Interested in creating and implementing a secondary level summer robotics camp?

The EV3 Robotics Camp Guide will provide the necessary tools to maximize the success of a summer robotics camp. This little booklet is packed full of sample materials to make the creation of a robotics camp easy, minimizing the time spent on a lengthy developmental process.

Since 2006, we at FLATE have evolved from co-sponsoring a camp experience to providing the total package. FLATE does not claim to have all of the answers, but if what FLATE has learned helps another organization successfully create and implement a summer robotics camp then FLATE is successful too.

The purpose of this guide is to assist in the creation of a summer camp; FLATE’s focus is on robotics. Using the concepts presented in this guide, we have helped a number of organizations to start and grow FLATE robotics camps at other locations. If your organization is interested in starting a FLATE robotics camp, this booklet will help you get started. Logistics and support vary at each location.

Our materials can be applied to camps offering science, technology, engineering and mathematics (STEM) or other curriculum. This material may also help educators choose between “wants vs. needs,” and provide useful ideas. We hope the EV3 Robotics Camp Guide provides instruction which will be a successful and inspiring part of your camp experience.

Learn more about us at: www.fl-ate.org or www.madeinflorida.org

We welcome your feedback and ideas about the materials, your experience using them, and suggestions to include new topics.

Please contact us at: 813.259.6577, or barger@fl-ate.org

Copyright Disclaimer:
All materials connected with Lego EV3™ in any way are under a strict copyright and should be treated as such. We are not connected to Lego™ or Lego Mindstorms™ products in any way. These products already have a connection with many campers and educators, and have excellent educational-support materials designed at the Carnegie Mellon University. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
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PROGRAM GOALS AND OBJECTIVES

This program is designed to introduce campers to the fascinating and technical world of robotics. It will help them better understand the science, technology, engineering, and mathematics, (STEM) concepts used in modern manufacturing. The camps expose campers to programming robotics through the use of software. In addition to the technological information the campers receive, the program enables them to learn and practice lessons in leadership skills, communication, and teamwork. Each summer camp is designed to be five days in length and involves classroom exercises, team experiences, field trips, and fun!

Our Introductory and Intermediate camps are primarily geared toward secondary students in middle school, grades 5 through 8 and incoming 9th. Due to popular demand, FLATE has expanded its basic camp model to several other Florida locations in partnership with other organizations and institutions; in addition to more remote locations, more camp offerings, camps for special groups and underrepresented. We’ve also added new topics including 3D Printing, Industrial Robotics, Engineering, and Alternative Energy.

Our high school robotics / engineering camps are also evolving. This camp is primarily meant for rising 9th and 10th graders who have some “robotics” experience, students work on open ended design problems with Lego™ Mindstorms EV3, but also learn more about CAD and produce designed prototypes. Additional robotics programming platforms are also introduced along with 3D Printing.
How to get there?

EXAMPLE MAP

From North (Ocala):
I-75/Tampa (south) Exit at SR 574/Mango/Martin Luther King Jr Blvd Right onto Martin Luther King Jr Blvd. (west) Left onto Falkenburg Rd (south at first traffic light) Left onto E. Columbus Dr East (east)

From South (Sarasota):
I-75/Tampa (north) Exit at SR 68/Brandon/Tampa Left onto SR-68 (west) Right onto Falkenburg. (North at the first light) Right onto E. Columbus Dr. East (east)

From East (Orlando):
I-4/Tampa (west) Exit at I-75/Naples (south) Exit on SR 574/Mango/Martin Luther King Jr Blvd Right on Martin Luther King Jr Blvd (west) Left onto Falkenburg Rd (south) Left onto E. Columbus Dr. (east)

From West (St. Petersburg):
I-275/Tampa (east) Exit on I-4/Orlando Exit at SR-574/Martin Luther King Jr Blvd East Right onto Martin Luther King Jr Blvd. (east) Right onto Falkenburg Rd (south) Left onto E. Columbus Dr. (east)
FUNDING

- Camp organizers must first decide whether the robotic programs will be a revenue, or non-revenue generating initiative. Revenue generating types of camps require different planning and budgeting.
- Camp organizers can pursue several areas of funding to assist in financing the programs: outside funding and internal funding. Outside funding can be secured through industry sponsors, private, and/or local organizations, individual contributions, and grants. Materials for the camps may be secured through donations versus being purchased by the camp or campers. Inside funding can come from sources such as school, or organization contributions.
- Organizers can also consider whether they will pursue scholarships, or grants to assist campers with paying for camp registration rather than allowing the campers to self-pay.
- For example, each of our 1 week camps cost about $250/camper on average. This does not include the investment of robots. To be as inclusive as possible, we charge $175/camper and have 20-24 enrollments per week. We solicit sponsors to offset some of the overall costs. The remainder is supported by FLATE and our host institution, Hillsborough Community College.

