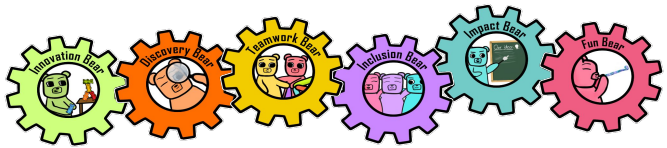
Parent information session

FIRST LEGO LEAGUE (FLL): Robotics, STEM and Beyond

GummyBears Robotics



FIRST LEGO LEAGUE CHALLENGE

Outline

- **Introduction**
  - **Who is GummyBears Robotics**
  - **Panelist**
- Panel Discussion
  - FLL program introduction (Xun, Coach of GummyBears)
  - How to help your child with robotics game (Jing, Coach of Master Cubz)
  - How to guide innovation project (Joyeeta, Coach of Uniqorn Dreamers)
  - Outreach/Core Values (Dan, Mentor of Just Team Pi)
  - How to prepare for a competition (Ram, Coach of Uniqorn Dreamers)
  - How to manage a team (Joyeeta, Jing)
  - What can GummyBears Robotics help (Xun)
- Q&A

About Us

- **The Gummy Bears** (FLL 44355)
  - First Lego League team 2019-2023
    - 2022 FIRST World Championship, Robot Design Award
    - 2023 FIRST World Championship, Engineering Excellence Award
  - Actively promoting FLL & STEM in local community
  - Officially established as a **501(c)(3) nonprofit organization** in 2025

- Our Mentored Teams – Now Part of GummyBears Robotics:
  - **Master Cubz**: 2024 FIRST World Championship, Champion's Award Finalist, Robot Performance 5th Place
  - **Uniqorn Dreamers**: 2024 WAFFLE World Championship Motivation Award Winner and 2023 MA Champion's Award 2nd Place
  - **Just Team PI**: 2023 MA Robot Performance Award 3rd Place

Mission statement of GummyBears Robotics

- Run by students, supervised by adult board members and mentors
- A platform for knowledge sharing
  - Promotes STEM education by inspiring youth in innovation, teamwork, and leadership through hands-on robotics experiences
  - Support , outreach, and mentorship to foster creativity, inclusivity, and a passion for STEM

Outline

- Who is GummyBears Robotics
- **Panel Discussion**
  - **FLL program introduction (Xun, Coach of GummyBears)**
  - How to coach robotics (Jing, Coach of Master Cubz)
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FLL introduction

- ❑ Overview of FLL Challenge Program
- ❑ FLL Competition
- ❑ Timeline, Time commitment and Cost
- ❑ Form your FLL challenge team or Find a team for your child
- ❑ What your child can learn from FLL

FIRST is …

- FIRST– **F**or **I**nspiration and **R**ecognition in **S**cience and **T**echnology: FLL, FTC, & FRC
- Robotics based STEM, core values, community service, and leadership (Robot Sports)

533K+ Students on 59K teams in **86 countries**	**250K** mentor, coach, judge, and volunteer roles	**18M** volunteer hours served
> $81M+ scholarship opportunities from nearly **200 providers**	**2,900+** events in nearly **70 countries**	**>70K** participants at annual ***FIRST*®** Championship

