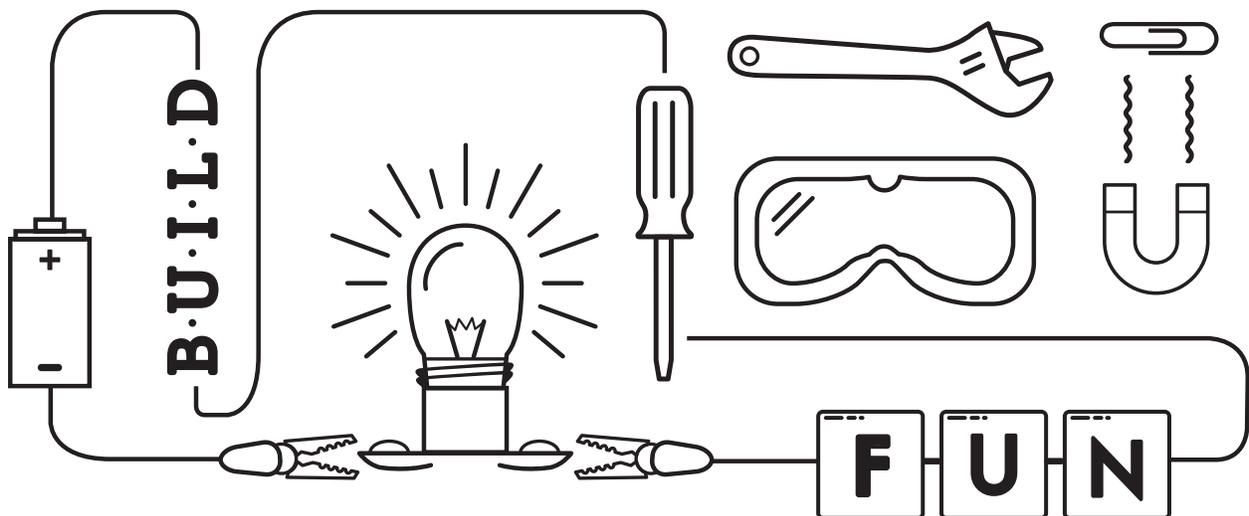




Camp Invention®

Robotic Pet Vet™ Curriculum Excerpt



Selected pages from Robotic Pet Vet™

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SAFETY AND HYGIENE

- For children's safety and proper hygiene, please be sure they wash their hands with soap and water after each session, after using recyclables, and before eating snacks and meals.
- Only adults should use glue guns. Practice caution when handling glue guns. They are hot.
- Demonstrate to children how to properly hold and use scissors. Do not allow anyone to run with scissors.
- Make sure children do not put materials in or near their eyes, mouths, and ears.
- Remind participants to safely handle objects with a point, such as pencils and nails.
- Alcohol swabs are used to clean safety glasses and goggles. Keep all alcohol away from heat sources.
- Be sure to follow all local and state fire and safety regulations.
- If any participant has an allergy, ensure that handled materials are nonallergenic.
- Practice caution when using the mallets and nails. Be sure to keep all fingers and other body parts clear of the mallet and nail's path. Keep nails off of the floor and step carefully.
- Day Three uses materials to simulate blood. If any child feels woozy about blood, have them step away for that portion of the activity.

OVERVIEW

Robotic Pet Vet™

Animal shelters are reporting that malfunctioning robotic dogs have been popping up all over town! These Robo-Pets are sending SOS-GPS signals for help, so grab a vet kit and tinkering tools to perform surgeries and discover how these robotic dogs work. Run diagnostic laboratory tests to determine what is making them sick and help them get back on their paws! Customize a Robo-Pet, construct a one-of-a-kind Dog Park, and then prepare to adopt and take home a new best friend!

- 1** On Day One, participants discover that a pack of robotic dogs needs to be rescued! Children receive clues containing the Robo-Pet locations, which they need to quickly decode to save the dogs. The dogs are not feeling well, so children perform surgery to explore the anatomy and gain insight into how all of the Robo-Pet's gears, circuits, motors, and lights work. Then, each participant adopts their own Robo-Pet from the animal shelter and sees them virtually come alive!
- 2** On Day Two, a few members of the pack are still feeling under the weather. Teams put their vet skills to the test as they run a series of urinalyses to diagnose what could be causing the Robo-Pets' symptoms. With the diseases and proper treatments identified, children give the dogs new fur coats, designing them while customizing their color and pattern.
- 3** On Day Three, the robotic dogs are sick again—this time with a virus! The Robo-Pet Vets investigate bone marrow and blood samples to find a cure. After children burst the viruses and the Robo-Pets are on the mend, children design new collars along with other canine accessories and prototypes to make their pets all their own.
- 4** On Day Four, participants discover that their Robo-Pets have bits of sticks and stones embedded in their paws. Teams get back to work as vets to extract the debris and let their pets run pain-free once again. Then, teams design and construct a tricked-out Dog Park where their faithful friends can play.
- 5** On Day Five, participants put the finishing touches on their robotic masterpieces and one-of-a-kind Dog Parks. As the child-canine bond cements, children prepare to take their pets home to meet the rest of the family. In a grand finale, children show off their fluffy, healthy, and enhanced dogs in a Robo-Pet party parade!

