



Junior Girl Scout Robotics Badges Workshop (Grades 4-5)

Estimated length: 3 hours

Updated on 1/15/18

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Learning Objective

Teach Girl Scouts about basic robot parts and functions, basic robot programming, and robotics competitions while fulfilling the requirements of the Programming Robots, Showcasing Robots, and Designing Robots Merit Badges.

Fulfilling Badge Requirements

The two activities and associated presentations that we suggest fulfill the requirements for the Designing Robots and Programming Robots Merit Badges respectively. The Showcasing Robots Badge is fulfilled by a combination of the [Designing Robots](#) activity, introduction presentation, and conclusion activity. More information about the specific badge requirements can be found in the [Activity A](#), [Activity B](#), [Closing](#), and [Resources](#) sections.

Materials

Note: The quantities for this materials list are for a workshop with approximately 40 Girl Scouts in attendance. Adjust the quantities accordingly for the expected number of attendees for your workshop.

While these are the suggested minimum amount for supplies, it is never a bad idea to bring extras. Also, in addition to the items listed below, it is important for the venue to have access to (or for you to bring) power, tables, chairs, and at least one projector.

For [Designing Robots](#):

- A roll of masking tape
- 40 toilet paper rolls
- 2 bundles of yarn or string
- 2 or 3 hot glue guns (whatever is most manageable for volunteers)
- 5 collapsed cardboard cereal boxes (or something similar)
- 10 pairs of scissors
- 40 pipe cleaners
- 2 boxes of markers
- 60 popsicle sticks

For [Programming Robots](#):

- [10 5-minute bots \(previously built\) with NXT Mindstorms or EV3s](#)
- 10 computers with NXT or EV3 programming software

10 USB programming cables for NXT or EV3

Preparations

In order to be best prepared for your workshop, make sure to split the Scouts registered into two approximately equal groups (Group A and Group B). So the Scouts will be more comfortable, it might be best to try to keep girls of the same troop together. Also, being familiar with your presentations is important in order to provide the best experience for the Scouts.

Setting Up

Before the Scouts arrive, having everything set up is important. First, you'll want to divide your room into two sections, making sure to have adequate table space and chairs for half the Scouts to sit at each section. Alternatively, the workshop could be held in two rooms close to each other. If that is the case, have one room designated as the main room for check-in and the introduction presentation. Designate one room/section to be for [*Activity A: Designing Robots*](#) and one for [*Activity B: Programming Robots*](#). Make sure to have the computers already booted up, plugged in, and ready to go by the time Scouts get there.

To prepare for [*Activity A*](#), set aside 20 sets of the following materials: 3 popsicle sticks, 2 toilet paper rolls, 3 medium length strings/yarn, 2 pipe cleaners, and a pair of scissors. Also remember to plug in the hot glue guns in a designated hot glue gun zone, making it clear that Scouts should ask for assistance before using the hot glue by themselves. Lastly, set up a projector and computer to display the presentations on in each room/section. Have the introduction presentation queued up on one or both projectors, whatever you think will be easier for Scouts.

Workshop Structure

Introduction (10 minutes)

Showcasing Robots Badge Requirements

Learn about robotics competitions (Presentation)

Learn about robotics teams (Presentation)

After Scouts are checked in (you can tell them whether they are in Group A or B when they check in) and settled down, you can begin the introduction presentation. Make sure to mention who you are, thank any sponsors you have, and give a basic outline of what the workshop will look like. From there, talk briefly about types of robotics competitions (FIRST Robotics Competition, FIRST Tech Challenge, FIRST LEGO League, etc.). If you are a FIRST team, give a brief overview of your program, team, and what competitions are like.

After discussing FIRST and your team, direct Group A to go to the Activity A area and Group B to go to Activity B area (or have half of them stay put if the introduction was given at an activity station). It is important to note that Activity A and B will be happening simultaneously so be prepared with presenters and volunteers to facilitate both activities at the same time.

