# FIRST® LEGO® League

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## RESEARCH PROJECT OVERVIEW

SESHAN BROTHERS

# ABOUT THE AUTHOR

- Seshan Brothers were on team Not the Droids You Are Looking For
- Our research project for Trash Trek was a Global Innovation Award semi-finalist project (Top 20 out of 30,0000 teams).
- Our research project in Nature's Fury won Innovative Solution at the FIRST LEGO League International Open in Toronto.
- Our research project for World Class was EV3Lessons.com which resulted in the site you are currently on! ;-)
- We are the Champion's award winners from World Festival 2018


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# WHAT IS THE RESEARCH PROJECT?

- A group research project related to the year's theme
- Research a real-world problem
- Come up with an innovative solution
- Iterate the idea and share your solution

**Themes:**

- 2011: Food Factor (food safety)
- 2012: Senior Solutions (senior citizens)
- 2013: Nature's Fury (natural disasters)
- 2014: World Class (education)
- 2015: Trash Trek (garbage)
- 2016: Animal Allies (animals)
- 2017: Hydro Dynamics (water)
- 2018: INTO ORBIT (space)
- 2019: City Shapers (cities)
- 2020: RePLAY (exercise)
- 2021: Cargo Connect (transportation)
- 2022: SUPERPOWERED (energy)

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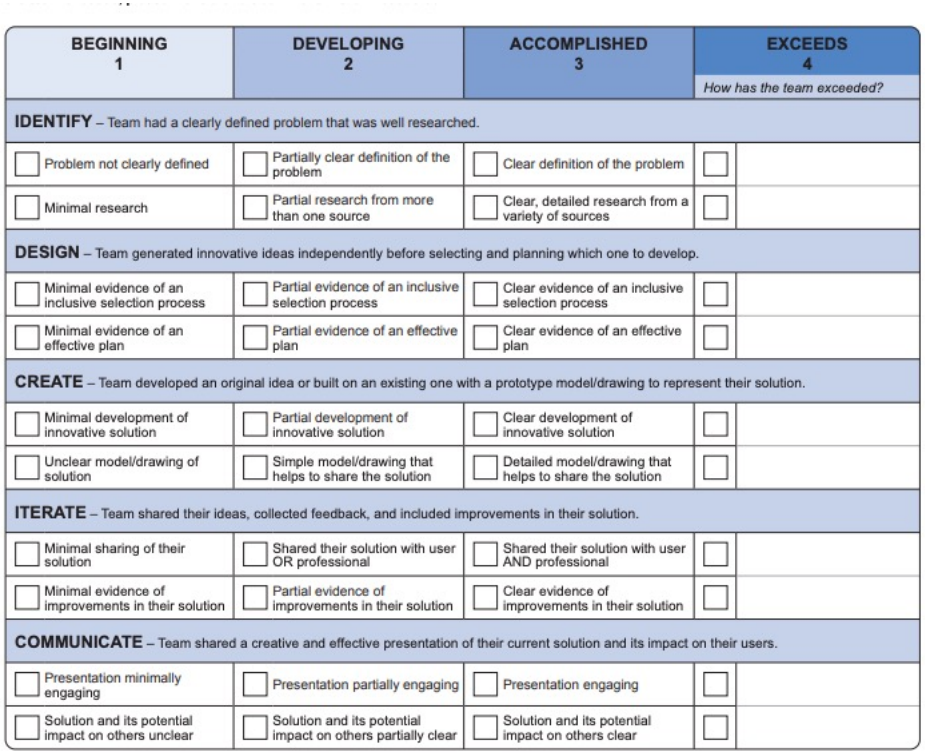
# THE RUBRICS WILL GUIDE THE PROCESS