MATERIALS FOR DAY FOUR



Alcohol swabs



Balsa wood



Cardboard (from Inventor Supply Room)



Craft sticks



Dog Park poster



Duct tape



DVD



Foam blocks



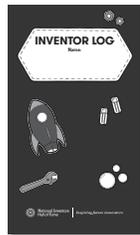
Glue guns



Glue sticks (for glue guns)



Goggles and safety glasses



Inventor Logs



INVENTOR SUPPLY ROOM

Inventor Supply Room



Mallets



Markers



Masking tape



Nails



Noise putty



Paw print mold



Pencils



Pony beads



Scissors



Tweezers

DAY FOUR OVERVIEW

Playful Pups

On Day Four, participants discover that their Robo-Pets have bits of sticks and stones embedded in their paws. Teams get back to work as vets to extract the debris and let their pets run pain-free once again. Then, teams design and construct a tricked-out Dog Park where their faithful friends can play.

ACTIVITIES

1 SAVE THE PAW

- Divide children into six teams, and give each team a paw print and tweezers.
- Play the "Paw Operation Music" Track.
- Take turns extracting as much debris from the paw as possible in 30 seconds.
- Reform paws with beads for the next session.

2 DOG PARK DESIGN

- Watch the "Cathecare" Track.
- Review the Rules of Brainstorming in the Inventor Logs, and brainstorm ideas of what might be found at the ultimate Dog Park.
- Sketch Dog Park ideas (Intermediate).

3 DOG PARK CONSTRUCTION

- Discuss tool safety and demonstrate how to use a mallet and nail on top of a cardboard hammering base.
- Explain how to hammer wood, or recyclables and wood, together and show how to cushion an exposed nail backing with a foam block.
- Distribute and sanitize goggles with alcohol swabs.
- Build Dog Parks using real tools, wood, nails, recyclables, and upcycled robotic dog parts from the surgery.

PLAN AHEAD

For Activity 1

- Fill each paw print mold with noise putty. Fold four pony beads into each paw for participants to dig out.



The putty will only hold its shape for a few seconds, so leave them in the molds until ready to distribute. The putty needs to be collected and remolded for each session.

For Activity 2

- Hang the Dog Park poster.

For Activity 3

- Plug in the glue guns and lay out the glue sticks for the glue guns.
- Add scissors to the Design Materials Table.



If there are leftover design materials from previous days, children may also use them to enhance their Dog Parks.

- Create a Hammering Station:
 - Locate cardboard from the Inventor Supply Room. Layer three to four pieces of cardboard to serve as a hammering base to protect the work surface.
 - Make four hammering bases, and set them on a table next to each other for children to access.
 - Place a mallet* at each hammering base.
 - Evenly divide nails*, balsa wood, and craft sticks among sessions. Set them out on the table.



***Mallets and nails are meant to be used with the wood. The main intent is to give children experience using real tools. Allow children to explore and experiment with using the tools at their own pace. Some may choose to only explore and not make a functional piece.**



Ration wood and nails to last for all sessions on Day Four and Day Five.

National Inventors Hall of Fame Inductees James Wynne, Rangaswamy Srinivasan, and Samuel Blum

James Wynne, Rangaswamy Srinivasan, and Samuel Blum invented a process that uses a short pulse ultraviolet (UV) laser to etch tissue in minute increments and in a highly controlled fashion. The technique allows removal of material to a precisely determined depth without thermal damage to surrounding tissue.

Until the early 1980s, lasers were used in eye surgery to create scar tissue that had therapeutic value, as when welding a torn or detached retina. The excimer laser breakthrough is used for delicate surgical procedures, most notably refractive eye surgeries such as PRK and LASIK, which permanently change the shape of the cornea, the clear covering of the front of the eye.