EXPENSES

There are different costs, which may be incurred for the camp: one-time expenses and recurring expenses.

<table>
<thead>
<tr>
<th>Recurring Expenses</th>
<th>One Time Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility charges and equipment costs</td>
<td>The computers and software that are required for the camps will be reused during various sessions</td>
</tr>
<tr>
<td>* Robot Kits if given as “take aways”</td>
<td>* Robot kits and spare part kits</td>
</tr>
<tr>
<td>Camp instructors - The use of volunteer instructors will greatly reduce the overall expense</td>
<td></td>
</tr>
<tr>
<td>Beverages – Recommended: bottled water only. Snacks and even lunches are all optional items to be considered</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous supplies: paper for printing certificates and lessons, markers, extra batteries, rulers, name tags, pencils, replacement robot parts, etc</td>
<td></td>
</tr>
<tr>
<td>Bus charters (if you don’t have access to school buses) will typically run $500 for ½ day tour</td>
<td></td>
</tr>
</tbody>
</table>

* The structure of the camp can determine whether a cost occurs once or several times.
THE BUILDING

The cost of a facility is something to take into consideration when planning your camp. Organizers can search for options that can be procured free of charge through local organizations such as a school, Boys and Girls Club, etc., or you may elect to rent a facility.

It is beneficial to choose a location which is easily accessible for staff, campers, parents, and accommodates any special needs. The facility should have adequate parking for staff and a drop-off area for children. It should also be equipped with desks and chairs and have adequate restrooms that can accommodate staff and campers.

CAMP ROOM(S)

Aside from the usual classroom layout with desks and chairs, layout for the robot challenges requires a minimum 20’ square of clear space, level flooring, or carpet (a square space, 20 feet on each side), and a roll of painters tape (the blue kind) to lay out the course the robots will follow.

Classrooms equipped with computers and a LCD or Elmo type projector is also recommended for the camps. We use one computer per two students. It’s also helpful if instructors have internet access within the teaching area. Internet access can allow instructors to show campers online videos and demonstrations which will complement the camp. An example of one such website is Stanford University’s “How Everyday Things Are Made” (http://manufacturing.stanford.edu/).

Finally, be sure to point the way to the classroom with a colorful sign:

EXAMPLE – SIGNS

Robotics Camp
**HARDWARE/SOFTWARE**

In our programs, middle or high school, each team of two campers has a laptop and a LEGO™ EV3 MINDSTORMS education base set along with appropriate software to run the programming. This student to equipment ratio is not mandatory, but we found it ideal for maximizing the overall learning experience. The EV3 education set is key, as there are major software, hardware, part and sensor differences between the home and education sets. Visit the Lego Education site at www.legoeducation.us to purchase your EV3 Kits.

**MATERIALS LIST**

<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptop or computers</td>
<td>Load programming software, research and design</td>
</tr>
<tr>
<td>Measuring devices: Meter sticks, rulers, and tape measures (teams could share).</td>
<td>Some activities require campers to do some simple measuring.</td>
</tr>
<tr>
<td>Install the EV3 programming software on each</td>
<td>Campers will be working with both robots and software daily.</td>
</tr>
<tr>
<td>Calculators: 1 per 2 campers (or use calculators on computers)</td>
<td>Campers are required to make calculations for distance, averages, etc.</td>
</tr>
<tr>
<td>Certificates/prizes for winners</td>
<td>For each team challenge we need to be able to reward winning teams with small prizes/certificates. This could include candy, pencils/pens, etc.</td>
</tr>
<tr>
<td>Folders: 1 per team or 1 per 2 campers</td>
<td>Folders to be used as team portfolios. All worksheets, reflection journals and team challenge material will be kept in these portfolios.</td>
</tr>
<tr>
<td>Name Badges</td>
<td>This is a great idea, just in case campers and teachers forget each other’s names or wander off.</td>
</tr>
<tr>
<td>Blue painter tape</td>
<td>Campers will be using the tape when experimenting with the color sensor on their robots. Instructor will make course outline out of tape.</td>
</tr>
<tr>
<td>4 cases of water bottles (full)</td>
<td>Water bottles will be used as points of reference and obstacles for the robots. This water is for the course ONLY-not for drinking.</td>
</tr>
<tr>
<td>Batteries for robots (check robots for size and type)</td>
<td>Make sure you check on the type and amount needed per robot. This is only a backup measure should a rechargeable fail.</td>
</tr>
<tr>
<td>Power Strips</td>
<td>For charging robots using their rechargeable battery, plug in after each day.</td>
</tr>
<tr>
<td>Spare Lego parts or extra kits</td>
<td>Have at least one extra kit and a box of spare parts</td>
</tr>
<tr>
<td>Colored Duct Tape &amp; construction paper</td>
<td>For color sensor challenge</td>
</tr>
<tr>
<td>Pencils and markers</td>
<td>For completing worksheets and decorating team flag</td>
</tr>
<tr>
<td>Empty cardboard boxes</td>
<td>For ultrasonic sensor challenge</td>
</tr>
<tr>
<td>Other Lego pieces or obstacles</td>
<td>Create additional Lego pieces or random obstacle for challenges</td>
</tr>
</tbody>
</table>
CAMP COORDINATOR ROLE