FIRST LEGO LEAGUE

GRADES	AGES
PreK-8	4-16

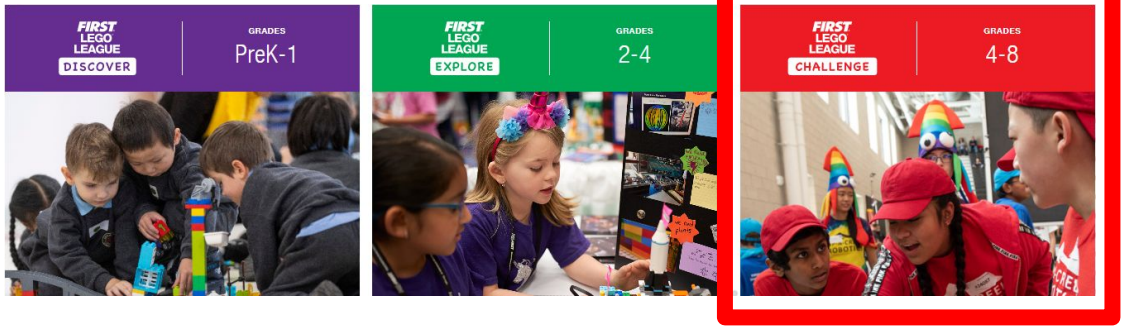
FIRST TECH CHALLENGE

GRADES	AGES
7-12	12-18

FIRST ROBOTICS COMPETITION

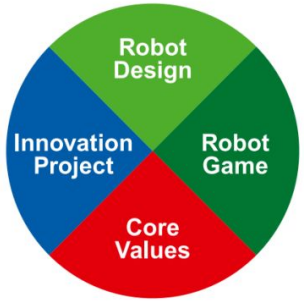
GRADES	AGES
9-12	14-18

FLL (FIRST LEGO LEAGUE) CHALLENGE



- 4th-8th grader (ages 9-14) in US
- Team size 2-10
- Teams design, build, and program robots while solving real-world problems to compete with others
- Coaches and Mentors guided, students do the work
- Following FLL Core Values and engineering design principle

FLL Challenge Key Elements



ROBOT DESIGN

Your team will prepare a **short presentation** on your robot design, programs, and strategy.

ROBOT GAME

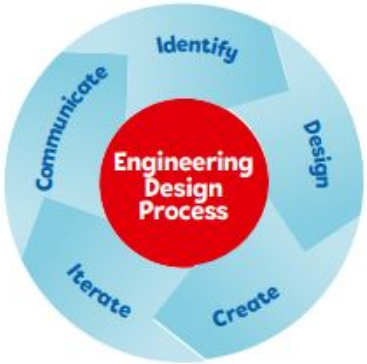
Your team will practice the **2.5-minute matches** to complete as many missions as possible.

INNOVATION PROJECT

Your team will prepare a **5-minute presentation** to explain your Innovation Project.

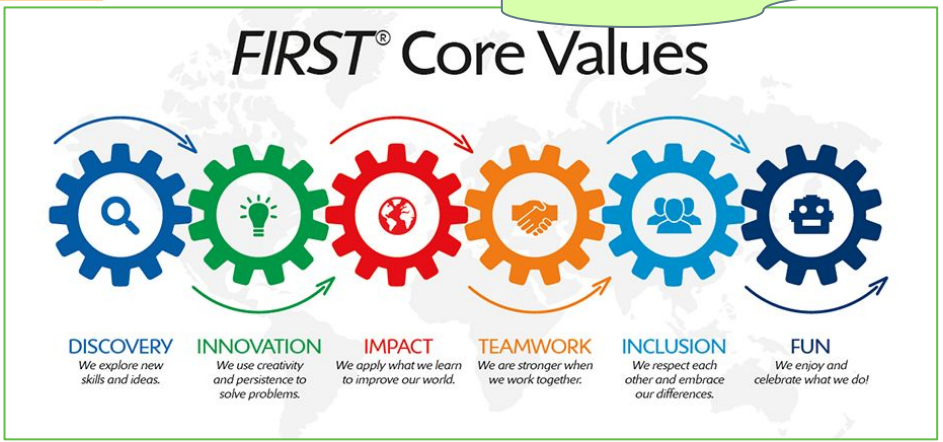
CORE VALUES

Your team will demonstrate ***FIRST*®** **Core Values** throughout your season and beyond!



Kids do the work

- Four equally weighted parts
- Each accounts for 25% of the total performance
- The Robot Design, Innovation Project and Robot Game are what teams DO.
- The Core Values are *how* they do it.



What Does the FLL Competition Look Like

- Season challenge released in August
- Build season runs through December
- Regional Qualifiers in November and December
- Top 25% teams advancing to MA State Competition mid-December
- Top 6 teams of MA advance to FLL World Championship and other international invitations in April or June of the next year

Time Commitment & Cost

- Time Commitment
  - Basic requirement: 3-hour per week
    - Senior teams normally have work hours throughout week, especially before competitions
  - Outside of meetings
    - Individual assignments such as self-learning, research, outreach activities
  - Set up your goal and determine the time commitment accordingly

- Cost
  - **One-time investment:** Robot - $600 per set, including engineering lego parts
    - Highly recommend one robot set per student
    - Buy parts from LEGO and 3rd party
  - **Seasonal cost:** ~$400 per team (Registration+Game mat)
  - Financial aid is provided through FIRST

Robot Game Space Requirement

- You need to buy or build a robot table.
- The official dimensions for the game table can be found on the FIRST website
  - Dimensions: 93’’ by 45’’
- Find a room that accommodates the table and has space for people to work
- The room should be easy to access