Collegiate Inventors Competition undergraduate silver prize Winners Team Cathecare

Anonicha Burapachaisri, Charles Pan, Aishwarya Raja, and Chanond Sophonpanich from Columbia University's Team Cathecare invented a UV catheter to help fight against infection from catheter use. Central line catheters provide a direct way to deliver medicines, fluids, or nutrients to patients over an extended period of time, often weeks or months. However, these catheters also make it easier for bacteria to enter the body and are responsible for 240,000 infections every year. Cathecare uses UV light to continually and automatically sterilize the hub, the most-handled portion of the catheter and the most susceptible to bacterial growth, stopping infections in their tracks.

Making Models

Designers and engineers experiment with simple materials to help them put their ideas into visual form. When people can see ideas in this way, those ideas are sometimes easier to morph, change, enhance, and take to the next level. Models also help people communicate their ideas to others.

Maker Movement

The term "maker" has made its way into common vernacular to mean a do-it-yourself type who makes or produces something—likely applying some creativity, curiosity, problem solving, and technical tinkering along the way. The buildup of energy around the topic of making in the last decade is referred to as the "maker movement."

For more than 40 years, the National Inventors Hall of Fame has been celebrating the nation's greatest "makers"—the original tinkerers, Take Apart legends, and heroes of innovation.

The National Inventors Hall of Fame Inductees have designed many of the tools, techniques, and processes that are in today's maker spaces—enabling, inspiring, and empowering makers to become the next wave of inventors and innovators.

ACTIVITY 1

Save the Paw

Participants extract debris from dog paws.

MATERIALS

DVD

Prepared paw prints

Tweezers



APPROXIMATELY 5 MINUTES

Step-By-Step Instructions

1. Play one of the "Background Music" Tracks online at campinvention.org/curriculum-videos as participants enter.

2. Say the following:



We saw some of the Robo-Pets running after squirrels in the parking lot. A little while into the chase, they began limping! I'm afraid that they may have gotten some sharp objects embedded in their dog paws. We need you to operate on the paws and then get to work building them a safe Dog Park where they can play!

3. Group participants in six teams. Give each team one of the prepared paw prints and a pair of tweezers.

4. Explain that they should take turns extracting the "debris" (i.e., pony beads) from the paw, but that they need to be very careful not to damage the paw too much! Tell children that their dogs will be given a medicine so that they will not feel anything.

5. Tell teams that the operation will be timed as the Robo-Pet's medicine will only last a short while. Explain that the music will stop after 30 seconds, and when it does, they must put the tweezers down and stop the operation.

6. Play the "Paw Operation Music" Track online at campinvention.org/curriculum-videos.

7. Have teams begin the operation.

8. Once the music has stopped, have all participants put their tweezers down and count how many pieces of debris they were able to remove.

9. Have teams share the number of removed pieces with the class.

10. Congratulate teams on another successful operation!

11. Have children insert beads back into the putty and place putty into the paw molds for the next session.

Guiding Questions

- How many pieces of debris was your team able to remove?
- Were the paws of teams that removed the most debris also the most damaged?
- What challenges do you think veterinarians face when performing surgery on real dogs?



If unable to play the music, clap hands to stop the operation.

Primary Discussion

There are medical robots that help doctors during surgery by making very small cuts and movements. Patients also get fewer cuts from the robot, which makes healing fast. LASIK is a type of surgery that also uses technology to make tiny, straight cuts. Invented by three National Inventors Hall of Fame Inductees, LASIK uses lasers to cut a tiny piece of the eye. Doctors change the shape of that piece of the eye, and then put it back in place. This surgery helps fix poor eyesight so people often do not need to wear glasses or contacts.

Intermediate Discussion

Innovative biomedical robots assist doctors by being able to make small, precise incisions and movements. Because they are so precise, patients receive fewer cuts, which speeds up healing time. LASIK is another type of surgery enabled by the use of precise technology to make tiny, straight cuts. Invented by three National Inventor Hall of Fame Inductees, LASIK uses lasers to cut a slice off a flap from the cornea. Doctors change the shape, or morph, the cornea and then put the flap back in place. This procedure helps fix poor eyesight so people often do not need to wear glasses or contacts.

ACTIVITY 2

Dog Park Design

Teams begin to design a Dog Park.