Activity A: Designing Robots (70 minutes)

Designing Robots Badge Requirements:

- Discover the future of robots (Presentation)
- Determine your robot's expertise (Activity)
- Plan your robot (Activity)
- Create a prototype (Activity)
- Get feedback on your robot (Scout's Presentations)

Showcasing Robots Badge Requirements

- Create a presentation on how you designed your robot (Scout's presentations)
- Tell others how you designed your robot (Scout's presentations)

Recommended Activity Roles:

- Presenter (1): Acts as the activity leader and gives the presentation.
- Hot Glue Gun Assistant (1): Responsible for monitoring and assisting students with hot glue gun.
- Supply Station Assistant (1): Responsible for giving out and keeping track of supplies

At the Designing Robots area, after everyone is settled, give an approximately 10 minute presentation. Cover biomimicry and how it relates to prosthetics. It is also good to get audience involvement, asking questions like "What is a robot?" and "What animal does this robot remind you of?". This can easily fulfill the requirement of discovering the future of robots while at the same time giving Scouts ideas for the activity. Then, have Scouts get into groups of 2 and give them their design challenge—make their own prosthetic that has to be able to pick up a cup with no skin to cup contact. This will be their robot's expertise.

Give each group the set of supplies you got together during setup. Make sure to let Scouts know that cardboard, tape and hot glue are available during the activity if they ask volunteers for it. From there, Scouts should work in their groups for about 45 minutes. This leaves 15 minutes for Scouts to present to each other the prosthetic they made. Facilitate this presentation and ask questions such as "Why did you choose that design?" or "Where did you get inspiration from?" in order to form a dialogue about designing and prototyping concepts. After the 70 minutes are over, Scouts should go to the other Activity Station, and the other Scouts should come to Activity A.

Activity B: Programming Robots (70 minutes)

Programming Robots Badge Requirements:

- Learn how robots work (Presentation)3
- Discover the robot brain (Presentation)
- Learn about programming (Presentation)
- Try simple programming (Activity)
- Code a robot (Activity)

Recommended Activity Roles:

- Presenter (1): Acts as the activity leader and gives the presentation.
- Programming Assistants (2): Help Scouts with program troubleshooting.

At the Programming Robots area, after everyone is settled, give an approximately 10 minute presentation. Cover parts of a robot, how robots work, robot “brains”, and the concept of programming. From there, give another 10 minute presentation on how to use NXT or EV3 software. Then, have Scouts get into groups of 2, and give them their beginner goals for this activity: make your robot go in a circle, square, and figure 8.

After a group accomplishes those, encourage that group to start exploring with sensors, giving them additional sensor-oriented tasks. It is also beneficial to show them sensors commonly used on FIRST robots, like [ultrasonic sensors](#), [pressure sensors](#), [potentiometers](#), [gyroscopes](#), or a [camera](#). They should have the remaining 50 minutes to work with their robots. Make sure to emphasize that it is okay if they do not complete all the goals. However, also make sure to have extra challenges prepared for Scouts that get done before the 50 minutes is up. After the 50 minutes are up, Scouts should go to the other Activity Station, as long as they have not already been there.

Closing (30 minutes)

Showcasing Robots Badge Requirements:

See robotics in action (Activity)

After both groups have done each activity, Scouts should all gather in one area/room. Give closing remarks, once again thanking a sponsor if you have one, and pointing Scouts to the closing activity. The closing activity should involve Scouts interacting (whether it be driving or activating) with a robot.

FIRST Competition robots that can shoot soft, harmless projectiles are always a fun option. For example, robots built for [FIRST Stronghold](#) that can shoot “boulders” (10” diameter foam balls) work well for this activity. However, if that is not an option smaller robots like several Spheros could also potentially work. Additionally, it is beneficial to have spare robot parts (like [gearboxes](#), [wheels](#), [electronics](#), [motors](#), etc.) to show the Scouts and let them interact with. Make sure to give Scouts the badges and goodie bags with STEM resources to use at home in them are fun.

Acknowledgements

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[AndyMark, Inc.](#)



[Girl Scouts of Central Indiana](#)



[West Lafayette Public Library](#)



[West Lafayette Jr./Sr. High School](#)

Resources

For presentation examples, the official Girl Scout Junior Robotics Badge Guide, and a general guide to hosting a badge workshop visit

[BoilerInvasion.org](#)

[Pictures](#) from the December 2017 event

Purchase Badges online at;

[Showcasing Robots](#)

[Designing Robots](#)

[Programming Robots](#)