Coordinators/camp directors are responsible for several areas in the creation and management of the camps. They assist in marketing, scheduling and camper registration, as well as coordinating logistics during the challenges/events.

BEFORE

Marketing:
- Place ads in local newspapers
- Place ads online with local news stations – for example www.myfoxtampabay.com
- Advertise on “camp” websites (www.summercamps.com)
- Hang posters (as many places as you can)
- Hand out flyers (at local events)
- Email flyers to past campers (parents) and/or perspective campers (parents)
- Arrange for online payments if possible
- Utilize social media to post flyer on Facebook site, twitter, etc.
- Contact local schools or district personnel to email flyer to teachers and parents

Tip: To ensure that camp reaches maximum registration capacity, coordinators/camp directors should utilize local media and newspapers.

Registration:
- Email confirmation letters with camp information, directions, permission slips such as for field trips, video/photo release forms, etc.
- Email reminders the week before camp
- Ensure you have all registration forms and payments for each camper
- Provide detailed location information

*If the coordinator/camp director plans to have press coverage of the camps, it’s necessary to contact the media in advance. News stations can be difficult to “book,” therefore, the more notice they have, the better. Also, contact television stations that are interested in community events as you may be able to advertise on such stations at no charge.

DURING

- Email regarding the weeks activities and special events, such as field trips
- Email parents/campers the camp survey

AFTER

- Email a “thank you” to campers and parents
- Email camp survey reminder (for those who haven’t completed the survey)
- Email link to online photos from the camps
**PURPOSE**
The “Made in Florida” summer robotics camps capture the interest of campers of all ages. Our camps include secondary students, which also includes home-schooled campers of the same age and grade level. The curriculum is a mixture of Lego ™ educational materials, STEM subjects and modern manufacturing information conducted in an environment of fun, team work and competitive problem solving.

**PREPARATION**
Preparation for a robotics camp program is imperative and since it is important – do it yourself. 
*Coordinators/instructors:* Take the time to conduct a pre-robotics camp simulation and determine the answers to the following:

- Can I put a robot together from its component parts?
- Are all of the robots the same and are they all functional?
- Are there enough computers available for programming the robots (if needed)?
- Can I program a robot to perform each of the tasks to be asked of the campers?
- Are all of the support supplies in place and properly stored and labeled?
- Is the camp space adequate in size, comfortable, and safe for middle school campers?
- Has the competition course been tested with your current robots?
- Are there adequate power outlets to avoid a “spaghetti” effect of extension cords, and to avoid fire/safety hazards?
- Is there adequate table space for each team to work by themselves on their robots?
- Is there space and seating capacity for family and friends during the last day of competition?

*Is there adequate help for the camp?* We recommend one instructor and one coordinator/helper for a camp of 20 or more campers (10 teams of 2). Both should be familiar with the robot challenges/lesson of the camp contact FLATE for some examples.

- Are there adequate power outlets to avoid a “spaghetti” effect of extension cords, and to avoid fire/safety hazards?
- Is there adequate help for the camp? We recommend one instructor and one coordinator/helper for a camp of 20 or more campers (10 teams of 2). Both should be familiar with the robot challenges/lesson of the camp contact FLATE for some examples.
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**PARENTAL PARTICIPATION**
Getting the parents involved is a multiple step process.

*First,* understand that:
- Parents plan summer activities around work, vacations, day care, and other activities well in advance.
- Parents feel more confident when they have the opportunity to speak to someone who is not only knowledgeable, but who will actually be present at the camp.

*Second,* in order to overcome perpetual parental uncertainty, nothing takes the place of one-on-one contact.

