Summer Camp Guide
Summer Camp Guide

Get ready for a summer of hands-on learning!

Forget Summer Brain Drain! With the littleBits Summer Camp Guide, your students will engage in increasingly complex challenges that flex their technology literacy, critical thinking, creative confidence and teamwork skills. Leveraging the STEAM Student Set, this program presents you with all of the tools and resources needed to easily implement your littleBits camp, with clear and organized guidelines for facilitators and parents' stamps of approval.

What's in this guide?

The littleBits Summer Camp Guide includes a suite of resources, including 30+ hours of instructional STEAM content, to make your summer camp easy to implement and engaging for students of all ages. We know no two camps are the same, so dive into the resources below to prep and customize your programming:

- Camp Materials, p. 3
- Pacing Guide, p. 4-7
- littleBits Invention Cycle, p. 7-8
- littleBits Invention Log, p. 9
- Invention Advising Tips, p. 9-15
- Classroom Management Tips and Troubleshooting, p. 16-17
- Facilitator Resources, p. 18
  - Lessons (available in Google Docs so you can customize!)
  - Student Handouts
Camp Materials

**littleBits Kits**

The littleBits Summer Camp Guide was designed using the STEAM Student Set.

- Contains 19 re-usable Bits, accessories and a detailed Student Invention Guide.
- We recommend 1 STEAM Student Set for up to 3 students working together, and offer classpack bundles of 6, 8 or 10 kits designed to serve 18, 24 or 30 students.
- Facilitators should have at least 1 extra Kit for building sample inventions or lending students extra materials.
- If you have other littleBits Kits beyond the STEAM Student Set, these are great add-ons for remixes and open challenges.

**Craft Materials**

Creativity soars when students combine their Bits with other materials and their inventions come to life. We recommend having an assortment of building and design materials for the group to share. Each lesson will list the specific materials needed per group. These can be purchased from an online vendor such as Amazon, or at your local craft store.

**EXAMPLES INCLUDE:**

- Paper or plastic cups
- Pipe cleaners
- Rubber bands
- Craft sticks (popsicle sticks)
- String
- Markers
- Tape (masking, scotch, duct)
- Paper (construction, printer, scrap)
- Glue dots
- Rulers
- #2 screwdrivers
- Feathers
- Googly eyes

**Recycled Materials**

You can never have enough recycled materials! If you haven’t stocked up over the school year, now’s your time to raid the trash room, set up collection bins etc.

**SOME OF OUR FAVORITE MATERIALS INCLUDE:**

- Empty containers (paper cups, milk jugs, water bottles)
- Cardboard (cereal, granola, shipping, clean pizza boxes)
- Container lids and bottle caps
- Cardboard tubes: Paper towel and toilet paper rolls
Pacing Guide

Your littleBits summer camp curriculum is divided into three sections:

1. Introduction to littleBits
2. Guided Challenges
3. Open Challenges

Choose from the activity options below to craft your implementation. Sample 10, 20 and 30 hour schedules are provided on p.6, but feel free to customize the pacing to meet the needs of your program and students’ abilities. If you would like to expand beyond the provided curriculum, browse additional lessons at [https://education.littlebits.com](https://education.littlebits.com).

1. Introduction to littleBits

Introductory lessons familiarize students with the STEAM Student Set and the littleBits Invention Cycle. Each introductory lesson can be completed in 1 hour. Students will need their STEAM Student Set Invention Guides (hardcopy can be found inside the Kits) for these activities.

- **INTRO TO LITTLEBITS**
  Learn littleBits basics through a guided or exploratory introduction.

- **INTRO TO THE LITTLEBITS INVENTION CYCLE**
  Explore the Create, Play, Remix and Share phases of the littleBits Invention Cycle through a competitive paper ball challenge.
2. Guided Challenges

Guided challenges include step-by-step instructions for building a specific invention, plus ideas for remixes. Guided challenges can be completed in 2–3 hours. Additional remixes can be incorporated to extend the exercise. Students are encouraged to document their process in their Invention Logs.

