



Proud member of :



FTC Team # 6134 - Black Frog Robotics



- ▶ Member of FIRST FTC since 2011
- ▶ Competed at the World Championship 6 Times
- ▶ MI State Inspire Award Winner 6 times



What is FIRST ?





**For
Inspiration and
Recognition of
Science and
Technology**





Progression of Programs



FTC - FIRST Tech Challenge

- ▶ 4,000+ FTC teams in the World
- ▶ 550+ FTC teams in MI
- ▶ More than building robots
- ▶ Middle School Program in Michigan
- ▶ FIRST Tech Challenge teams are challenged to design, build, program and operate robots to compete in a head to head challenge in an alliance format.
- ▶ Guided by adult coaches and mentors, students develop STEM skills and practice engineering principles, while realizing the value of hard work, innovation, and working as a team.



FTC - FIRST Tech Challenge

- ▶ Teams Get to
 - ❖ Design and Build robot
 - ❖ Raise Funds
 - ❖ Design and market their team brand
 - ❖ Do community outreach
- The robot kit is reusable from year to year and can be coded using a variety of levels of Java based programming
- ▶ Cool thing about FTC is being part of a team
- ▶ Participants are eligible to apply for \$80M+ in college scholarships.



Resources

- ▶ FIRST

- ▶ www.firstinspires.org



- ▶ www.firstinspires.org/resource-library/ftc/team-management-resources

- ▶ <https://firstinmichigan.us/FTC/>

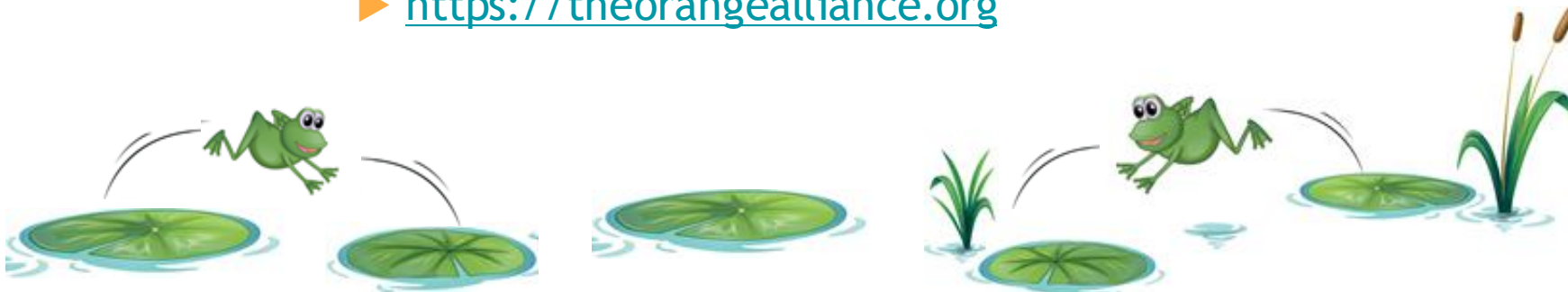
- ▶ Frog Force

- ▶ www.frogforce503.org

- ▶ <http://frogforce503.org/page-ftc-resources.html>

- ▶ The Orange Alliance

- ▶ <https://theorangealliance.org>





RESOURCE LIBRARY

← Back To Search



Team Management Resources

Aug 7 2018 | 10 KB

Content Type: FIRST Tech Challenge

Tags: Event Preparation, Finances/Fundraising, Mentor, Team

For Rookie and Veteran Teams!

