Introduction to *FIRST* LEGO League Challenge

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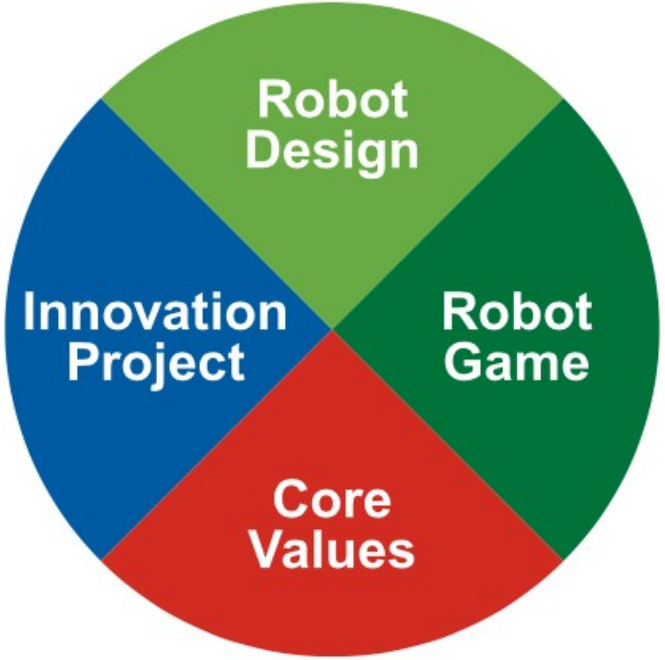
FIRST LEGO LEAGUE CHALLENGE

Four Parts of *FIRST* LEGO League Challenge



- Four equally weighted parts
- Your rank in each area accounts for 25% of your total performance
- Teams are evaluated using rubrics and points scored on the game

Innovation Project

Innovation Project is based on a yearly theme

2024-25 SUBMERGED – Solve a problem related to ocean exploration

2020-21 RePlay Season - Help people get more active

2017-18 Hydrodynamics Season - Improve the way people find, transport, use, or dispose of water

2014-15 World Class – Improve the way we learn something

Innovation Project Overview

Identify a real-world problem within the overall theme

Research and identify existing solutions

Design new solutions or improve an existing one in some way

Create a prototype or model for the solution

Share the solution with others

Iterate the design using feedback/testing

Communicate your ideas to judges in a 5-min presentation

Sample Project (SUBMERGED)

PROBLEM:

- Marine biologists and experts find sampling and carrying seafloor sediments (20 - 40 m) to be difficult
- Embedding the corers is hard, even sometimes having to use small hammers to do it
- They must be kept in a vertical position to not mix the different layers of collected samples

EXISTING SOLUTIONS

- Baskets to transfer corers vertically must be carried by hand
- Nets to store the corers can still tip over.
- In both cases, balloons can be used to lift samples to the surface, although they must be inflated with air from the diver's tank and their pressure needs to be controlled while ascending

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Sample Project (SUBMERGED)

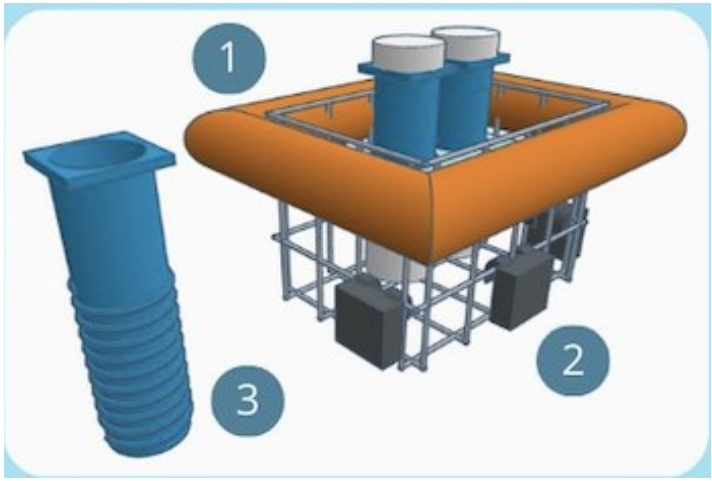
SOLUTION: ScuBasket

Basket that holds 6 corers that descends to the seafloor and comes back up on its own.