What to expect as a coach

Role:

- Support students with materials and logistics
- Organizes team meetings
- Teach basic skills or find resources for kids to learn
  - Reference materials
  - Experts
  - Outreach opportunities
- Set the right expectation with students and parents

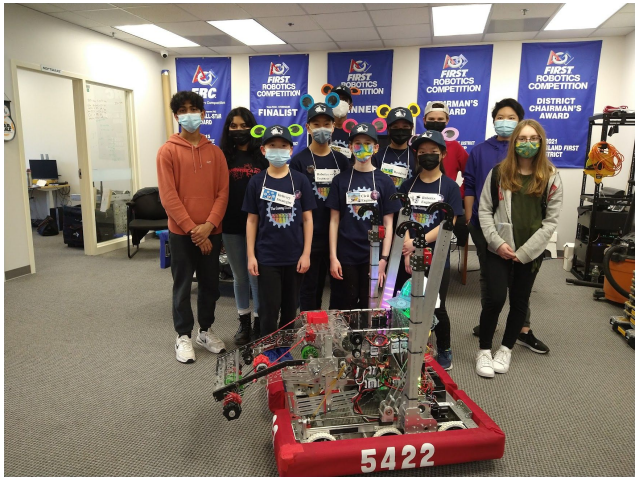
Requirements:

- Does not feed students answers
- Gives feedback and support

Bottomline: The point of FLL isn't to win, it's to learn

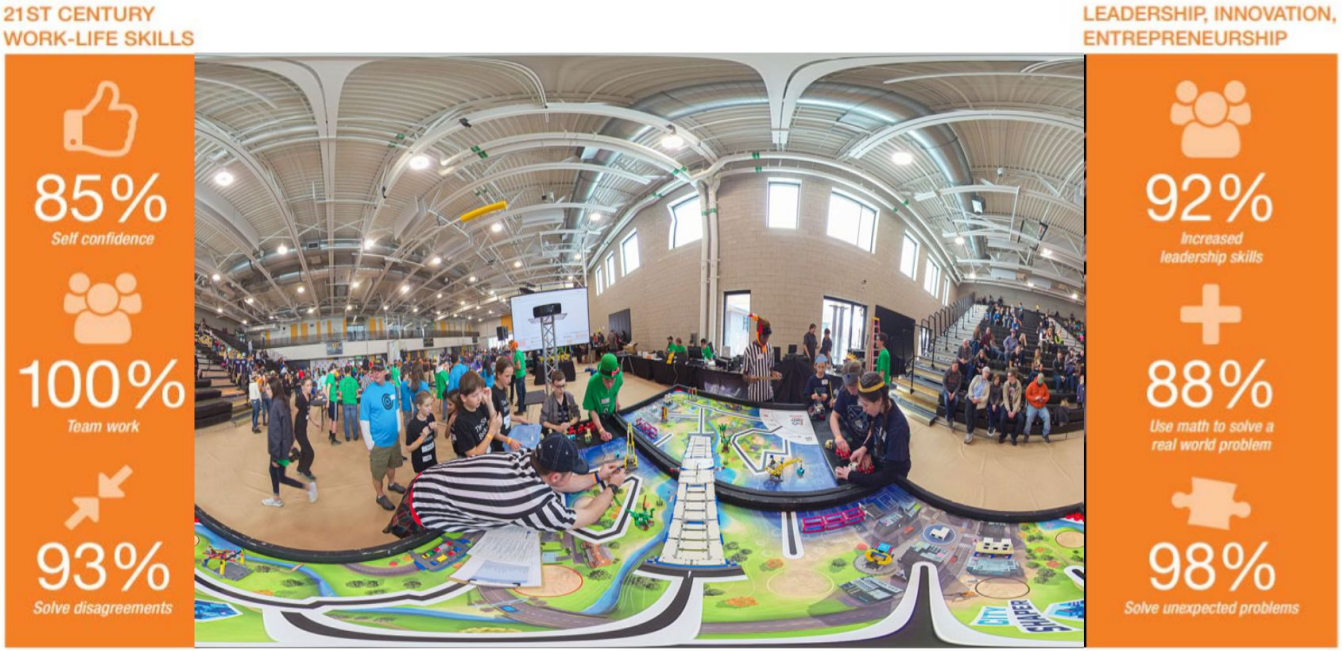
Can’t coach? Find a team for your child

- Start with friends with similar interests, and try to partner with the parents
  - Science fair, STEM summer camps, etc
- Check with local high school teams, such as FTC or FRC teams
  - High School Student mentors
- Check local comercial places and summer camps
  - Could be expensive



