers.** K-6. Use Ozobot's custom color code language to program a path for Bit to follow.



**Ozobot App.** K-6. Calibrate & Tune up Ozobot. Use the color code language in Freedraw, Playground, or Challenge Mode.



**OzoGroove App.** K-6. Program Bit to dance! Upload your own music and create your own moves.



**OzoBlockly Web App.** 2-12. Use Google's block-based coding language to program Ozobot.

### Teacher-to-Teacher Tips

- Ozobot Bit works best on a clean, dry, flat indoor surface. Inclines, bright glares, glossy finishes, etc. can interfere with Ozobot's functionality (ipad/phone surfaces are OK as long as flat).
- Use clean white paper for color code creation. If Bit senses any color, it will start to move.
- Always re-calibrate the robot when you move from paper to a device or vice versa.

### Troubleshooting

Ozobot's FAQ Page:

<https://ozobot.com/support/faq>



## References

- Bredekamp, S., & Copple, C., eds. (1997). Developmentally appropriate practice in early childhood programs. Revised edition. Washington, D.C: National Association for the Education of Young Children [NAEYC].
- Buss, A., & Gamboa, R. (2017). Teacher transformations in developing computational thinking: Gaming and robotics use in after-school settings. In P.J. Rich & C.B. Hodges (Eds.), *Emerging research, practice, and policy on computational thinking* (pp. 189-203). Cham, Switzerland: Springer. Retrieved from <http://sci-hub.cc/downloads/1d8d/10.1007@978-3-319-52691-1.pdf>
- Highfield, K. (2015). Stepping into STEM with young children: Simple robotics and programming as catalysts for early learning. In C. Donohue (Ed.), *Technology and digital media in the early years: Tools for teaching and learning* (pp. 150–161). New York, NY: Routledge.
- NAEYC, & Fred Rogers Center for early Learning and Children’s Media. (2012). *Technology and interactive media as tools in early childhood programs serving children from birth through age 8*. Retrieved from [https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/topics/PS\\_technology\\_WEB.pdf](https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/topics/PS_technology_WEB.pdf)