1. An inflatable connected to a small CO, bottle activated by the diver, with an automatic valve controlled by pressure.

2. A ballast to control the buoyancy and stability of the corers in vertical position.

3. Each corer has a screw-like shape to make the insertion into the seafloor easier, using a hand crank.



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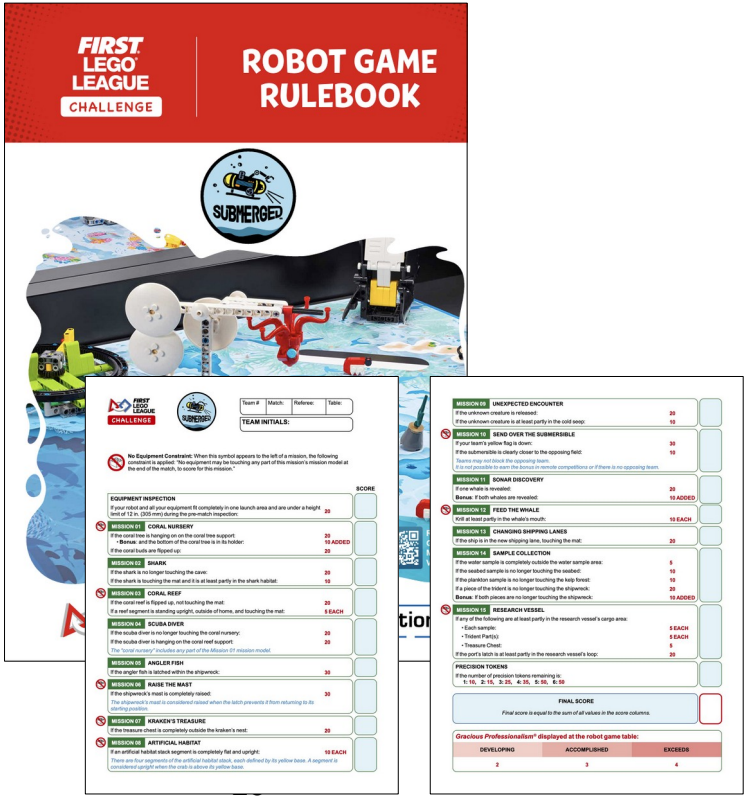
Robot Game

Overview

- 4ft x 8ft table with a mat
- LEGO-based missions
- LEGO MINDSTORMS or SPIKE Prime to solve the missions
- Theme changes yearly
- 2 tables placed next to each other at competition

Robot Runs

- 3 matches, best score counts
- 2.5 minutes to complete as many missions as you can (Note: majority of teams will not do all the missions)
- Points vary by mission
- Each mission has its own set of rules and instructions
- Referees score you at the end of each match using a scoresheet



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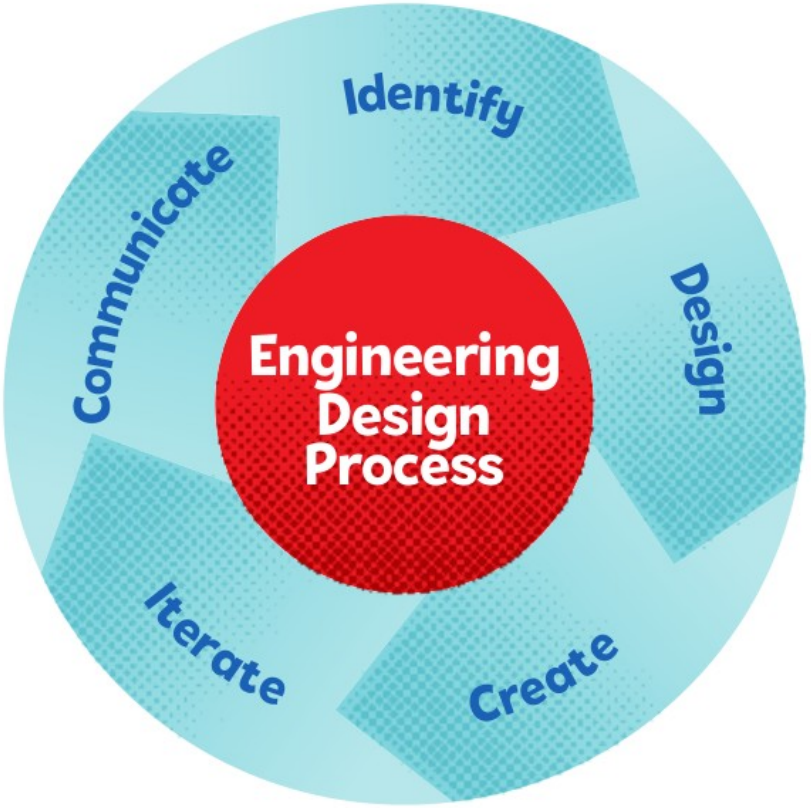
2025-26 Season: UNEARTHED (Archaeology)