MATERIALS

<input type="checkbox"/> Dog Park poster	<input type="checkbox"/> Inventor Logs	<input type="checkbox"/> Pencils
<input type="checkbox"/> DVD	<input type="checkbox"/> Markers	

 **APPROXIMATELY 5-10 MINUTES**

Step-By-Step Instructions

1. Tell participants that now that their Robo-Pets can run around pain-free again, they can design the ultimate Dog Park where their dogs can play.
2. Share that first they will hear advice on working together as a team from Collegiate Inventors Competition Winners and biomedical inventors Team Cathecare. Explain that Team Cathecare invented UV medical tubing to help fight against infection that can occur when medical tubes are inserted into the body and introduce bacteria.
3. Play the "Cathecare" Track online at campinvention.org/curriculum-videos, or read the transcript provided at the end of the curriculum.
4. Give each participant their Inventor Log.
5. Gather children and review the Rules of Brainstorming in the back of their Inventor Logs.
6. Show them the Dog Park poster. Then, brainstorm what types of items might be found at a Dog Park.
7. Ask children to think about how they can enhance the items beyond what they are now.

 *What might be something new you could include in a Dog Park?*

 *How might you combine two items into one?*

 *How might you change something that exists now to make it more fun or challenging for a dog?*

 *How might you design something for big dogs and for small dogs?*

8. Play one of the "Background Music" Tracks online at campinvention.org/curriculum-videos.
9. Tell Primary participants that they may choose to work individually or in teams.
10. Give Intermediate participants pencils and markers. Have them work in teams of three. Have them spend 2 minutes sketching and designing an innovative Dog Park for their Robo-Pets.

Primary Discussion

What are some of your favorite things to do at a playground? Do you think a dog would like to do those same things? If you wanted to climb a wall or ladder, hang from monkey bars, or swing from a swing, you would be out of luck if you were a dog! A dog's four-legged body and lack of hands with thumbs to grip onto handles, ropes, or rungs make it impossible for a dog to try any of those activities. The good news is that dog parks are specially designed with dogs in mind! They provide the types of activities that dogs not only can do with their bodies, but enjoy doing!

Intermediate Discussion

When inventors are designing and prototyping, they often use materials that are available to them in their home, in a garage, or even at the grocery store. Sometimes their ideas need a certain special item, while other times they come across a material that inspires their design. Think about the parts and pieces that you came across inside your robotic dog or while searching in the Inventor Supply Room and how that might affect and inspire the design of your Dog Park.

ACTIVITY 3

Dog Park Construction

Teams begin building their innovative Dog Parks.

MATERIALS

<input type="checkbox"/> Alcohol swabs	<input type="checkbox"/> Glue guns	<input type="checkbox"/> Hammering Station
<input type="checkbox"/> Design Materials Table	<input type="checkbox"/> Glue sticks (for glue guns)	<input type="checkbox"/> Inventor Supply Room
<input type="checkbox"/> DVD	<input type="checkbox"/> Goggles and safety glasses	<input type="checkbox"/> Pieces and parts of robotic dog (from Day One)

MAJORITY OF THE SESSION

Step-By-Step Instructions

1. Announce the beginning of Dog Park construction.
2. Explain that children will have the chance to use real tools and wood to construct their parks.
3. Show teams the available building materials at the Design Materials Table and the Hammering Station.
4. Tell teams that they may also use items from the Inventor Supply Room and pieces and parts from their robotic dog surgery on Day One to make their Dog Park.
5. Tell children that they are going to be entrusted with real tools. Explain that there are a few safety tips and techniques that will help them be successful.
6. Demonstrate the proper use of a mallet and nail.



Place the pieces of wood that you want to join together on top of the flat, layered cardboard.



Hold the mallet with a firm grip.



Push the nail into the wood as much as possible.



Hold the nail straight, keeping fingers out of the way as much as possible, and tap the nail directly in the middle with the mallet.



Swing the mallet with your whole arm and elbow.



Gently tap the nail at first. Once it is stable and held in place by the wood, let go and continue to hammer.

7. Explain that they can hammer two or more pieces of wood together or hammer wood and recyclables together. Tell participants that if the sharp end of the nail sticks out of what they hammered, they should either attach another object to the back or push the rest of the nail through a foam block to cushion it.
8. Caution children to keep the nails off of the floor, to pick up any that accidentally fall, and to watch where they walk.
9. Tell children to use the layered pieces of cardboard at the Hammering Station to elevate any items that they wish to nail together, so that they do not hit the nail directly on the table. Glue guns are also available for connecting pieces.



Only adults, Leadership Interns, and Counselors-In-Training may operate glue guns.

10. Give each child a pair of goggles and an alcohol swab. Have them sanitize their goggles.



Have a Leadership Intern or Counselor-in-Training stand at the Hammering Station to safely monitor the use of the tools.