What your child would learn from this program

- *"We don't use kids to build robots. We use robots to build kids." - Dean Kamen, FIRST Founder*



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Robot Coach's job

- Teach Coding - See our resource page
- Teach Building - See our resource page and watch youtube
- Season starts Workflow - Document as much as possible
  - Build a base robot
  - Build the mission model, double and triple check, follow updates
  - Route planning: 5-8 launches
  - Assign launches to students
  - Brainstorming how to solve each launch, watch youtube examples
  - First iteration- each student present their solution (both the build and the code) and get feedback from coach and teammates
  - Second iteration - build launch structures, test reliability and repeatability, improve the design (both the build and the code)
  - Third iteration - fine tune launches (build, code, launch structures)
  - Finalize - nobody touch the build and code unless coach say so
  - Prepare Robot Presentation (25% robot game, 25% of robot presentation) - Rubrics
  - Practice loading like crazy

Soft skills for robot coaches

- Setup rules (meeting rules, homework rules, how to resolve conflict rules)
- Manage expectation with parents and kids (time commitment, task commitment, result expectations)
- How to give kids feedback - Sandwich Feedback Technique
- Kids driven, ask and listen to kids
- Patient and calm, don’t say things you will regret. Partner with team manager to solve together. Transparent and thorough communication.

Most important resource page - Check frequently

https://www.firstinspires.org/resource-library/fll/challenge/challenge-and-resources

Rubrics

BEGINNING 1	DEVELOPING 2	ACCOMPLISHED 3	EXCEEDS 4 *How has the team exceeded?*
IDENTIFY – Team determined which missions to attempt, explored building and coding resources, and sought guidance as needed.			
☐ Minimal evidence of mission strategy	☐ Partial evidence of mission strategy	☐ Clear evidence of mission strategy	☐
⚙ Minimal use of building or coding resources	⚙ Some use of building or coding resources	⚙ Clear use of building or coding resources to support their mission strategy	⚙
DESIGN – Team members worked collaboratively on their designs and developed the building and coding skills needed.			
⚙ Minimal evidence that all team members contributed ideas	⚙ Partial evidence that all team members contributed ideas	⚙ Clear evidence that all team members contributed ideas	⚙
☐ Minimal evidence of building and coding skills in all team members	☐ Partial evidence of building and coding skills in all team members	☐ Clear evidence of building and coding skills in all team members	☐
CREATE – Team developed original designs or improved on existing ones according to their mission strategy.			
☐ Unclear explanation of attachments and their purpose	☐ Simple explanation of attachments and their purpose	☐ Clear explanation of innovative attachments and their purpose	☐
☐ Unclear explanation of code and/or sensor use	☐ Simple explanation of code and/or sensor use	☐ Clear explanation of innovative code and/or sensor use	☐
ITERATE – Team repeatedly tested their robot and code to identify areas for improvement and incorporated the findings into their solutions.			
☐ Minimal evidence of testing their robot and code	☐ Partial evidence of testing their robot and code	☐ Clear evidence of repeated testing of their robot and code	☐
⚙ Minimal evidence of improvements based on testing	⚙ Partial evidence of improvements based on testing	⚙ Clear evidence of improvements based on testing	⚙
COMMUNICATE – Team effectively explained what they learned from the robot design process and celebrated their progress.			
⚙ Unclear explanation of process and lessons learned	⚙ Simple explanation of process and lessons learned	⚙ Detailed explanation of process and lessons learned	⚙
⚙ Team shows minimal pride or enthusiasm for their work	⚙ Team shows partial pride or enthusiasm for their work	⚙ Team clearly shows pride or enthusiasm for their work	⚙

⚙ *Criteria on this page with this style of check box count dually toward Robot Design and Core Values awards rankings*

Game Table info

- **Online Purchase**
  - https://andymark.com/collections/first-lego-league
- **How to build - search FLL table building instructions**
  - **chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.firstinspires.org/sites/default/files/uploads/resource_library/fll/table-build.pdf**

FLL Learning Resource

To be added to

https://gummybearsrobotics.org/

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What is innovation project ?

Innovation project is meant for kids to learn more about the season theme through research and hands-on work.