We want your season to be as easy as possible, so we have compiled all of the resources we think you will need to be successful. If you don't hesitate to email firsttechchallenge@firstinspires.org. Favorite this page in your Dashboard and check back to see what resources



(154)

Team Registration

- [Starting a Team Checklist](#)
- [Create/login to your FIRST account](#)

Mentor Training and Resources

- [Mentor Manual](#)
- [FIRST Non-Engineering Mentor Organization](#)
- [Youth Protection Program](#)
- [Forum Registration Instructions](#)

Budget

- [Sample Budget: PDF | Word](#)
- [Kit of Parts and Pricing Info](#)
- [Storefront Ordering Instructions](#)

Fundraising

- [Fundraising Resources](#)
- [Fundraising Toolkit](#)
- [Fundraising Guide](#)
- [FIRST Tech Challenge Grants](#)
- [FIRST Grants FAQ](#)
- [FIRST W-9, Regranting Policy and Procedure](#)

Building Teams that Build Robots

- [Building Teams That Build Robots](#)
- [Outreach & Marketing Resources](#)
- [Team Blast Archive](#)



Engineering Notebook

- [Engineering Notebook Guidelines](#)
- [Engineering Notebook Self-Assessment: PDF | Word](#)
- [Engineering Notebook Examples: Team 365 \(.zip\) | Team #4250 \(.zip\) | Team #5037 \(.zip\) | Team 6134 \(.zip\)](#)

Building the Robot

- [Robot Building Resources](#)
- [Programming Resources](#)
- [Legal and Illegal Parts List](#)

Preparing for Competition

- [How to Register for a FIRST Tech Challenge Event](#)
- [Awards](#)
- [FIRST Tech Challenge Dean's List](#)
- [Dean's List Submission Guide](#)
- [Preparing for Competition Checklist](#)
- [5 Tips for Great Events \(video\)](#)
- [Sample Team Roster](#)
- [Team Judging Self-Reflection](#)
- [Tips for Shooting Quality Cell Phone Videos](#)

Scholarships and Alumni

- [Scholarships Opportunities](#)
- [FIRST Alumni and Internships](#)

Stay Connected

- [Email](#) | [Blog](#) | [Facebook](#) | [Forum](#) | [Google+](#) | [Twitter](#) | [YouTube](#)



FTC - Timeline



- ▶ Kick-Off starts the season with this year's Game Reveal
- ▶ Build Season may only be 8 weeks, but keep improving
- ▶ Qualifying Competition Season, 6 weeks - MI : Every teams can register for 2 regional qualifier events.
- ▶ Michigan State Championship - 2 Days : Qualify for State Championship through robot performance and/or awards
- ▶ World Championship



FTC Kickoff



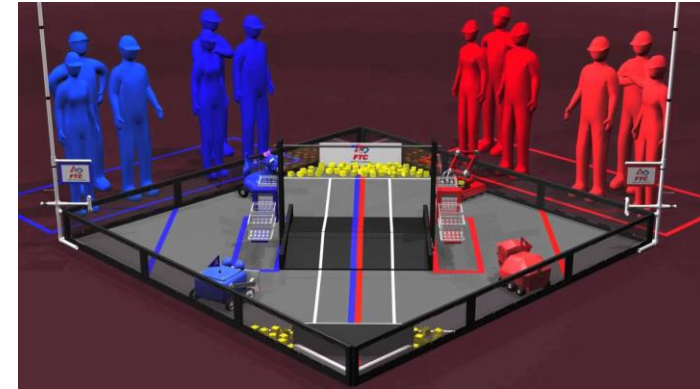
FTC - Kickoff

- ▶ Today in a little while we will all get to watch the challenge for this year and we will learn what is our robot expected to do and how to maximize our points.
- ▶ We will also get a chance to see the field.



FTC - Match

- ▶ Matches consist of an Autonomous Period and a Tele-Op Period
 - ▶ Autonomous (30 Seconds) is entirely robot programmed actions
 - ▶ Tele-Op (2 Minutes) is Driver / Operator controlled
 - ▶ Tele-Op Period usually has a 30 second End Game element
 - ▶ Scoring opportunities that are only available during the End Game
- ▶ Every Match consists of : Red Alliance vs. Blue Alliance
 - ▶ Two teams on each alliance
 - ▶ During Qualification Matches, team alliances are for one match
 - ▶ An alliance partner may become your opponent later in the event
- ▶ Event Team Rank will be based on robot alliance performance



FTC - Drive Teams

- ▶ Drive Teams consist of three members
 - ▶ Driver Must be student member
 - ▶ Operator Must be student member
 - ▶ Coach Either a student member or a mentor
 - ▶ Human Player (one per alliance) - New this year!!
- ▶ Drive teams can use 2 controllers to initiate robot commands
 - ▶ Forward, backward, intake, lift, etc.
 - ▶ Most teams will have more actions than will fit on one controller
- ▶ Drive Teams do not have to be the same members the entire event, but only 3 per match
- ▶ Develop a match strategy with your alliance partner
- ▶ Knowing your partner's and opponents' strengths and weaknesses could give you the edge



What are my source for Requirements?