Here is a sample workflow if you need to break up an activity:

- **Session 1:** Create, Play, Remix*
- **Session 2:** Remix, Share, Optional Extensions

Choose any of the “Invent a...” guided challenges from the STEAM Student Set Invention Guide to practice the Invention Cycle:

- SELF-DRIVING VEHICLE
- ART MACHINE
- THROWING ARM
- SECURITY DEVICE

If your students have prior experience with littleBits, or prefer more of a challenge, put the instructions aside and create design challenge prompts (such as “Create a self-driving car”) to turn the lesson into a more open-ended experience. Suggested flow for the open pathway is included in these lessons.

3. Open Challenges

Open challenges provide an invention prompt that students can address in a variety of ways using littleBits and other materials. Iteration and design are key elements in these activities. Open challenges can be completed in 4–8 hours. Additional remixes can extend the activity.

Depending on how deeply you want to engage in the material, you may choose to break up your lesson into several sessions, with the example below showing 1 Session = 2 hours.

**4 HOUR CHALLENGE:**
- **Session 1:** Create (Ideas and Prototypes), Play, Remix*
- **Session 2:** Continue Remixing (fine tune prototypes), Share

**8 HOUR CHALLENGE:**
- **Session 1:** Create (Ideas and Prototypes)*
- **Session 2:** Play and Remix*
- **Session 3:** Fine tune prototypes and plan out presentations*
- **Session 4:** Finalize presentations and host a showcase

*PRO TIP:
Be sure to store inventions in a safe place between sessions.
STUDENTS WILL REFER TO THEIR INVENTION LOGS TO COMPLETE ANY NUMBER OF THESE OPEN CHALLENGES:

- **INVENT FOR GOOD**
  Create an invention that makes a positive difference in someone’s life.
- **HACK YOUR CLASSROOM**
  Create an invention that makes your school/camp more awesome.
- **CHAIN REACTION CONTRAPTION**
  Perform a simple task with a chain reaction contraption inspired by Rube Goldberg.
- **BITOLYMPICS**
  Create an Olympics inspired invention or game.
- **CARNIVAL GAMES**
  Create a game that others can play.

** Great for end of program showcase/presentations!

Sample Schedules

Sample 10, 20 and 30 hour schedules are provided below:

**10 HOURS**
- **Intro to littleBits** (1 Hour)
- **Intro to the littleBits Invention Cycle** (1 Hour)
- **Guided Challenge: Art Machine** (2 Hour)
- **Guided Challenge: Self-driving Vehicle** (2 Hour)
- **Open Challenge: Invent For Good** (4 Hour)

**20 HOURS**
- **Intro to littleBits** (1 Hour)
- **Introducing the littleBits Invention Cycle** (1 Hour)
- **Guided Challenge: Self-driving Vehicle** (2 Hour)
- **Guided Challenge: Throwing Arm** (2 Hour)
- **Guided Challenge: Security Device** (2 Hour)
- **Open Challenge: Hack Your Classroom** (4 Hour)
- **Open Challenge: Chain Reaction Contraption** (4 Hour)
- **Open Challenge: Bitolympics** (4 Hour)

**30 HOURS**
- **Intro to littleBits** (1 Hour)
- **Introducing the littleBits Invention Cycle** (1 Hour)
- **Guided Challenge: Self-driving Vehicle** (2 Hour)
- **Guided Challenge: Art Machine** (2 Hour)
- **Guided Challenge: Throwing Arm** (2 Hour)
- **Guided Challenge: Security Device** (2 Hour)
The littleBits Invention Cycle

**CREATE**

**Definition:** Explore new ideas and bring them to life. You can start by brainstorming, tinkering with Bits, and building from your imagination, or you can jump-start your challenge by building something from instructions. Don’t worry if it doesn’t work or if it isn’t perfect. The important thing is to create your first model so you have something to experiment with.

**Note For Facilitators:** The Create phase is the launch pad for an invention journey. It's where students explore problems and opportunities, create lists of ideas, evaluate available resources, and create their first prototype to test.

**PLAY**

**Definition:** Use it! Playing with what you’ve created is fun, and also an important part of inventing! Playing is like a test run. It’s a chance to see how well your invention works and look for ways you can make it better.

- **Open Challenge:** Hack Your Classroom (4 Hour)
- **Open Challenge:** Chain Reaction Contraption (4 Hour)
- **Open Challenge:** Invent For Good (4 Hour)
- **Open Challenge:** Carnival Games (8 Hour)
Note For Facilitators: Play is a natural way for students to explore and evaluate their creations without worrying too much about perfection. In this phase, students are reflective about their play, and gather information about their prototype's first test run and the circuits they've created.