11. Play one of the "Background Music" Tracks online at campinvention.org/curriculum-videos.
12. Have teams begin building.
13. Approximately 5-10 minutes before the end of the session, have teams put the tools away, label and store their Dog Parks, and clean their work space.
14. Tell children that they will be able to finish building their Dog Parks on Day Five.

Guiding Questions

- Do you enjoy using real tools? Why or why not?
- If you could build anything with wood, nails, and a hammer, what would you build? Why?
- What is your favorite part of a playground? Do you think a dog would enjoy it too? Why or why not?

Primary Discussion

It is fun to try and build structures with many different types of materials like wood, metal, paper, plants, or clay! Building materials do not have to be expensive or brand new—they can be reused. Many inventors built their first prototypes using whatever was available to them, including recycled materials and discarded scraps. Our bodies even use recycled materials when they grow new hair and fingernails or repair a scraped knee. As a Robotic Pet Vet, you took apart pieces of a robotic dog and recycled them to make a new Dog Park. Keep building, inventing, and trying different materials you find as you explore!

Intermediate Discussion

Yoshinori Ohsumi won a Nobel Prize in 2016 for discovering and explaining how cells in our body are taken apart, separated into many pieces and parts, and then recycled to make new components inside our body. As a Robotic Pet Vet, you took apart pieces of a robotic dog and recycled its parts to make a new Dog Park. This is just another example of how robotics and the invention process can be similar to biological processes!

MATERIALS PROVIDED

The Camp Invention program supplies all materials for each module's activities. Here is a collective list of materials (and their respective quantities, based on the number of participants) for all activities in the CrickoBot™ module.

QTY	Item Description
120	Balsa Wood Pieces - Blocks, Sticks and Sheets
100	foam blocks, 2x2x1 (72 PER PACK)
80	Battery, AA Non-Alkaline
1	Corn Syrup (16oz bottle)
40	10" x 10" Fake Fur with Adhesive Back
56	Robotic Dog w/o Fur
16	bag, resealable, plastic, gallon 10"x12"
8	Cup, Plastic 3.5 oz
10	adhesive bandages
6	goggles, safety
30	glasses, safety eye
1	Robotic Pet Vet DVD
1	Roofing Nails 7/8"
1	Ribbon- Pink, 3/8" x 10yd
1	Ribbon- Polka Dot, 3/8" x 10yd
1	Ribbon- Yellow, 3/8" x 10yd
4	Small Rubber Mallet
20	tubing, vinyl, 1/4"
1	tote, plastic boot box w/lid
1	Food Coloring assorted box
100	glue sticks (glue gun), small
1	foam sheet, red
72	bell, jingle, 3/8", gold
50	bead, pony, blu
500	Adhesive Jewels
100	Glucose testing strips
8	ball, table tennis
10	paper, white copy, 8 1/2 x 11
48	bubble wrap, 1-1/4 diameter, 12"x250'
12	scissors, child
1	towel, paper (roll)

QTY	Item Description
1	Measuring Cup (32oz)
2	bowl, foam, 12 oz
4	container, clear round, 32 oz
200	alcohol swabs
3	drop cloth, clear plastic, 9'x12'
8	Phillips, 0 x 2 1/2
8	Phillips, 1 x 1 1/2
1	towel, cloth 20" x 40"
1	Water beads, Red
200	craft sticks
2	glue gun, low heat, small
2	glue gun, low heat, small
1	Dog Bone Containers
3	Noise Putty
6	Plastic Tweezers
12	test tubes, plastic with caps
1	Dog Paw Mold- CAMP
1	Tape, Duct 50-60 yd
2	tape, masking
1	poster, goggle safety
4	Vet Records Youngest Class Only Handout
4	Vet Records All Other Classes handouts
8	Code Key handout
1	Location Clue handout
1	Prescription Handout
1	Robotic Pet Vet Door Sign
1	Dog Park Poster
1	Simple Machines Dog poster
1	Code Symbols Cut Out sheet
1	Dog Wound poster
8	Operation Table Handout
1	Real Dog Anatomy posters
1	Robotic Dog Anatomy poster
6	Fur Template handout
3	Diagnosis Cards
1	Robo-Pet Prototype poster

QTY	Item Description
40	Adoption Cards
1	scissors, adult
24	markers, assorted colors, washable
24	pencils, #2
1	marker, black permanent
1	glue stick (non glue gun)
2	syringes, 5ml plastic (Solid Plunger)
1	paper, pH
1	drink mix, lemonade, unsweetened packet, powdered