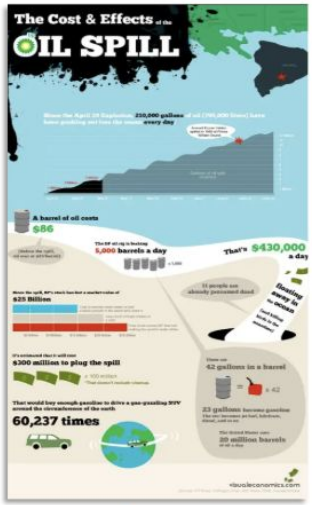
a. It is a segment of the FLL challenge that is scored separately
b. It may or may not involve legos
c. It needs to speak to the theme
d. First gives a lot of pointers in the season team meeting guide
e. Students exemplify engineering design principles and core values in designing their project's solution

Traditional oil spill detection & containment techniques are:

- **Slow in response**
- **Manual efforts**
- **High cost**

We need:

- **Prompt** and **targeted** methods to locate the extent of spills
- **Scalable solutions** for **quick** detection, containment, and removal of oil



From Business Insider

From NOAA

How do you go about it ?

1. Research a real world problem
2. Talk to experts
3. Document your findings
4. Write a proposal
5. Iterate on the idea
6. Design a prototype
7. Iterate on the prototype
8. Seek expert feedback
9. Prepare an engaging presentation
10. Present to judges in 5 min

Coach's job

1. Explain the theme
2. Guide the research
3. Help finding resources
4. Facilitate task division
5. Identify Experts
6. Provide Structure
7. Advise on feasibility
8. Have kids document their research and findings
9. Provide feedback on presentation, find opportunities for mock presentation
10. Understand, explain AND ALIGN WITH the JUDGING RUBRIC