**REMIX**
**Definition:** Improve your invention. Keep experimenting! Add new Bits, swap parts with other inventions, or take all the pieces apart and put them together in a different way.

Note For Facilitators: Remix is where students kick their experimentation into high gear. You should encourage them to test as many variations and improvements as they can, based on their reflections during Play. This phase is often when students become more comfortable with the uncertainty of exploration and experimentation. When an idea doesn't work, it hasn't really failed. It's succeeded in showing them something new about how things work. Encourage students to challenge themselves by pushing beyond their comfort zone when it comes to inventing. Sometimes really wonderful ideas are hidden in unexpected places.

**SHARE**
**Definition:** Inspire others. Show the world what you’ve created. Get inspired by exploring what others have shared. Create, play with, and remix other inventions. This is how awesome new inventions are born. Check out [DIY.org for examples of inventions](https://www.diy.org) that are posted daily by kids around the world.

Note For Facilitators: The Share phase is where students reflect on the whole invention process, figure out how to best tell their story, and share it with others. This reflection helps them develop critical skills that they will need as inventors, or in whatever profession they chose. Figuring out how to tell their story to others flexes their communication skills, and sharing that story provides a valuable opportunity for feedback. Learning from other students’ stories and interacting with their inventions will also help to deepen this active learning process.

**IN SUMMARY**
The four phases form a cycle because the process doesn’t need to end with sharing. What they learn through sharing can be great fuel for another run through creating, playing, remaking, and mixing. It also serves as a reminder that an invention is never perfect or complete. There is always room for more exploration and improvement.

*See the Invention Advising Section (p.9) for tips on how to guide students through the Invention Cycle phases.*
littleBits Invention Log

The Invention Log is a workbook that students can use to document their invention process. It contains questions that help them reflect as they work through problems and record their experiences. Encourage students to explore different methods of expressing themselves. A combination of drawings, words and charts not only bring the log to life, but also let your students explore different ways of communicating information. Each lesson pairs with the Invention Log and supports students as they bring their ideas to life using the Invention Cycle. Be sure to print out a copy for each student.

Invention Advising Tips

Anyone can be an Invention Adviser - whether you’re a seasoned STEAM expert, or are just getting started teaching the concepts. We’ve put together our best tips to help you guide students and inspire them to create inventions with littleBits and the littleBits Invention Cycle. Use this section to supplement your lessons, add constraints to a challenge, or swap out brainstorm and remix prompts.

CREATE

The Create phase is about brainstorming and creating a prototype of your idea. In the Invention Guide, guided challenges have a different Create phase than the open challenges.

- In guided challenges, step-by-step instructions for an invention are provided. This gives students a jump start on the invention and is helpful for those new to littleBits.
- In open challenges, students create a prototype of an invention from an idea they brainstorm.

TIPS FOR BRAINSTORMING WITH LITTLEBITS

| Don’t Worry About The Bits Yet | The goal of a brainstorm is to collect as many ideas as possible around a topic. If students are thinking about what they can realistically make with Bits vs. the topic at hand, they may miss out on some really great ideas. Adding Bits will come later and your students may surprise themselves by what they are able to accomplish with them. |

START HERE
<table>
<thead>
<tr>
<th><strong>Don’t Worry About “Good” Ideas</strong></th>
<th>In the early stage of the Invention Cycle, all ideas are relevant. Encourage your students to let their imaginations run wild. Wacky and weird ideas are great for getting the brain juices flowing. Establish early on that there is no such thing as “bad ideas” in a brainstorm.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Don’t Let Students Judge Or Make Fun Of Ideas</strong></td>
<td>All ideas should be given the same respect as others. This helps create a more supportive and collaborative space for creativity to flow. When ideas are rejected, creativity can be stifled.</td>
</tr>
<tr>
<td><strong>Build Off Of Others’ Ideas</strong></td>
<td>When brainstorming, one idea can trigger a bunch of other ideas in other people. Make sure to capture these ideas. This can help add perspective to or round out the original idea.</td>
</tr>
<tr>
<td><strong>Document Ideas</strong></td>
<td>Your students will be coming up with lots of ideas to push their inventions forward. Have them keep a record of these ideas. It can be in the form of a list, drawings, or whatever is easiest for the student to communicate. This visual reference will be a helpful guide as they begin to build with the Bits.</td>
</tr>
<tr>
<td><strong>Define Constraints</strong></td>
<td>Define the user or issue, time, cost, environment, materials, or weight. Constraints help students focus and stay on track towards a goal. When the challenge is too broad, it’s easy to get stuck because there are too many options. You can also try adding Bit constraints like limiting the number that can be used to complete the invention (i.e. you can only use four Bits).</td>
</tr>
</tbody>
</table>