As all the details will never fit into a flyer, take the extra time to cover the following using a memory guide that covers:
- Benefits of the camp
- Camper drop-off and pickup policy (include time window)
- Assurance that activities are supervised by camp staff
- The camp’s lunch, snack, and food allergies policy
- The camp fee payment schedule and options

*Third,* follow up every registration with a personalized thank you note, indication of your anticipation of working with their child this summer, and again at the conclusion of the camp with resource information.
PRACTICAL PRACTICES

- Provide a flyer that emphasizes the “Who says fun and learning cannot happen together” theme. Include camp related photos and cover the basic logistics and amenities included in the camp infrastructure.
- Provide detailed location information
- Post all policies related to camp activities and camper behavior expectations on your website.
- Provide the web address for this information in all camp flyers.
- Notify employees at your institution of the camp as a great opportunity for their children.
- Notify your campus leadership and public affairs office to help develop press and T.V. coverage for camp.
- Start promotion and registration activities in February and continue through opening day.
- Provide a minimum of 90 days to plan and prepare for your summer camp.
- Build a database of parents of participants as well as serious inquiries that did not result in a camp registration last year.
- Support your camp instructors’ interest and enthusiasm for camp innovations.
- Provide tangible products to campers related to the educational aspects of camp that encourage further learning.
- Cultivate camper leadership and promote teamwork, critical thinking, and problem solving.
- Establish a non-refundable fee structure that commits parents to delivering campers to camp each day.
- Establish a “late pick up” fee to encourage prompt retrieval of campers at the end of the day.
- Select instructors based on their knowledge and enthusiasm who connects well with campers.
- Provide instructors with a good honorarium, but don’t hire an instructor just because they want the money.

FOLLOW UP

- A great follow up activity is to have a “Parents’ Night” or “Open House” where you talk about all the different technical school programs in your area (have a representative from your school district), include Q&A and offer an enticing door prize.
- Hold an “open house” at a partner college and include campers and their parents on the invitation list.
- Take that opportunity to present the importance of STEM subjects in the school curriculum, promote next year’s camp, and of course, another opportunity to take pictures!

PERFORMANCE

- Measure your impact - Learn how you can improve your next camp by using a simple paper survey handed out to campers on the last day of the camp. Additional feedback from parents and instructors can be tracked by using an online survey, such as Survey Monkey.

FLATE has resources for camp planning and curriculum ready to share with your team – sample documents can be found in this guide.
FLORDIA STANDARDS ADDRESSED

<table>
<thead>
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<th>Science</th>
<th>Technology</th>
<th>Communication &amp; Writing</th>
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<td>Hypothesis &amp; evidence</td>
<td>Purpose of technology</td>
<td>Brainstorming solutions</td>
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<td>Circumference</td>
<td>Experimental design</td>
<td>Technology relationships</td>
<td>Reasoning with evidence</td>
</tr>
<tr>
<td>Angles</td>
<td>Observations &amp; predictions</td>
<td>Systems</td>
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</tr>
<tr>
<td>Graphs and tables</td>
<td>Data analysis &amp; acquisition</td>
<td>Design tradeoffs</td>
<td>Documenting processes</td>
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<tr>
<td>Linear relationships</td>
<td>Measurement</td>
<td>Troubleshooting</td>
<td></td>
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<tr>
<td>Scaling and models</td>
<td>Error analysis</td>
<td>Sensors</td>
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</tr>
<tr>
<td>Ratios &amp; proportions</td>
<td>Amplitude and frequency</td>
<td>Performance</td>
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<tr>
<td>Unit conversions</td>
<td>Light and reflectivity</td>
<td>Boundaries</td>
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<tr>
<td>Averages</td>
<td>Color and perception</td>
<td>Mechanical elements</td>
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<tr>
<td>Boolean logic</td>
<td>Spatial graph model</td>
<td>Controls</td>
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<tr>
<td>Spatial reasoning</td>
<td>Ultrasonic waves</td>
<td>Computer Programming</td>
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<tr>
<td>Patterns</td>
<td>Speed, distance &amp; power</td>
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DAILY TEACHING FORMAT

**Background information:** PowerPoint presented by the instructor.

**Student learning activity:** Designed to provide students with all necessary skills to be competitive in the challenge. This typically includes students working through step by step instructions and completing the student worksheet. We suggest using a test out activity at the end of this stage to determine mastery of the skills.

**Challenge introduction:** Present challenge rules and allow students time for focused brainstorming.

**Solution development stage:** Students work to build and program their robots to complete the challenge. Students should be encouraged to complete revisions and keep a record of problems and solutions.

**Challenge Trials:** Most challenges involve a number of trials. Groups are typically awarded the points/time for their best trial. We normally use 3 trials but allow for adjustments depending on available time.
CLASSROOM MANAGEMENT AND TEACHING STRATEGIES

Below we’ve listed some recommendations to consider based on our experience running robotics camps.

