



FIRST® at Home
Virtual Camp Kit



CORE VALUES – INNOVATION PROJECT – ROBOT DESIGN



FIRST® City Under Quarantine

**Created By:
FRC 8027 and Share & Learn**



www.droidsrobotics.org

<https://www.facebook.com/groups/FLLShareandLearn/>

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Camp Summary

This program is designed to introduce campers to the exciting and technical world of *FIRST*[®]. It will help students better understand the science, technology, engineering, and mathematics, (STEM) concepts and build a variety of holistic skills that prepare students for life. The camps expose campers to programming robotics with block-based coding software, building robots, robot mechanics and problem solving through competitive team challenges. In addition to the technological information the campers receive, the program enables them to learn and practice lessons in project-based learning, student centered activities, leadership skills, communication, and teamwork, through *FIRST*[®] Core Values. The camp is designed to be five days in length and involves remote collaboration, activities and fun!

Materials List

MATERIAL	PURPOSE
<i>FIRST</i> [®] City Under Quarantine PowerPoint Slides	Use the slide deck to guide your campers through the activities it provides additional layers of details for each day.
Laptop, computers, or tablet (note that the Chromebook/tablet EV3 software is limited, but SPIKE	Load programming software, research and design.
Internet Access	To complete research and connect to remote collaboration platform
Measuring devices: Meter sticks, rulers, and tape	Some activities require campers to do some simple measuring.
Six 2X4 LEGO Bricks, 6 hoses, or Juice bottle lids/cardboard and pipe cleaners	You will need to create some simple mission models using whatever LEGO brick you have. If you do not have any, you can model out of any items around the house
Large white paper or poster board, black electric tape, some small	Used to create the challenge described on day 5.
LEGO MINDSTORMS EV3 or Spike Prime robot set	Used to solve the robot game challenge at the end of the week and to learn programming languages

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Day 1 - Outline

Topic	Core Values	Innovation Project	Robot Design
<p>Goal</p> <p>Complete the Core Values Activity for the Day.</p> <p>On Day 1, the goal is to learn more about each person.</p> <p>Photo Sharing.</p>	<p>Complete the Core Values Activity for the Day.</p> <p>On Day 1, the goal is to learn more about each person.</p> <p>Photo Sharing.</p>	<p><i>FIRST</i>[®] City needs our help. Due to a pandemic, everyone is under quarantine.</p> <p>Started thinking about possible topics.</p>	<p>Design your robot.</p>
<p>Student Task</p>	<p>Each student should share one photograph and explain why it is important to him or her.</p> <p>[Optional] Play a Quizlet live game to learn the Core Values</p>	<p>Pick a topic in your city related to the quarantine from the following main areas:</p> <p style="text-align: center;"><i>Staying healthy, Isolation, or Education</i></p> <p>✓ Complete Picking a Project Topic</p>	<p>Look at the final Challenge (Day 5). How would you try to solve them? Discuss what sensors you might need to use to solve the challenge. Where on the robot would they need to be?</p> <p>✓ Complete Coming up with a robot design and strategy</p>
<p>Notes</p>	<p>Students need permission to share one personal photograph.</p> <p>Quizlet: https://quizlet.com/513724250/fl-core-values-flash-cards/</p> <p><i>Slide 4 & 5</i></p>	<p>Internet Access – maybe some pre-populated resources on the three topics</p> <p style="text-align: center;"><i>Slide 7</i></p> <p>Activity: Project topic worksheet</p>	<p>Information on available parts and what they do.</p> <p style="text-align: center;"><i>Slide 8 - 13</i></p> <p>Activity: Strategy and Robot Design Worksheet</p>
<p>Suggested Time</p>	<p>1 hour</p>	<p>2 hours</p>	<p>1 hour</p>

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Day 1 – Robot Design - Coming up with a Strategy

	Location from Launch Near/Far	Navigation Easy/Hard	Combine with Mission	Activation Method	Points
1					
2					
3					
4					

Day 1 – Robot Design - Coming up with a Robot Design

What sensors do we need?	What are some mechanisms that can solve the mission?	What features should the robot have?

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Day 1 – Innovation Project - Picking a Project Topic

What Problems Exist	Identify some experts you can contact	Identify some virtual field trips

Sample Sources:

Isolation:

PBS. Scott Kelly. <https://www.nytimes.com/2020/03/21/opinion/scott-kelly-coronavirus-isolation.html>

Education:

Smithsonian Magazine.