**BRAINSTORMING TECHNIQUES**

| **Post-it Notes** | Post-it Notes are a great tool for brainstorming. They are easy to distribute, quick for collecting ideas, and easy to reposition. A good practice for working with Post-it Notes is to only write one idea per note. Start by setting a timer (2–3 min) and have students write down ideas (one per Post-it). Then have each student post and explain their ideas to their group. Most likely, patterns will emerge on the Post-its. Next, have students reposition and cluster the ideas that are similar. These clusters can be great drivers of inspiration for invention. |
| **Play The “Yes, And” Game** | Have one student start by saying a sentence related to the challenge. The other students say “yes, and”. Then the next student in the group adds to the sentence. Have them go through five rounds. For example, in the Hack Your Classroom Challenge, one student could start by saying, “I walked into the classroom.” yes, and... |
(next student) “I opened my locker” yes, and...  
(next student) “books fell on my head”

This could be inspiration to design a locker hack that notifies you if something is pressing up against the door of the locker.

<table>
<thead>
<tr>
<th>Mine Students Interests For Inspiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideas are not always automatic when you start brainstorming. It’s helpful to guide students’ thinking towards things that interest them. For example, in the Hack Your Classroom challenge, you could lead brainstorming by looking at other places the kids feel excited and engaged. Their favorite parts of a video game, book, or game show could serve as inspiration for a new classroom invention.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Imagine The Scenario/Experience Map</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a way to help get the ideas flowing, you can ask your students to envision the scenario they are designing for. For example, in the Invent for Good challenge, you could ask them to spend one or two minutes with their eyes closed, imagining themselves going through the day of a friend or family member. When they are done, they can take a moment to write down what they did during their imaginary day and what problems or opportunities may have occurred to them (this is an experience map- it's like a mind map that documents a particular experience).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Empathy Role Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empathy is important for challenges that are focused on designing for other people. In order for students to understand who they are designing for and what their needs are, you can have them act out what it would be like to be in that person’s shoes. For example, if the prompt is to design a device to help an elderly person remember to take medication, the students can take turns acting out and imagining how the elderly person would act in different situations. The other students could call out scenarios like “on a vacation,” “going out dinner,” or “gardening.” This way, students start thinking about many aspects of the person’s life that they can help improve.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Empathy Role Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the students are designing for other students, another option is to have students interview each other. For example, in the Invent for Good challenge, students can ask one another questions like “When was the last time you felt angry?” and “When was the last time you were excited?”</td>
</tr>
</tbody>
</table>
## TIPS FOR CREATING THE FIRST PROTOTYPE

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fear Of Failure</strong></td>
<td>Students may worry about whether their prototypes will work. Remind them that this is just their first prototype. It’s a test run so they can learn more about their idea and their circuit. If it doesn’t work the way they planned the first time, there will be plenty of time to keep working on it - that’s a normal part of the Invention Cycle that every inventor goes through.</td>
</tr>
<tr>
<td><strong>Concept Prototypes</strong></td>
<td>“But I can’t build a real _______ with littleBits…”</td>
</tr>
<tr>
<td></td>
<td>Sometimes, students will have an idea that can’t realistically be built with littleBits. This is ok! Students can still create a model that represents how the invention could work in the real world. In this case, testing and remixing becomes less about making it work, and more about exploring new features and making sure it tells the story. For example, in the Invent for Good challenge, if a student wants to design a smart time-based device that reminds grandma to take her medication throughout the day, they can use Bits to model some of the key functionalities of the invention (i.e. button, pulse, RGB LED, and buzzer = blinking lights and buzzing sounds when it’s time to take medication.</td>
</tr>
<tr>
<td><strong>Real World Examples</strong></td>
<td>All the Bits have parallels to things that exist in the real world. These real-life scenarios can be found in the Bit Index. Make sure that students refer to the Bit Index if they are stumped by a Bit.</td>
</tr>
<tr>
<td><strong>Everyday Materials</strong></td>
<td>Get inspired by the things around you! Can a cardboard box become a control station or a paper cup become the nose for a rocketship? Is there an existing object that can be improved? For example, in the Hack Your Classroom challenge, students could pick physical objects or spaces in the classroom to make “smarter.” It is important to note that students will be using materials to build prototypes, not final-looking sculptures.</td>
</tr>
<tr>
<td><strong>Help With Building And Mechanics</strong></td>
<td>Your STEAM Student Set includes useful accessories for attaching Bits, including hook &amp; loop shoes, magnet shoes, and mounting boards. Refer to the Bit Index in the Student Invention Guide for more information about accessories.</td>
</tr>
</tbody>
</table>
**PLAY**