BRAINSTORMING OF PROJECT IDEAS

Brainstorming

Project Name	Project Description	Problem/Gap	Wow Factor	Impact in Community	
Provide a short name for your project (max 10 words)	*Provide a description of your project in less than 100 words*	*Problem you are attempting to solve or the gap your attempting to fill using this project*	*Provide a quality that makes someone feel excited or surprised when they first learn about this project*	*How do you think this project will impact the community*	*Questions for our panel of advisors on the project idea*
AcidAway Filter	A machine called an ion exchange filter which attached to the side of a boat and has a sensor connected to it to sense low ph levels, which are caused by the acidity of hydrogen ions, and the IEF would remove the hydrogen ions from the water, or it could be attached to a submarine that, while mapping the ocean floor, would increase ph levels	Ocean acidification caused by the loose hydrogen ions that stop calcium ions from fully forming, and therefore destroying a lot of of sealife	This has the potential to save lots of lives.	Impact and improve the majority of sea life	
NetNinja	Ghost fishing is a big problem. Lots of animals get stuck in lost or abandoned fishing gear. This project idea is to try to help all of those animal entanglements. This project could be a small robot (or maybe an ROV), equipped with cameras and sensors. The novelty of this robot would be a claw/suction mechanism. This would pick up lost or abandoned fishing gear (mostly focusing on nets).	Lost or abandoned fishing gear can still continue to trap and harm sea life, which could lead to even more dead sea life and marine habitats could slowly start to degrade. I think that when this happens it is called ghost fishing??	Traditional methods for removing ghost gear can take a lot of effort and be slow. A bot with a suction/arm mechanism can hopefully operate fast and efficiently, covering large areas and extracting nets more quickly than manual efforts.	Help save a lot of unnecessary marine life depletion. 100,000 Animals Die Annually From Entanglement, so this solution could really help save many marine lives in the future.	How much is the depth do nets usually float? **How would you go identify a location in the ocean/s where there would be nets?** **How long would it take?** How feasible do you think it is for us to make? Will it have an impact? **What kind of parts for the bots are most flexible (li can go in deep and shallow waters)?** What are your suggestions for making an ROV by ourselves? **Do you have any suggestions that could make this idea stronger? Is is hard to attach certain things to an ROV/UUV/AUV, etc.?**
O2 Splash	Lightweight oxygen tanks that descend by rope(very much like an anchor) into hypoxic bodies of water and spray dissolved oxygen to balance the oxygen levels, and then be raised by an autonomous pulley system.	In lots of places in the ocean, the little amounts of dissolved oxygen(DO) what sea life uses to breathe could be fatal. This would help prevent that and save sea life.	This could help hypoxic fishes.	It would improve lots of areas for fish to live	
HelpMyKelp	Growing more kelp can help reduce the amount of C02 that goes into the oceans. These buoys will lower and raise kelp lines based on the time of day. So that the kelp can grow efficiently. They will also monitor the temperature and pH of water! The buoys will also be in a radial pattern so that in bad weather they won't tip over	The decreasing pH levels in our Oceans is a major problem. It can lead to huge impacts on wildlife like dying coral, and other mollusks. Kelp and other macroalgae can help reduce the amount of C02 going into our oceans. Unfortunately, Kelp can only grow in nutrient rich waters, so growing it along places like the gulf of mexico is impossible. Or is it... ?	Allows Kelp to absorb C02 where kelp can't grow!	Will reduce pollution in our waters! Allows seafood to thrive and coral reefs to grow. Reduces impact of climate change	How would we regulate the temperature for kelp to sustain? How would we make it feasible? What would it cost to regulate temp. for kelp? What is currently happening in the ocean? Kelp farming in adverse environments? Can we use other types of seaweeds?
OAE system	A system that would use a handmade Bi-Polar Electro Dialysis machine(To put it simply, it makes acidified water more alkaline), to target the most acidified areas of water.	Ocean acidification refers to a reduction in the pH of the ocean over an extended period of time, caused primarily by uptake of carbon dioxide (CO2) from the atmosphere.	This would be a revolutionary technology, making a cheaper, but effective device that could wipe out climate change	Would make the ocean more alkaline, which would allow shellfish, oysters, etc. to form their shells fully, which ocean acidification inhibits.With ocean acidification gone, it reduces the CO2 in the oceans and atmosphere, thereby almost erasing CC	How to deploy the BMED Machine? **What are your suggestions to recreating a new invention like this, and or trying to improve it?** **What do you think are the most accurate ways to test a machine like this?**
PEATer Pan: The magical solution to oil spills	ROV containing/holding a slab of peat moss, an oil absorbing moss that repels water, this would suck up oils spills naturally. No matter the scope, which is a big flaw when using machines	Oil consists of many different toxic compounds. These toxic compounds can cause severe health problems like heart damage, stunted growth, immune system effects, and even death. Our understanding of oil toxicity has expanded by studying the effects of the 2010 Deepwater Horizon oil spill. An oil spill can harm birds and mammals in several ways: direct physical contact, toxic contamination, destruction of food sources and habitats, and reproductive problems. Physical contact – When fur or feathers come into contact with oil, they get matted	It would be revolutionary, because unlike previous technologies, it does not matter where or the scope, because it will be able to go there and pick up oil even in the middle of the ocean, which, other machines cannot.	Would make the ocean safer for animals and humans.	What is the metric for peat moss clean-up Where can I get peat moss? **Will extra weight on an ROV make it fail?** **What do you think are the most accurate ways to test an idea like this?** How would we find people to use this? How can we commoditize? What is the effectivity range? How much does peat moss cost? **How would we attach something to an ROV?** **How much weight can an ROV hold?**

NetNinja and PEATer Pan were the preferred ideas by the experts we visited.

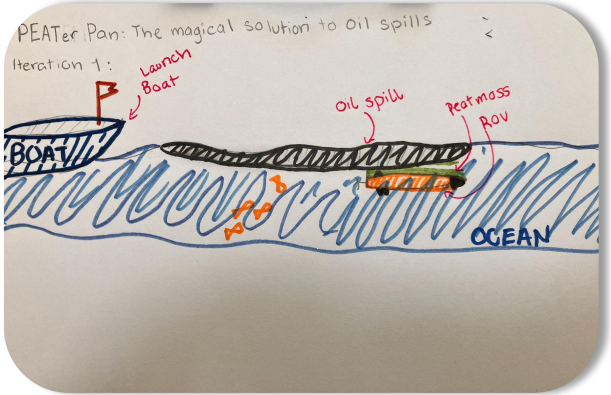
Gap Identification & Feasibility

How to lead the research ?

1. Read and understand the theme from the season materials provided
2. Research a problem connected to the theme, boil it down to a simpler version
3. Find experts to talk to and understand the problem
4. Google, youtube, chatgpt, scientific papers, government websites, FIRST resource pages
5. Mentors can help scope and direct the research to keep it focused, remove noise and distractions

How to make a prototype ?

1. Start simple, outline requirements
2. Have kids brainstorm and design some ideas on paper
3. You can use legos if it's easy and makes sense



How to make a prototype ?