• Establish camp rules before students arrive. You don’t need a long list of rules, just some basic rules concerning safety and appropriate interactions with other students, the adults that are in charge and the technology and resources they are borrowing. We include these as part of our welcome the first morning of camp.

• Having a plan for the organization of the classroom or lab can go a long way in ensuring that everyone has a positive camp experience. Consider having numbers at each group station that correlate to the number on the robot kit and computer that each group is assigned. If funds permit give each student a camp folder with all the documents they will need. This will serve as an engineering portfolio during the week to document their work and progress. Classroom management still applies! Students who are distracted by others during lesson instruction will miss valuable information they will need later for the challenge. As an instructor you will not have time to repeat information when the challenge heats up.

• Determining which students to pair up can be tricky. We always recommend using pairs. A group of three may be used in special situations but should be avoided if at all possible. Start with allowing any students who signed up together to work together. From there try to pair students close in age/grade level. If you must make changes avoid doing so after the morning of day 2 unless it’s a very special circumstance. Encourage teams who have problems after day 1 to work through difficulties. Don’t hesitate to have quick conferences with parents each evening when they come to pick up their children, but try to keep things positive. It’s a robotics camp!

• Encourage your students to persevere. Things will go wrong. Some of it will be out of their hands. Remind them that engineers face obstacles on a daily basis and must troubleshoot for solutions.

• Consider taking the facilitator approach as opposed to being the person with all the answers. This is especially important when students are developing solutions to the challenges. You will need to continue encouraging students to persevere and find their own solutions to the various problems they will encounter. If you attempt to fix every problem that arises, the students will become dependent on you, and you will quickly find yourself overwhelmed. The camp structure is designed to give students the background they need to be successful in the challenges so use the challenges as a carrot to dangle and get the students to complete the worksheets. You can also give points for teams that fully complete their work.
RECOMMENDED CAMP RULES

• *There is no I in TEAM.* You will be working with the same partner each day. Continuously reflect on what it means to cooperate with your partner.

• Inform an adult when you are leaving the classroom/lab to use the restroom and always go with a buddy. (Important if you are on an open campus such as a college).

• No personal electronics (phones, games, etc.) except during official break times and lunch.

• Everyone should have equal time with robots and programming. Switch roles often.

• No food or drinks around the robots and computers.

• No running in the classroom/lab (Important to remind students of this when the challenges heat up).

TEACHING ENGINEERING

In this camp students will learn through the use of Science Technology Engineering and Mathematics – STEM concepts. Teaching STEM doesn't include a set of concrete ideas attached to a test but rather a set of benchmarks that students should be able to accomplish. The structure of this camp is to build concrete ideas based in math and science, allow students to investigate those ideas using technology, and finally using engineering and the design process to solve challenges.
TEACHING ENGINEERING CONTINUED……

This camp is a hands on, minds on experience. Students learn by doing activities, testing out if their ideas are correct and then apply their new knowledge to a challenge. For students to be successful students must be allowed to do the following:

- Work collaboratively
- Think critically
- Explore ideas freely
- Make mistakes and be encouraged to continue investigating
- Ask questions and provided with guidance not given the answer
- Design solutions outside of the expressed rules (this is how and why each camp will be slightly different)

If you allow these core ideas to flourish in your camp, all students will be successful and feel accomplished, no matter what the scoreboard says at the end. They know that they have gained knowledge, even when it feels that they are just having fun!

ENGINEERING DESIGN PROCESS

During each challenge students will go through this process. You should review this with the students if there is time. Introduce the concept of engineering and how they will be working as various types of engineers throughout the week.

<table>
<thead>
<tr>
<th>Ask</th>
<th>What is the main task that you are being asked to complete in this challenge or activity?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>What have I learned in camp already that will help me solve this challenge?</td>
</tr>
<tr>
<td></td>
<td>Criteria: What are the design requirements?</td>
</tr>
<tr>
<td></td>
<td>Constraints: What are your design limits?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Imagine</th>
<th>Brainstorm possible solutions to the problem/challenge.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Plan</th>
<th>Write pseudo code to describe the behaviors you want the robot to complete:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Create</th>
<th>Build your design and program following the plan you developed.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Improve</th>
<th>Test and Improve. Record some of the improvements you made to your robot and the program. You do not need to record every change that is made, just the major changes.</th>
</tr>
</thead>
</table>
HELPFUL HINTS FOR CAMP INSTRUCTIONS

Include a *Parent Experience* at the end of camp. Parents are notified at the beginning of camp so they may plan appropriately to attend. The parent experience should include the final challenge and an awards ceremony to honor the winners of the various challenges throughout the week.
**MEDIA RESOURCES**

Researching the Internet for “robots” will supply organizers with infinite amount of resources for industrial, medical, space exploration, or educational robotics. Below are some “key words” to help you begin your journey.