Preparing for Competition
May 9 2019 | 10 KB
Content Type: FIRST Tech Challenge
Tags: Awards, Events, Team
This section contains resources for FIRST Tech Challenge teams specifically for pre-competition preparation.

Before Going

- Sign up for an event (contact your local partner)
- Read our Game Manual Part 1 and 2
- Utilize the Engineering Notebook Self Assessment
- Visit the FIRST Tech Challenge Forum
- Understand how to use the Question Box
- Read the How to Prep for an Event blog post

How to Prepare for Inspection

- Utilize the Inspection Forms from Game Manual Part 1, Appendix A
- Robot must fit in an 18" x 18" x 18" sizing box (How to make your own)
- Insure your alliance flag holders are up to specs (Practice with our Sample Flags)

How to Prepare for Judging

- Practice using the Team Judging Self-Reflection Sheet (not collected)
- Complete your Control Award Content Sheet with these instructions
- Check with your Event Organizers if the Compass and/or Promote Awards are being given. Ask for submission instructions. Review the guidelines and requirements in Game Manual Part 1

Upon Arrival

- Go to Team Check-In
- Ask where to turn in your Control Award Content Sheet and Engineering Notebook

What to Print

- Team Roster
- Robot Inspection Forms
- Field Inspection Checklist
- Control Award Content Sheet
- Team Judging Self-Reflection Sheet
- Engineering Notebook Checklist

Stay Connected

- Email | Blog | Facebook | Forum | Google+ | Twitter | YouTube

Game Manuals

- SKYSTONE Game Manual Part 1 - updated 7/10/19
 - Section 1 & 2 - Intro and Gracious Professionalism
 - Section 3 - Tournament Definitions
 - Section 4 - Tournament Day Outline
 - Section 5 - Tournament Types
 - Section 6 - Eligibility and Advancement
 - Section 7 - The Robot
 - Section 8 - Robot Inspection
 - Section 9 - Award Criteria
 - Section 10 - Dean's List Award
- Game Manual Part 2 - Coming 9/7/19
- One Page Game Description - Coming 9/7/19

Playing Field Materials and Manuals

- Purchase Playing Fields and Elements from AndyMark
- AndyMark Field Assembly Guide - updated 9/28/18
- AndyMark Field Setup Guide - updated 9/20/18
- Field Reset Guide - updated 9/8/18
- Navigation Targets U.S. v2 updated 10/5/18
- Navigation Targets International v2 updated 10/2/18

Videos and Promotional Materials

- SKYSTONE Presented by Qualcomm Season Tesser
- ROVER RUCKUS Presented by Qualcomm Game Animation
 - Can't access YouTube? Download the Game Animation. Right-click to save.
- SKYSTONE Presented by Qualcomm Game Logo (.zip)

Q&A Forum Documentation

- FIRST Tech Challenge Forum
- Forum Registration Instructions
- Game Q&A Specific Forum Instructions
- Forum Answered Questions: pdf | Epub | Mobi