| BEGINNING 1 | DEVELOPING 2 | ACCOMPLISHED 3 | EXCEEDS 4 *How has the team exceeded?* | |
|---|---|---|---|---|
| **IDENTIFY** – Team had a clearly defined problem that was well researched. | | | | |
| ☐ Problem not clearly defined | ☐ Partially clear definition of the problem | ☐ Clear definition of the problem | ☐ | |
| ☐ Minimal research | ☐ Partial research from more than one source | ☐ Clear, detailed research from a variety of sources | ☐ | |
| **DESIGN** – Team generated innovative ideas independently before selecting and planning which one to develop. | | | | |
| ☐ Minimal evidence of an inclusive selection process | ☐ Partial evidence of an inclusive selection process | ☐ Clear evidence of an inclusive selection process | ☐ | |
| ☐ Minimal evidence of an effective plan | ☐ Partial evidence of an effective plan | ☐ Clear evidence of an effective plan | ☐ | |
| **CREATE** – Team developed an original idea or built on an existing one with a prototype model/drawing to represent their solution. | | | | |
| ☐ Minimal development of innovative solution | ☐ Partial development of innovative solution | ☐ Clear development of innovative solution | ☐ | |
| ☐ Unclear model/drawing of solution | ☐ Simple model/drawing that helps to share the solution | ☐ Detailed model/drawing that helps to share the solution | ☐ | |
| **ITERATE** – Team shared their ideas, collected feedback, and included improvements in their solution. | | | | |
| ☐ Minimal sharing of their solution | ☐ Shared their solution with user OR professional | ☐ Shared their solution with user AND professional | ☐ | |
| ☐ Minimal evidence of improvements in their solution | ☐ Partial evidence of improvements in their solution | ☐ Clear evidence of improvements in their solution | ☐ | |
| **COMMUNICATE** – Team shared a creative and effective presentation of their current solution and its impact on their users. | | | | |
| ☐ Presentation minimally engaging | ☐ Presentation partially engaging | ☐ Presentation engaging | ☐ | |
| ☐ Solution and its potential impact on others unclear | ☐ Solution and its potential impact on others partially clear | ☐ Solution and its potential impact on others clear | ☐ | |

- **Identify**
  - Identify a problem, do background research, analyze existing solutions
- **Design**
  - Think of different solutions, select one and come with a plan
- **Create**
  - Develop a solution including a prototype/model/drawing
- **Iterate**
  - Share the solution with others and improve the idea
- **Communicate**
  - Create an effective presentation for judges

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# START WITH THE CHALLENGE PROMPT

**START**

**Explore your energy journey. How can you reimagine a better energy future? It starts here, with your critical thinking and innovation leading the way to tomorrow's energized world with *FIRST*® ENERGIZE℠ presented by Qualcomm.**

### Identify a specific problem related to improving your energy journey.

An energy journey is where energy comes from and how it is distributed, stored, and used. The Project Sparks (see Sessions 1-4) explore problems related to different energy journeys. You problem could come from a Project Spark, or it could be a different problem you want to solve.

### Research your problem and solution ideas.

Explore energy sources and how energy is stored, distributed, and used in your community. Can you find ways to make part of your energy journey better? Can you improve one step to be more efficient, reliable, affordable, accessible, or sustainable? What solutions already exist? Are there any experts or users you could interview?

### Design and create a solution that could improve your energy journey.

Use your research and explorations to either improve an existing solution used in your energy journey or design a new innovative solution. Can you make different energy technology choices? Make a drawing, model, or prototype of your solution.

### Share your ideas, collect feedback, and iterate on your solution.

The more you iterate and develop your ideas, the more you will learn. What impact will your solution have on your community?

### Communicate your solution with a live presentation at an event.

Prepare a creative and effective presentation that clearly explains your Innovation Project solution and its impact on others. Make sure your whole team is involved in sharing your progress.

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# PICK A PROBLEM THAT IS MEANINGFUL

- Always think of a problem first
- The problem can be as small or big as you want
- Most students relate better to local problems that impact their lives

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# SAMPLE PROBLEMS FROM PAST YEARS

- **2011: Food Factor (food safety)**
  - Detecting spoilt milk
- **2012: Senior Solutions (senior citizens)**
  - Helping seniors remember where they left their possessions
- **2013: Nature's Fury (natural disasters)**
  - An early-warning ash detection system for airplanes
- **2014: World Class (education)**
  - A better way to learn to program the EV3 (EV3Lessons.com)
- **2015: Trash Trek (garbage)**
  - A more efficient way to recycle batteries
- **2016: Animal Allies (animals)**
  - Bats getting killed by wind turbines
- **2017: Hydro Dynamics (water)**
  - Detecting leaking pipes




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# CREDITS

- This lesson was written by Sanjay and Arvind Seshan
- More lessons available at www.ev3lessons.com and www.flltutorials.com

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