- FANUC / da Vinci surgery
- Sony robotics / Toyota robotics
- ASIMO / NASA robotics
- Aldebaran NAO
- LEGO Minstorms™/EV3

**TAKE AWAYS**

Pens, pencils, lanyards, T-shirts, nametags and team flags can all be used as take/give aways during the camp. Each child can/should be given a certificate of completion. Also, certificates will be given to the overall challenge winners, and other outstanding performances during the week. Be creative! Give certificates for special behaviors, like helping other teams etc…

**TRIPS AND TOURS**

Based on your particular camp genre and to stimulate interest in STEM, manufacturing careers and diverse robotic applications, make arrangements to take campers to visit local, modern manufacturers, or colleges with a robotics lab so that campers can see robotics in real-life applications. You can also take campers to the movies, or show movies that are related to robotics. Have parents complete a field trip release form before taking campers off camp grounds. Your local school district or host institution can supply you with a release form which you may use for your camp. (See appendix for sample forms.)

**CAMP FOOD AND LUNCH**

Campers can bring their own snacks and lunches; this option avoids issues of campers with food allergies or food preferences and leaves the meal choice up to the family. To accommodate the campers’ food, it is recommended that the camp’s facility contain refrigerators or coolers. We have provided bottled water and non-sugar snacks twice during the day, but now have the campers bring their lunches and snacks. At FLATE camps campers take lunches to the campus cafeteria to eat away from the robots and computer equipment.
PRESENTATION OF LESSONS

This is the DAY 1 Lego™ Mindstorm Lesson/Challenge. It is simple and easy for most children to complete successfully. Day 1 is the most important day for setting the foundation of the remaining camp days. There is much more robot, hands on time to come in the following days but if the first day is skipped or reduced it will result in difficult days ahead with frustrated students who do not have the tools and knowledge to be successful.

Example Lesson Plans/Challenges additional lesson plans are included on the CD also on the FLATE Wiki site at
http://flate.pbworks.com/w/page/80454308/Summer%20Camp%20Resources

EXPLANATION OF DOCUMENTS

The teaching materials folder contains all teacher resources; this should be reviewed completely prior to camp. It should be used to determine your camp organization and create marketing materials. Challenges folder contains the teacher explanation of challenges; students should not see these documents. Day 1 – 5 folder contains all student viewable work power points and worksheet. Worksheets are to be printed and power points to display as you teach the lessons. The power points contain the challenge details for the students. Each day is organized in chronological order of how it will be used and taught by listing the documents in order by number. For example in the day 1 folder all documents are listed 1 – 7 and will be used in that order. In the teacher lesson plan sequence starting on Page 9 you will see the explanation of when to use each document.

Teacher Sequence of Lessons - Teacher Sequence - Day 1 of 5

Prior to teaching this day: Review the following information – Camp Calendar, Daily Format, Classroom Management, Teaching Engineering, Recommended camp rules and Day 1 Folder. Determine how your camp site/classroom will be set up and organized. Determine a location that robots will be stored, where they can be plugged in after each day.