DIY Resources

- Low-Cost Field Perimeter Build Guide

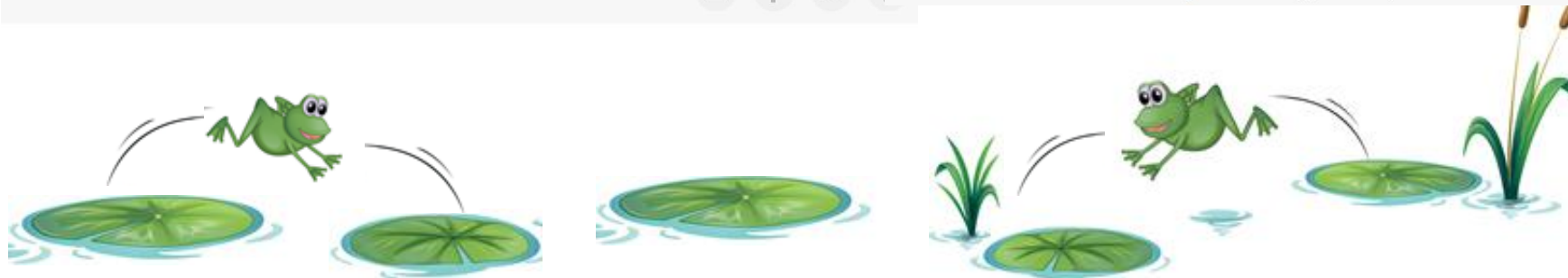
Season Results

- Orange Alliance
- Event Results
- Event Results Key

Team Materials

- Control Award Instructions
- Control Award Content Sheet
- Robot Self-Inspection Checklist
- Field Self-Inspection Checklist
- Using Vuforia VuMarks/Pictographs for Game Play

- ▶ Game Manual 1 gives the general guidelines of FTC, matches, tournament, robot rules etc.
- ▶ Game Manual 2 gives game specific information, rules etc.

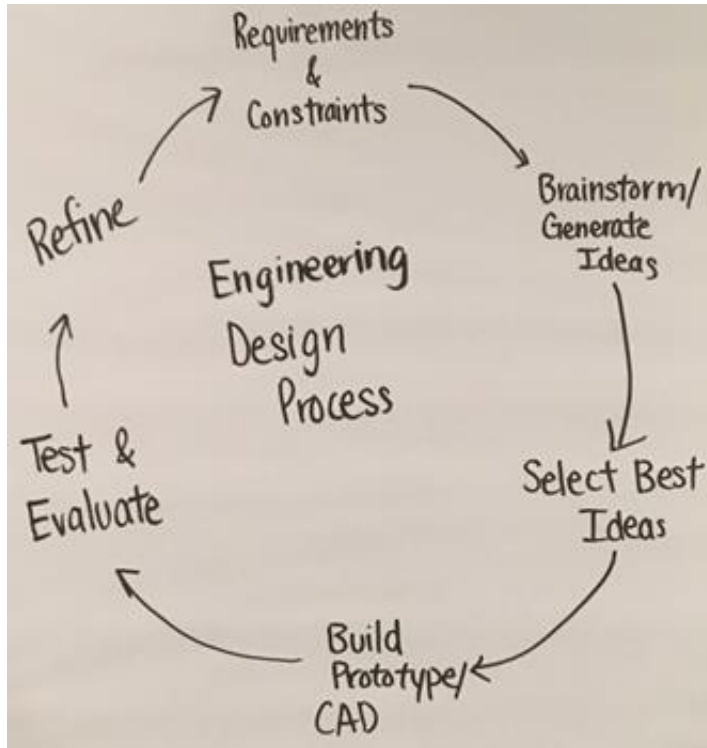


FTC Build Season



FTC - Build Season

Engineering Design Process



Seminars

9:00am - 9:45am

- ✓ FLL/FTC Rookie Coach Workshop
- ✓ Introduction to Google Blocks
- ✓ Robot Design and Build
- ✓ CAD with Autodesk Fusion

10:00am - 10:45am

- ✓ Using Sensors with Google Blocks
- ✓ Engineering Design Process
- ✓ 3D Printing with Autodesk Fusion
- ✓ Detroit PAL Coach Meeting

11:00am - 11:45am

- ✓ Beginning Programming with Android Studio
- ✓ FTC Awards and your Engineering Notebook
- ✓ Vision Processing with Vuforia
- ✓ DPSCD Coach Meeting

Times

Doors Open at 8:30am

Opening Remarks at 8:45am

Workshops and Seminars 9:00am - 11:45am

Game Reveal and Field Reveal at 12:00pm

Lunch Break 12:15

Game Strategy Session at 1:00pm



Components of a Robot

- ▶ Chassis - Supporting framework
- ▶ Drivetrain - Propulsion system
- ▶ Game Spec - All task based mechanisms
- ▶ Electrical - Control system
- ▶ Programming - Set of instructions that allow the robot to complete tasks



Components of a Robot - Drivetrain

One of the major systems of the robot is the drive train, the system that moves the robot around on the field.