<https://www.smithsonianmag.com/innovation/education-during-coronavirus-crisis-180974497/>

Staying Healthy:

AARP

<https://www.aarp.org/health/healthy-living/info-2020/safety-grocery-shopping.html>

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Day 2 Outline

Topic	Core Values	Innovation Project	Robot Design
<p>Goal</p>	<p>Today's core value goal is collaboration.</p> <p>Students will have to come up with a poster design and decide the content together.</p>	<p>Identify a specific problem you want to address with regards to staying healthy, isolation or education. For example, students may pick the problem of how to get groceries if you cannot go inside the store.</p>	<p>Build a robot, start with the base model and add on as needed for your mission.</p>
<p>Student Task</p>	<p>Create a Public Service Announcement related to the topic or problem you picked.</p>	<p>Research existing solutions. By the end of the week, you should be able to add your solution to the table.</p>	<p>Build a EV3 or Spike Prime Robot</p> <p>Build EV3 Robot using a CAD tool (Link: https://www.bricklink.com/v3/studio/download.page)</p> <p>OR</p> <p>Build Spike Prime Robot using the same CAD tool</p>

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Day 2 Outline Continued

Topic	Core Values	Innovation Project	Robot Design
<p>Notes</p>	<p>Paper and Markers or a collaborative tool such as Google Slides or Google Jamboard (https://jamboard.google.com/) where the team can work together and create a plan</p> <p><i>Slide 15</i></p>	<p>Internet Access</p> <p>Activity: Sample notes and existing solutions</p> <p><i>Slide 16-17</i></p>	<p>Starting Designs: COR3: http://flttutorials.com/en/robotgame/building/one%20kit%20build/2018/06/12/COR3.html</p> <p>Droid Bot IV: http://primelessons.org/translations/en/lessons/DroidBotIVBuildInstructions.pdf</p> <p>Alternative (no robot): Learn what features make a good robot</p> <p><i>Slide 18</i></p>
<p>Suggested Time</p>	<p>30 mins</p>	<p>2 hours</p>	<p>1 hour</p>

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Day 2 – Innovation Project - Sample Notes

Source: Title, Author	
What does the source say about the topic we are trying to research?	

Day 2 – Innovation Project - Existing Solutions

Solutions	Pros	Cons	Cost	Implementation	Other Notes
Solution 1					
Solution 2					
Our team's solution					

Day 3 - Outline

Topic	Core Values	Innovation Project	Robot Design
Goal	For today's activity, the team will continue to learn to work on collaboration.	Develop solution ideas to the problem you picked.	Build the mission models and layout needed for the challenge. Learn to program your robot.
Student Task	Design a city emblem together that represents your team and incorporates elements of the problem you have chosen to study	Meet some experts virtually, conduct a survey, go on a virtual field trip. Come up with a list of questions for your experts.	Beginner: Learn to move forward and backward and to turn
Notes	Paper/Markers or digital tools such as Google Slides. <i>Slide 20</i>	Internet access Worksheet to collect notes <i>Slide 21-22</i>	Provide LEGO list (minimal parts) Robot, White paper/board, black electric tape <i>Slide 23-38</i>
Suggested Time	30 mins	2 hours	2 hours

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Day 3 – Innovation Project – Expert Interview

Expert (Title, Company)	
<p>Question 1: Have you experienced the problem we are studying? Answer:</p> <p>Questions 2: What do you think would solve this problem? Answer</p> <p>Question 3: We have come up with a solution. What do you think of our solution? Would it work? Answer</p>	

Day 4 - Outline

Topic	Core Values	Innovation Project	Robot Design
Goal	Create a mission model to add to the challenge	Create your final presentation support material	Learn to use sensors - color sensor and ultrasonic sensor
Student Task	<p>Create a mission model that represents your problem/solution (a physical model or a CAD)</p> <p>Create any new rules that the mission may require</p>	<p>Create a poster or presentation (e.g. Google slides) with all the information you have gathered. Include the CV emblem you designed yesterday</p> <ol style="list-style-type: none"> 1) Problem 2) Existing Solution 3) Your Solutions 4) Research you did 5) Expert consulted 6) Include your City Emblem and the Public Service Announcement 	<p><u>Beginner:</u> Move until color, Move until Ultrasonic, and Line follow Lessons</p> <p><u>Advanced:</u> My Blocks, Line Squaring, Proportional Control</p> <p>Discuss the importance of commenting code</p>
Notes	<p>LEGO brick or design in CAD using Studio 2.0</p> <p style="text-align: center;">Link: https://www.bricklink.com/v3/studio/download.page</p> <p style="text-align: center;"><i>Slide 40</i></p>	<p>Digital tools or poster board/markers</p> <p style="text-align: center;"><i>Slide 41</i></p>	<p>Robot, White paper/board, black electric tape</p> <p>Alternative (no robot): email code to person who does</p> <p style="text-align: center;"><i>Slide 42-60</i></p>
Suggested Time	30 mins	2 hours	2 hours