Robot Design

Engineering Design Process



Robot Design Overview

Step 1: Analyze the missions and develop a strategy

Step 2: Build and program a robot to meet that strategy

Step 3: Test the robot and make improvements as needed

Step 4: Develop solutions to individual missions

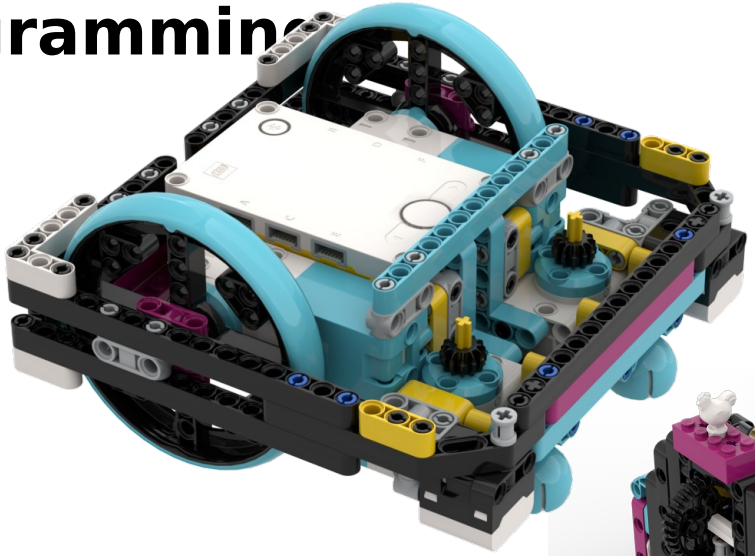
Step 5: Test code and solutions

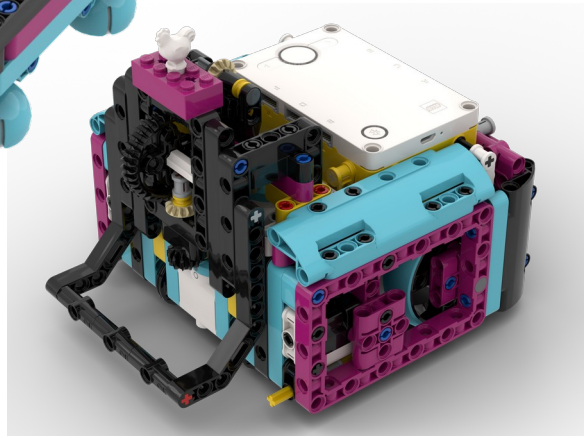
Step 6: Iterate code and robot as needed

Step 7: Document the process to share with judges in 5-mins

Building and Programmin

- Programming in block-based or text-based languages
- Learn physics and engineering concepts
- Optional CAD skills





Core Values

What are Core Values?

- The cornerstones of the program
- The set of ideas that every FIRST team should live by

We are stronger when we work together.

We respect each other and embrace our differences.

We apply what we learn to improve our world.

We enjoy and celebrate what we do!

We explore new skills and ideas.

We use creativity and persistence to solve problems.

What is Gracious Professionalism and Coopertition?

Gracious Professionalism:

- High-quality work, emphasis on the value of others
- Respect for individuals and the community.
- Competition and mutual gain are not separate notions.

Coopertition:

- The idea you should respect and support teams you compete against.

Learning Life Skills through *FIRST*

- Teamwork
- Communication
- Problem Solving
- Helping one another
- Giving back to community

Approximate Timeline

August 5, 2025: Challenge documents released

August-November 2025: Team meets weekly to solve the challenge

November-December 2025: Qualifiers

December 2025 - February 2026: State/Regional Championship

April 2026: World Championships

May-June 2026: Official Open Invitationals run by Program Development Partners

Our Schedule

8/26: Today, Kickoff
9/2:
9/9:
9/16:
9/26:
10/7:
10/14:
10/21:
10/28:
11/5:
11/12: Final Preps
11/18:

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Robot Coding Lesson

Debrief

- What did we accomplish?
- What did we learn?
- What core values did we apply?
- What do we do next week?

- This is our rookie year! Don’t expect to do as well as experienced teams.
- That said, let’s do our best, and see how great we can do.
- Our goal is to learn, have fun, and be better than when we began.

“Homework”

- Find an archaeology challenge that YOU find interesting.
- Research Lego robot designs and coding.
- Consider what team roles (responsibilities) you would be interested in.

Some Key Responsibilities

- Project Management: Goals, Tasks, Milestones
- Code Management: Backups and Integration
- Mission Management: Solutions, Sequence
- Materials Management: Kits, Parts, Attachments
- Research Management: Sources, Records

Some Key Responsibilities

- Communications Manager: Scripts, Displays
- Team Captain: Coordination, Daily Schedule
- Documentation Manager: Record-keeping!

Next Tuesday

- Select roles
- Select innovation problem
- Set milestones
- Explore missions
- Coding actuators and sensors