1. Start simple, outline requirements
2. Have kids brainstorm and design some ideas on paper
3. You can use legos if it’s easy and makes sense
4. Identify starter kits, tutorials, open source software and tools
5. Encourage kids to use simple materials to demonstrate the idea
6. Working prototype is good but not needed
7. Demos are better than just talking through slides

How to show your work ?

1. Maintain an journal (digital and print - for hand drawn items)
2. Have kids update the journal after every session
3. Set milestones and consolidate materials for presentation at regular milestones
4. Process is more important than the result

GUMMYBEARS ROBOTICS

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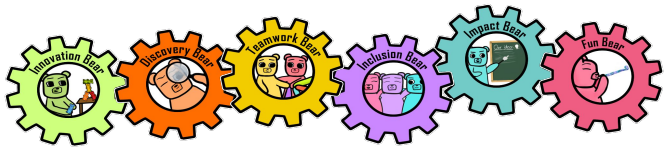
Core Values & Outreach

Dan

Just Team Pi



FIRST LEGO LEAGUE CHALLENGE

Core Values

- Discovery
- Innovation
- Impact
- Inclusion
- Teamwork
- Fun

Core Values - Inclusion

- Age
- Gender
- Ethnicity
- Skill
- Personality

Core Values - Teamwork

There is no ‘you’ or ‘me’; there is only ‘JTP’.

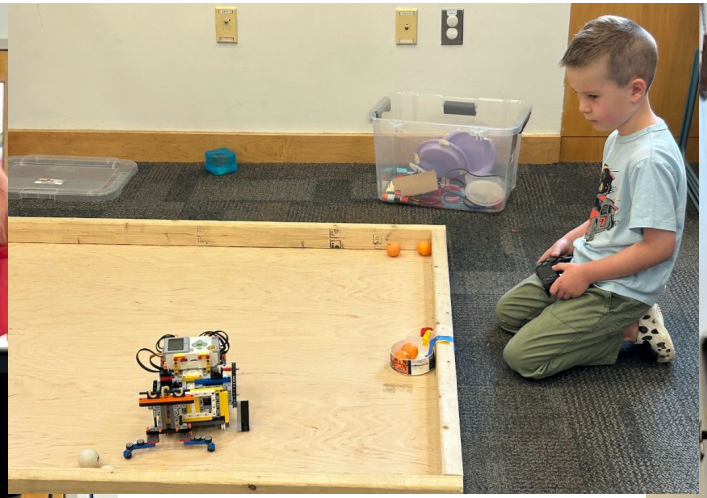
– Coach Vitaliy

Core Values - Fun

The goal is, first, to have FUN in learning, then become a little better than last time.

Community Outreach - Apple Blossom

Community Outreach - STEM Stations



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Timeline

- Scrimmage: October/November
- Qualifiers (last year dates):
  - 11/18 - Newton (Newton Championship) - 48 team max
  - 12/2 - Melrose (Newton Championship) - 24 team max
  - 12/2 - Shrewsbury (WPI Championship) - 36 team max
  - 12/3 - (Sunday) - Foxboro (Newton Championship) - 36 team max
  - 12/9 - Worcester #1 (WPI Championship) - 36 team max
  - 12/9 - Revere (Newton Championship) - 48 team max
  - 12/9 - Northborough (WPI Championship) - 48 team max
- Championship
  - 12/13 WPI

Deliverables for Scrimmage

- Robot Game
  - Complete as many missions as possible
  - Implement game strategy in form of runs or launches
  - Team should practice all runs/launches

- Innovation Project
  - Prepare a presentation for the judging session to get feedback
  - Visual aids are helpful
  - Prototype is optional

Time commitment

- 6 - 8 hours per week
- Timed Practice, Practice, Practice
  - Robot Game
  - Innovation Project presentation

Competition Prep (one month away)

- Order t-shirts for the team
- If possible: get new hub battery & motors
- Practice in as many tables as possible
- Practice project presentation with others to get feedback

Day of competition

- Compile a list of all items to carry to the venue
  - Backup bot
  - All attachments including previous versions
  - Extra Lego parts
  - Charging cable
  - Power bank
  - Wet wipes to clean wheels

- Food for the team & coaches

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Team Manager’s perspective

- Kids interest or parent’s interest
- Kids choice comes first
- Pick members with similar expectation
  - Time commitment
  - Priority alignment
  - Learning or results driven
  - Financial easiness
  - Assignment picky or not
- Communication is the key
  - Align expectation with parents at least monthly
  - Align schedule, progress with robot coach and innovation coach at least weekly
  - Communicate before conflict
  - Hear stories from all sides