<table>
<thead>
<tr>
<th>Est. Time (hours)</th>
<th>Teacher Actions</th>
<th>Student Actions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Present to the students an overview of what to expect during the 5 days of camp. Get them excited about what they are going to learn. Review the rules of camp, where bathrooms are located, and lunch procedures. Have students complete the, 1 D1 robotics what do you know worksheet.</td>
<td>Enter camp and get name badge. Sit at a computer station and complete the problem solving activity. Meet your partner for the week. Listen to the presentation about camp, rules and procedures. Complete the, what do you know about robotics worksheet and participate in the discussion.</td>
<td>Prepare name badges ahead of time. Give students a fun problem solving activity while they are waiting in the morning. Hand out worksheets as needed or create a camp folder for students that has all worksheets and camp calendar included.</td>
</tr>
<tr>
<td></td>
<td>Present a brief history of robotics to the students. Explore uses of robotics today both real and fictional. Allow time for discussion and questioning as you present this information.</td>
<td>Students should answer questions about the presentation and participate in the discussion.</td>
<td>Create this presentation in a format of your choice, power point is recommended with pictures and video clips embedded.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>Have students get their assigned kits for the week. Present the 2 D1_Intro to EV3 power point. Plan for discussions during this presentation. Give students a set amount of time to determine their team name. Write down team names with student names.</td>
<td>Receive your EV3 kit for the week. Participate in the Intro to EV3 presentation with your partner. Familiarize yourself with the EV3 kit. Create a team name with your partner.</td>
<td>Label or number all kits prior to start of camp. Create a list of kits and which groups they are assigned</td>
</tr>
<tr>
<td>3</td>
<td>Present the 3 D1_Hello Pseudo Flowchart up to Robot behaviors. Have students take out robot brick and download cord. Allow students to complete the personality activity. Have students present their robot personality to the class.</td>
<td>Participate in the presentation and discussion. Get the robot and download cord. Explore the programming software. Create a personality for your robot.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Continue to present the 3 D1_Hello Pseudo Flowchart Power point and show the 4 D1_Psuedo Example to the student and have them take out one copy of their 5 D1_Psuedo WS. Explain that when they start programming they will use this worksheet to plan out their robot behaviors and coding actions.</td>
<td>Explore the use of Pseudo code and create a simple pseudo code.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Have students build their robots. Last slide on the 4 D1_Hello Pseudo Flowchart power point.</td>
<td>Build your robot according to the instructions.</td>
<td>Plan to have spare parts in case things go missing. Have a robot built for visual learners.</td>
</tr>
<tr>
<td>6</td>
<td>Present the 6 D1_Get Moving power point and have students take out the 7 D1_Behavior 1 worksheet. Discuss the presentation with the students. Allow students to complete the activity.</td>
<td>Participate in the presentation and then complete the exploration activity. Complete the Get Moving section of Behavior 1. Review your observations with the class.</td>
<td>Remind students that these activities are important in being successful in challenges. These activities are building their foundation of knowledge to then apply what they have learned in the challenges.</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Teacher Sequence to Present Lesson  Day 1 of 5... Continued**
FLATE Robotics Summer Camp – Behavior #1

Robot Behavior – Moving forward an exact distance

Team Name:  
Robot Name:  

Using your programming software and your robot answer the following questions.  
Hover your mouse over an object to show the name.

Get Moving

Click action tab (green)

Select move tank and drag it to the programming screen  
Connect it to the play icon

1. What does 1 rotation mean on the robot?
2. What motor ports does this block receive power from?
3. Label each motor right or left:  
   - B –  
   - C –  
4. What does the power setting control?
5. What happens if you change the power to negative 50 on each motor?
6. If you need the robot to go farther forward, what do you do?
7. What happens when the motor power is positive 50 but the rotations are negative?

How far, How fast

Measure the Diameter of the wheel in inches and cm

Diameter = ______ (inches), ______ (cm)

Calculate the Circumference of the wheel  

\[ \text{Circumference} = \text{Diameter} \times \pi \]

(Diameter) ________ x 3.14 (inches) =
Appendix

Example Camp Flyer
Parental Consent Forms

Parental consent forms will vary by institution. Be sure to consult with your legal department to determine what is required. The samples shown (CANNOT be used for any real camp registration) on this page are unique to our institution and are provided as an example only.

Forms Include:

1. Registration and Medical Release Form
2. Participant Release Form and Photo/Videography Release
3. Code of Conduct Agreement
4. Field Trip Form

1. Registration and Medical Release

![Registration and Medical Release Form]

2. Participant and Photo/Videography Release

![Participant and Photo/Videography Release Form]

3. Code of Conduct

![Code of Conduct Form]

4. Field Trip

![Field Trip Form]
Example Sponsor Thank You

Dear Sponsor,

We are still excited about the success of the 2015 Summer Robotics Camps, and I want to personally express how important your support has been. Camp information via mass e-mail, school and media resources, and other contacts helped create a growing awareness about optional summer educational opportunities for middle school campers throughout Hillsborough County. This year we held eight camps which provided us with 200 participants and a definite increase in parental interest as well over 100 parents and relatives attended the three Friday afternoon “Final Challenges.”

The 2011 summer plans are already in the works. Additional “Advanced Robotics for Middle School Campers” more “Girls Only” camps, and educational outreach to underserved areas is planned.

Again, thank you very much for your support of the program; we will obviously be seeking your support in the future, and we all hope you enjoy “showing off” the latest in robotic T-shirt wear!

Sincerely, Marilyn
Barger Executive Director
Florida Advanced Technological Education Center of Excellence

Parent/Guardian:
Example Check Return Letter

Dear Parent,

Enclosed is the registration check that was sent for the Robotics Camp. This year’s camp is a much greater success than we had anticipated and we will schedule several more camps next summer.

Your application will go in our “first contact” file for next year’s mail out, and you will be notified as soon as we schedule classes.

Thank you for your support of the program and the interest you are taking in your child’s education. We hope to see you next summer!