- ▶ There are many different drive train configurations, but they all consist of:
 - ▶ One or more motors
 - ▶ Some means of transferring their torque/motion to the floor (a wheel, etc.)
 - ▶ Some means of steering
- ▶ The most common way of connecting motors are:
 - ▶ Tetrax gears (40, 80 and 120 tooth)
 - ▶ Chain ($\frac{1}{4}$)
 - ▶ Direct drive
 - ▶ There are different gear ratios and you could also use servos.
- ▶ There are many options, and drive train design is often a matter of personal preference. It does not matter



Components of a Robot - Game Spec

- ▶ Game spec are the attachments that are supposed to do the tasks in the game.
- ▶ This is could be one attachment or multiple.
- ▶ If the game includes picking something up you would make a game spec element for that specific task.



Electrical

- ▶ Wiring is one of the most important components of a robot
- ▶ Even the briefest of power interruptions can cause the communication system to have to reboot
- ▶ Best Practices:
 - ▶ Make wiring diagrams
 - ▶ Label the wires
 - ▶ Keep it neat
 - ▶ Use zip ties to tie them down



Programming - Software

- ▶ Java is the recommended programming language for the FIRST Tech Challenge. The minimum allowed version number is 3.1. Programming must be done using one of the following applications:
 - ▶ *FTC Blocks Programming development tool (built in to the FTC Robot Controller App version 2.2 and greater) - a visual, blocks-based programming tool hosted by the Robot Controller.
 - ▶ Android Studio - a text-based integrated development environment.
 - ▶ App Inventor - a visual blocks-based programming tool.
 - ▶ Java Native Interface (JNI) & Android Native Development Kit (NDK)
 - ▶ FTC OnBot Java Programming tool (built into the FTC Robot Controller App version 3.2 and greater)



Prototyping

- ▶ Prototyping is a good way to make ideas come to life. Prototypes aren't made out of metal, but instead can be made out of simple materials such as: cardboard, tape, channels and more. The prototypes do not have to be pretty.
- ▶ You should use a method to evaluate each prototype, so the team can decide which idea works the best. Use data to decide which idea is consistent.
- ▶ Prototyping can help try out multiple ideas and can help have different work streams running at once. that allow the robot to complete tasks



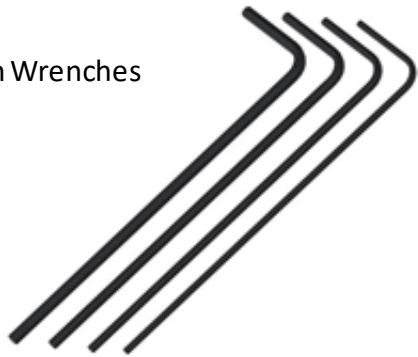
Tools - Hex Drivers

- A must are hex drivers ($7/64''$, $3/32''$, $5/64''$, $1/16''$)
- Also useful are ball head drivers
- And a $7/64''$ T-Drive
- Hobby stores, Amazon, and tools stores all sell these



T-Drive

Standard Allen Wrenches



Hex Driver



Hex Driver with Ball Head



Engineering Notebook



Engineering Notebook

What is an Engineering Notebook?

- ▶ An engineering notebook helps a team to document the “journey” they go on throughout the year, and it helps to display things that the team has learned throughout the year.
- ▶ This documentation should include sketches, team meetings, design evolution, processes, obstacles, photos and each team member’s thoughts throughout the journey for the entire season. It should also have the underlying science, mathematics, and game strategies for the team.