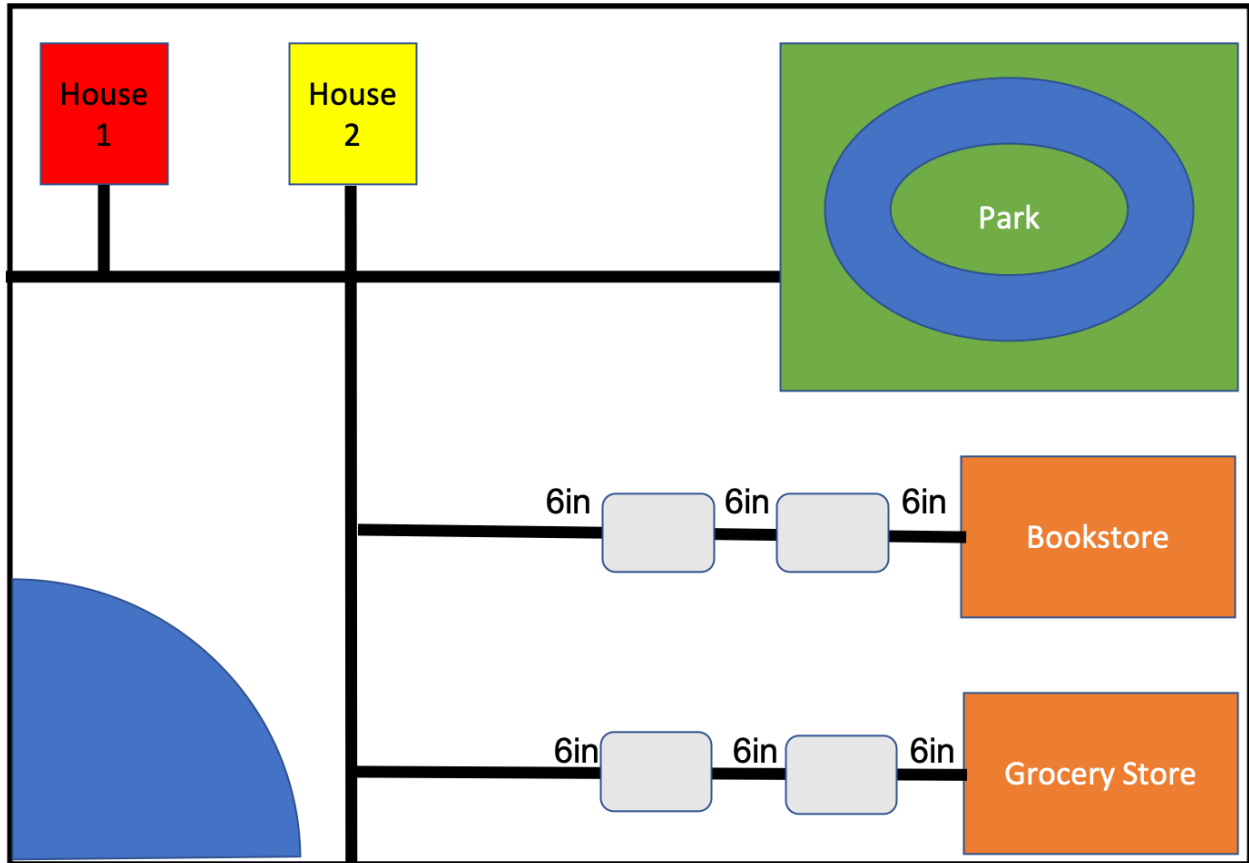
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Day 5 – Outline – Final Challenge

Topic	Core Values	Innovation Project	Robot Design
Goal	Develop rules for your new mission	Create your final Innovation Project <i>presentation</i>	Solve the missions
Student Task	<p>Add the mission model you created yesterday to your final challenge if you can and write the mission rules for it.</p> <p>[Optional] Give each student a set of Core Values cards and play a Core Values Matching Game.</p>	<p>Create a 5min video explaining your presentation (poster/slides).</p> <p>Share your 5 min presentation with your coach, family members, experts, etc. and collect feedback.</p>	Include the mission model you built yesterday and use the lessons from the previous days to solve the missions
Notes	<p>Matching Game: http://flttutorials.com/assets/images/CoreValues/CoreValuesMatchingGame.pdf</p> <p style="text-align: center;"><i>Slide 62</i></p>	<p>You may choose to do the presentation live via a Zoom call (or similar). However, you may also choose to just do a video recording.</p> <p style="text-align: center;"><i>Slide 63</i></p>	<p>White paper with electric tape, some boxes, minimal LEGO brick, 1 robot</p> <p style="text-align: center;"><i>Slide 64</i></p>
Suggested Time	10 mins	30 mins	4 hours

Day 5 - Final Challenge



Setup

Place hoops in Grocery Store and Bookstore. Start robot in $\frac{1}{4}$ circle Launch Area at the start. Once you leave launch, do not touch your robot by hand. Return to Launch to modify your robot. Exception: Coach will remove the box in the line to the store every 10 seconds.

Missions

M01: The family in House 2 is bored and also want an extra resource to help the child with schoolwork. Go to bookstore. Pick up book (Model with Hoop) and deliver to House 2. Stay 6in away from people in line. (5pts per book delivered)

M02: The family in House 1 is running low on food. To stay healthy, they need milk, bread and eggs. Go to Grocery store. Pick up groceries (Models with hoop) and deliver to house 1. Stay 6in away from people in line. (5pts per grocery item delivered.)

M03: Go to Park to meet your friend and go for a walk together. You must be completely inside the park area and do 3 right turns and 3 left turns

M04: **Add your rules here**

Rules

R01: Maintain social distancing at all times at the store. There is a line of people in front of the each store. Your robot must stay 6 inches away and move forward only when robot (box) in front is removed. (Hint: How can you use a sensor to maintain this distance?)

R02: You must use a sensor to accomplish all missions above.