The goal of the Play phase is for students to test the prototype they made in the previous Create phase and reflect on how it can be improved.

**TIPS FOR TESTING A LITTLEBITS PROTOTYPE**

| Outline The Criteria For Success | Students should determine what they want to test about their prototype before they start Playing. For example, if the invention they are testing is the Circuit Cruiser, students could write down three tests that the Circuit Cruiser should pass in order for it to be a success for them (i.e. it needs to be able to surprise someone, it has to be able to drive both forwards and backwards, it needs to be able to pass a note). |
| Time Constraints | Play is an exciting phase because students actually get to use their inventions and test them out. It can be easy for students to get distracted at this point, so in order to help them focus, try using strict time constraints for testing and recording information. |
| Record In The Invention Log | The Invention Log is a great way to capture the students’ process throughout the Invention Cycle. Make sure you build time into your lesson to take small breaks for students to reflect at each phase. These breaks should happen regularly so students capture important findings and changes as they happen. This way, at the end of the lesson, students will have a physical record of their invention, and the thought process that brought their original idea to fruition. |
| Use The Feedback Chart | Students sometimes struggle with giving feedback on other people’s work. Use the provided Feedback Chart to guide “Glow, Grow, Questions, and Ideas” that will help take inventions through the Play phase and into remixing. |

**REMUX**

In the Remix phase, students will improve and adapt their inventions to fit criteria they’ve decided upon. There are three prompts per challenge in the Invention Guide. However, if a student is stuck, use this list to guide them.

Remixing is a phase in the Invention Cycle that you can repeat until you have an invention that you feel successfully accomplishes the challenge. You may remix your initial prototype once, or 50 times!
## TIPS FOR REMIXING A LITTLEBITS PROTOTYPE

<table>
<thead>
<tr>
<th>TIP</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mash-ups</strong></td>
<td>Every kid gets a secret ingredient bag. They have to integrate the ingredients in the bag into their invention.</td>
</tr>
<tr>
<td><strong>Simplify</strong></td>
<td>More isn’t always better. Try taking some things out of your invention. Does it work better or is it easier to use without them?</td>
</tr>
<tr>
<td><strong>Pick-a-bit</strong></td>
<td>Pick one Bit you aren’t using in your project. What are all the ways you could add this to your invention? Do any of them make it better? Try closing your eyes when you pick the Bit. Sometimes unexpected things are the most helpful.</td>
</tr>
<tr>
<td><strong>The Right Look</strong></td>
<td>Experiment with different styles for your invention. Think about how the looks would be pleasing to the intended user. For example, could the Circuit Cruiser be camouflaged to blend in with its surroundings? Could that make passing notes easier?</td>
</tr>
<tr>
<td><strong>Back To The Drawing Board</strong></td>
<td>Instead of simply modifying your circuit, find a totally different way to achieve the same result, then compare. Which worked better?</td>
</tr>
<tr>
<td><strong>Borrow</strong></td>
<td>Learn from others’ successes and failures. Bring in ideas from other places.</td>
</tr>
<tr>
<td><strong>Bring It To Life With Bits</strong></td>
<td>Look at the other objects in the room. What would happen if you combined any of them with your invention? Rolling trash cans, buzzing chairs, blinking backpacks...Bits can give everyday items a new life! For example, in the Hack Your Habits challenge, you could hack the recycling bin so that it flips up a smiley face sign when you recycle.</td>
</tr>
<tr>
<td><strong>Adapt Or Repurpose</strong></td>
<td>What are other ways/contexts the invention could be used? You’ve made a circuit, and it’s probably good at lots of different things. This is also a great way to assess your students’ understanding of the different features and functions of the Bits.</td>
</tr>
</tbody>
</table>

## SHARE

The goal of the Share phase is for students to explain their invention and collect feedback about it.