Lourdes Fleurima
Sr. Staff Assistant
FLATE, Florida Advanced Technological Education Center of Excellence
HCC, Brandon Campus fleurima@fl-ate.org www.madeinflorida.org
## Appendix

### Example Weekly Schedule

<table>
<thead>
<tr>
<th>Day</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intro Orientation &amp; Robotics: What Do You Know?</td>
<td>Challenge 1: Bottle Touch Practice</td>
<td>Challenge 1: Bottle Touch Practice</td>
<td>Practice Challenge #2</td>
<td>Practice for Final Challenge</td>
</tr>
<tr>
<td>2</td>
<td>Practice Challenge #2 Obstacle Course Round 1</td>
<td>Obstacle Course Round 2</td>
<td>Obstacle Course Round 2</td>
<td>Line Follower Round 1</td>
<td>Practice for Final Challenge</td>
</tr>
<tr>
<td>3</td>
<td>Challenge 1: Bottle Touch Practice</td>
<td>Practice Challenge #2</td>
<td>Practice Challenge #3 Line Follower</td>
<td>Round 2 &amp; 3</td>
<td>Round 1 of Final Challenge</td>
</tr>
<tr>
<td>4</td>
<td>Line Follower Round 2 &amp; 3</td>
<td>Challenge Practice</td>
<td>Challenge Practice</td>
<td>Round 1</td>
<td>Practice for Final Challenge</td>
</tr>
<tr>
<td>5</td>
<td>Practice for Final Challenge</td>
<td>Practice Challenge #3 Line Follower</td>
<td>Practice Challenge #3</td>
<td>Round 2 &amp; 3</td>
<td>Process Final Challenge / Take Robots apart and put together / Graduation / Awards</td>
</tr>
</tbody>
</table>

**Intro Robotics Camp Calendar**

- **9 to 10 AM**: Intro Orientation & Robotics: What Do You Know?
- **10 to 11 AM**: Practice Challenge #2 Obstacle Course Round 1
- **11 to 12 PM**: Lunch
- **1 to 2 PM**: Practice Challenge #3 Line Follower Round 2 & 3
- **2 to 3 PM**: Challenge 1: Bottle Touch Practice
- **3 to 4 PM**: Full Speed Ahead Lesson - Robot Move Forward
## Example Camper Survey

Instructions: Read the questions carefully. Circle one best answer for each question.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Please rate your familiarity with science, technology, engineering /robotics, and mathematics (STEM) courses needed in middle and high school in order to prepare for careers in engineering and advanced technology college programs.</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>How likely are you to take a course in engineering, technology, or robotics in school next year?</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>The camp helped me to better understand how science, technology, engineering and mathematics (STEM) are used in industry.</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>The field trip helped me make the connection between the camp activities and real world applications.</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Programming the robot helped me to see how automated systems are programmed and controlled.</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Learning to program the robot by thinking logically will help me when solving other problems in science, technology, engineering, and mathematics (STEM) subjects in school.</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>The camp provided opportunities for teamwork and collaboration with others.</td>
</tr>
</tbody>
</table>

What did you like best about the camp?

What did you like least about the camp?

What would you change about the camp?
**Example Parent Survey**

Please talk to your student about the camp and answer the following questions.

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

1. The location used for the robotics camp was convenient.

2. The facilities used for the camp were accommodating.

3. The robotics lessons were challenging.

4. The robotics lessons were enjoyable.

5. There was enough time allowed to program the robots and complete the various challenges.

6. The *Made in Florida* presentations helped relate middle and high school science, technology, engineering/robotics, and mathematics (STEM) courses to college programs and career choices in engineering and advanced technology programs using real examples from Florida advanced manufacturing industries.

7. The *Advanced Manufacturing Industry Tour* helped relate the robots and activities experienced during the camp to the real world of Advanced Manufacturing in Florida.

8. The robotics instructors were knowledgeable and helpful.

9. The robotics camp provided a positive experience.

10. As a parent, I would recommend this camp to others.
If you would like to print your guide in a “booklet” format (from the original PDF file), please use the following steps, you will need a printer that can print double sided documents:

**Step 1** – select **Booklet** under **Page Sizing and Handling** *(please make sure you are using a printer that prints double sided documents)*.

**Step 2** – make sure booklet subset is for **Both Sides**

**Step 3** – select **Print**

Before selecting Print, make sure that the Booklet subset is for Both Sides.
All FLATE Best Practice Guides are available as online resources, or for download at fl-ate.org/best-practices

ET High-Tech Camps for High School Students

Recruiting & Retaining Girls in STEM

Professional Development

Curriculum Review Processes

Forging Positive Partnerships in Florida

Industry Tours for Students Guide

Curriculum Alignment Credentials Guide

Communities of Practice Guide

Curriculum Alignment Credentials Guide
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