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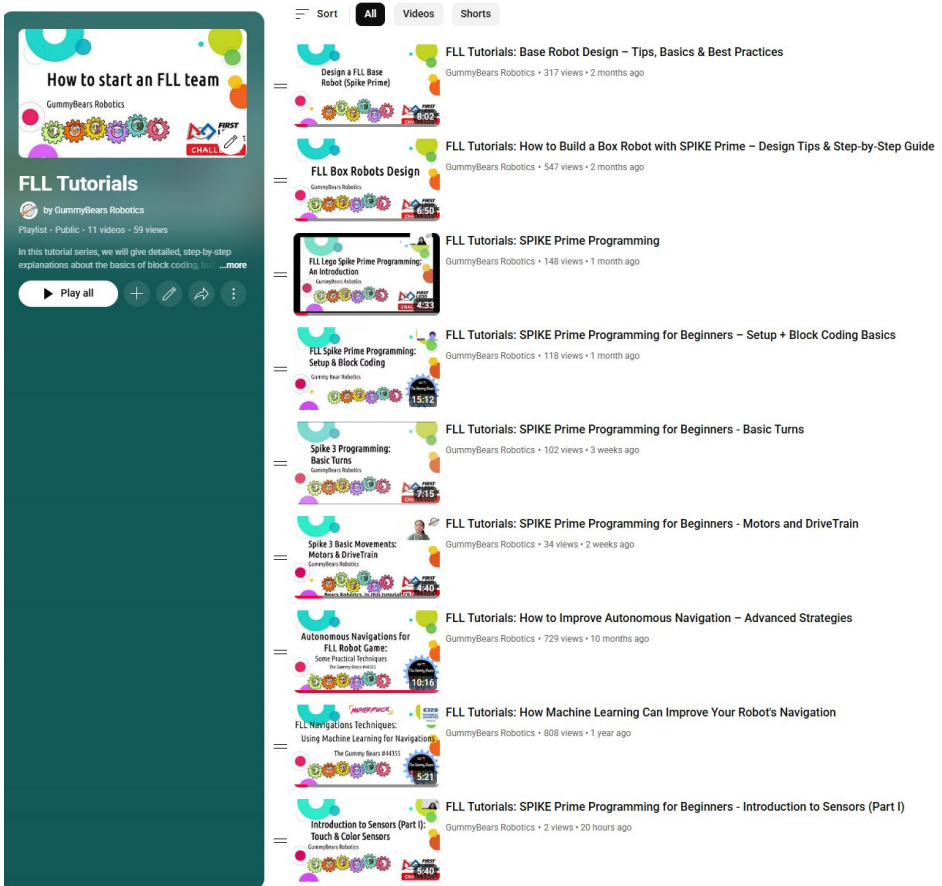
  - How to coach innovation project (Joyeeta, Coach of Uniqorn Dreamers)
  - Outreach/Core Values (Dan, Mentor of Just Team Pi)
  - How to prepare for a competition (Ram, Coach of Uniqorn Dreamers)
  - How to manage a team (Joyeeta, Jing)
  - **What can GummyBears Robotics help (Xun)**
- Q&A

YouTube Channel for Sharing

- Subscribe to our Youtube Channel
  - FLL tutorials for beginners
  - Cool solutions for advanced teams



FLL Clinic and online chat group

- FLL clinic
  - Step-by-step guidance to start a new team
  - Trouble shoot
  - Competition preparation, such as mock judging sessions
  - Can be virtual, or in person
- Online chat group for timely help
  - Google Chat group
  - Get timely help from experienced coaches and students
  - Send email to info@gummybearsrobotics.org to join

Outreach opportunities

- Partnership with nonprofit organizations to help underrepresented community
  - FriendlyHouse
  - Worcester Refugee Assistance Project
  - Chinese Bible Church of Greater Lowell
- Active participants of public events
  - Apple Blossom Festival of Westford
  - Gates Robotics Fair at Paul P. Gates Elementary School
  - Cambridge Science Fair (9/21/2025)
- Summer Workshop
- FLL team participation
  - All levels are welcome!
- Individual volunteering
  - 6th-12th grade
  - At least one year of FLL experience

Contact:
info@gummybearsrobotics.org

Donation

- All the service we provide are free of charge
- But we need to purchase robot sets and materials to develop cool solutions
- Your help is greatly appreciated!

https://gummybearsrobotics.org/donate-today