## TIPS FOR SHARING AN INVENTION

<table>
<thead>
<tr>
<th>TIP</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| **Guide Student Reflection** | Sample reflection questions include:  
  ● What did you invent?  
  ● How does your invention work?  
  ● How did you come up with the idea? |
<table>
<thead>
<tr>
<th><strong>What were your biggest challenges when creating this invention?</strong></th>
<th><strong>Create A Storyboard</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What were your biggest wins or most fun moments?</strong></td>
<td>A storyboard is a series of images that tell a story, similar to a comic. An invention storyboard could show different stages of how someone uses an invention or it could depict what life is like before and after the invention is introduced to the world. Another option is to have students storyboard their process from first prototype to final invention. This way you can follow along to see what they changed and how the invention improved.</td>
</tr>
<tr>
<td><strong>What did you learn from creating this invention?</strong></td>
<td><strong>Create A Commercial</strong></td>
</tr>
<tr>
<td><strong>What would you do differently if you were to invent this again?</strong></td>
<td>Have students act out (or film) a commercial to “sell” their invention. The commercial should highlight the key features of the invention and how it will solve a problem or improve the quality of life for someone else. For example, in the Invent a Chain Reaction Contraption challenge, a commercial is a great way for students to physically demonstrate how their invention works and the intricacies they thought about that may not be outwardly apparent by looking at it.</td>
</tr>
<tr>
<td><strong>What would you do next if you had time to keep improving your invention?</strong></td>
<td><strong>Act Out A Skit</strong></td>
</tr>
<tr>
<td></td>
<td>Acting out scenarios helps to bring an invention to life. In small groups, have students play out “a day in the life” with the invention. Students can act out different scenarios in which the invention will be used throughout the day. For example, in the Invent for Good challenge, the students can act as the user and show how the invention helps them throughout the day.</td>
</tr>
<tr>
<td></td>
<td><strong>Make A Product Pitch</strong></td>
</tr>
<tr>
<td></td>
<td>Try to frame the presentation as if the students are Steve Jobs showing a new product to the world for the first time.</td>
</tr>
<tr>
<td></td>
<td><strong>Invite In Guests</strong></td>
</tr>
<tr>
<td></td>
<td>It can be fun to mix it up and bring in guests to give feedback on inventions. You could enlist a neighboring class to test out the inventions as brand-new users, or ask someone from the community to be a “guest judge.” Parents make for a great audience too! Outside guests can make the challenge feel important and exciting. You will want to make sure that guests know to only provide constructive feedback to maintain a positive atmosphere.</td>
</tr>
<tr>
<td></td>
<td><strong>Share With The World</strong></td>
</tr>
<tr>
<td></td>
<td>Post student work on social media channels or your camp website (of course, with permission first!).</td>
</tr>
</tbody>
</table>
Classroom Management Tips & Troubleshooting

● SETUP & CLEANUP
  ○ Establish your cleanup and storage expectations. Show students how you would like them to handle the Bits, and how Bits should be organized for storing between lessons.
  ○ To identify which Bits belong to which Kit, you can number Kit boxes and use a sharpie to add numbers to the bottom of each Bit (i.e. all Bits in Kit box #1 would be labeled #1). We’ve also seen educators use nail polish to color code their Kits/Bits.
  ○ For challenges in progress, develop a classroom protocol for labeling and storing prototypes (and Bits), so your students can easily put away and access their inventions again with limited interruption.
    ■ The back of the Invention Guide has a map showing where the Bits fit into the packaging.

● WORKING IN TEAMS
  ○ Keep groups small (max 3 students to a Kit)
  ○ Create Student Roles
    ■ When breaking off into groups, it can be helpful to give students specific roles to keep them engaged and participating. Try these or make up your own:
      1. The Troubleshooter: this person is responsible for making sure the circuit works. They should check that the Bits are in the correct color-coded order. If the circuit is not working as expected, this person unsnaps and resnaps the Bits together, wipes the bitSnaps, checks the battery, etc.
      2. The Scribe: this person reminds the group to record their processes and leads the charge with the Invention Log, being sure to record experiments and results.
      3. The Ideas Person: this person is in charge of adding wacky ideas to the mix at every phase. These wacky ideas can make the challenges fun, and force students to think about how to best answer the challenge.
      4. The Questioner: this person questions everything in every phase of the Invention Cycle. They constantly ask why (e.g. why the group is choosing the Bits they are using, why they are making changes, why they are presenting information in a certain way). This person helps the group think critically about the decisions they make.

● CARE AND MAINTENANCE OF YOUR BITS
  ○ Cleaning Bits
    ■ If you find that you’re getting a poor connection between Bits, cleaning is a good first step to troubleshoot the problem.
    ■ The best way to clean Bits is to wipe them with a dry cloth (a clean T-shirt works perfectly). If any of the electrical connectors are oxidized (you may see dark deposits on them), put a small amount of isopropyl alcohol on a soft, clean cloth and gently wipe the deposits. Do not use any other cleaning products on your Bits.
    ■ Note: Some electrical connector cleaners have chemicals that can damage the plastic part of the Bit, and therefore are not recommended,
  ○ Power Source
    ■ Every circuit that students build will require a power source, so maintaining power is an important part of managing littleBits in the classroom. Signs of low batteries may include:
1. Low or flickering lights (especially when you try to run one of the motors in the circuit)
2. Erratic behavior with the servo motor
3. Motors that won’t run
   ■ When you see that batteries are running low, it’s time to recharge or replace them. USB power can also be used instead of 9V batteries.
   ■ Plan ahead for how you will test and supply extra batteries.

- **TROUBLESHOOTING**
  - **Involving Students**
    ■ The first step is to define a protocol you wish students to follow if they encounter an issue. Some educators evoke an “ask three before me” rule, in which students are required to ask three peers for help before asking the teacher. Show students how to reference the Bit cards, or use other available resources, for independent problem solving.
    ■ Another option is to co-create a troubleshooting checklist with students. This checklist might include helpful tips. For example, check all connections, check switches and screws, check the battery, and so forth.
    ■ You may find it helpful to post “tips and tricks” posters around the classroom to help students independently solve common problems and Share creative solution ideas. Students can post any solutions, tips, or tricks they have discovered to create a collective peer-generated resource for using littleBits.
  - **“My Circuit Isn’t Working”**
    ■ Is your power Bit switched on? The switches are small, and sometimes students miss them. When turned on, there should be an LED light on the power Bit that shines red.
    ■ If you’re using a battery, does it need to be charged or replaced? You may want to keep a battery tester in your classroom.
    ■ Do you need to wipe your connectors? If there is dust on the connectors or the magnets, wipe them off with a clean, dry cloth.
    ■ Do you need to clean your connectors? If any of the three electrical connectors are oxidized (they’ll have dark deposits on them) you can use some isopropyl alcohol on your soft, clean cloth.

**WHEN IN DOUBT, CONTACT US!**

Our team of specialists is ready and waiting to help you out Monday through Friday from 9am - 6pm EST. Give them a call at (888) 440-3906 or email support@littleBits.com
Your Teaching Resources

Lessons and student handouts are available via the links below. You can copy and customize your lessons in Google Docs, or transfer them to a file type of your choice.

**INTRODUCTION**
- Intro to littleBits
- Intro to the littleBits Invention Cycle

**GUIDED CHALLENGES**
- Self-driving Vehicle
- Art Machine
- Throwing Arm
- Security Device

**OPEN CHALLENGES**
- Invent For Good
- Hack Your Classroom
- Chain Reaction Contraption
- Bitolympics
- Carnival Games

**STUDENT HANDOUTS (PDF)**
- Invention Log
- Feedback Chart

Growing littleBits in your Camp (and Beyond!)

Congratulations! You’ve made your way through the littleBits Summer Camp Guide (trumpets sound!). By now you’ve likely tried out some of the provided challenges (and hopefully created some of your own!) and experienced first-hand the joy that littleBits brings to the learning experience. The STEAM Student Set is just the beginning; students and educators of all ages, backgrounds and abilities are inventing, learning and growing with littleBits every day, all around the world. We’re thrilled to have you on this journey with us; we can’t wait to see what your students dream up!

To keep exploring:
- Add new Kits and Bits to your camp collection
- Browse engaging inventions and lessons
- Join the conversation