Engineering Notebook - Requirements

- ▶ Format the Engineering Notebook as either typed or handwritten.
- ▶ Place it in a binder no larger than three inches.
- ▶ One copy per team. No more than two notebooks at competition.
- ▶ The team number must be visible on the front cover.
- ▶ Place a one page summary of the team, the district or organization, and team accomplishments during the season in the front cover pocket.
- ▶ The summary should point judges to pages in their notebook they would like the judges to see.
- ▶ Include four sections: Robot Design Process, a Team section with information about the team and outreach, and a Business plan or a sustainability plan.



Engineering Notebook - Examples

- ▶ You can find multiple examples of engineering notebooks on the FIRST website under the Team Management Resources section. One of the examples listed is on a Black Frogs engineering notebook as well.
- ▶ Here is the link to this page:
<https://www.firstinspires.org/node/5226>



Competitions



FTC - Competition Day: What to expect?

- ▶ Long Day - Usually 8:00 AM to 6:00 PM
- ▶ What to bring?
 - ▶ Your robot
 - ▶ Tools to repair your robot
 - ▶ Engineering Notebook
 - ▶ Document the entire season : Meetings, Training, Design, Builds, Finances, Outreach, Seminars
 - ▶ Your enthusiasm and be prepared to have fun



FTC - Competition Day: Different Areas

- ▶ Pit Area
 - ▶ Each team will have a table
 - ▶ Home base: Repairs, Charging, Impress judges with Q/A, Team board
- ▶ **Competition Area**
 - ▶ All matches will be played here.
- ▶ Judging area
- ▶ Food Area



FTC - Competition Day: What does it look like?

- ▶ Set up your Pit Area
 - ▶ Each team will have a table
 - ▶ Home base: Repairs, Charging, Impress judges with Q/A, Team board
- ▶ Get your Robot inspected
 - ▶ All teams must have their inspections before the event can create the Match Schedule
 - ▶ Robot inspection
 - ▶ Field inspection
- ▶ Judges Presentation
- ▶ 5- 10 Qualifying Matches, Alliance selections, Play off matches.
- ▶ Pit Judging
- ▶ Awards



FTC - Competition Day: Setting up your Pit



FTC - Inspections

- ▶ Robot Inspection
 - ▶ Size - 18" x 18" x 18"
 - ▶ Weight - 42 lbs.
 - ▶ Power Switch
 - ▶ No sharp edges
- ▶ Field Inspection
 - ▶ Robot must connect to your controls
 - ▶ Correct software versions
- ▶ Make sure to get your Inspection sheets signed
- ▶ Refer to Game Manual 1 for details



FTC - Judging

- ▶ Judges Presentation
 - ▶ 15 minutes (Team presentation and Q/A)
 - ▶ Knowledge of the robot, Enthusiasm for STEM, Having fun
 - ▶ Hand over your Engineering Notebook
 - ▶ Use visual aids for presentation like boards, pictures etc
- ▶ Pit Judging
 - ▶ Judges might come back to your pit if they have questions for you.



FTC - Event Match Format

- ▶ Qualifying Matches
 - ▶ Number of matches varies based on number of teams and venue (6-10 matches)
- ▶ Match Scoring and Event Team Rankings
 - ▶ Match scoring is completely game specific and is based on alliance performance
 - ▶ Team Ranking is based on your alliance's match performance
 - ▶ Wins, Losses and Ties are a key driver, but are not the only factor
- ▶ Alliance Selections
 - ▶ After all the Qualifying Matches, the teams are ranked and Play-off Alliances are selected
- ▶ Play-off Bracket Matches
 - ▶ Alliances do not change during the play-offs



FTC - Alliance Selection

- ▶ There are usually 4 alliances in the play-offs
- ▶ Each alliance has 3 teams
 - ▶ Only two teams play per match
 - ▶ Each elimination round is a “Best of Three” format
 - ▶ Every team must play at least once per round
- ▶ The winning alliances play a 3 game series to determine the Event Winner



FTC - Awards

- ▶ Besides Robot Performance, you could win awards based on:
 - ▶ Judges Presentation
 - ▶ Engineering Book
 - ▶ Pit Judging
 - ▶ Gracious Professionalism etc.
- ▶ Awards List (partial)
 - ▶ Inspire Award
 - ▶ Think Award
 - ▶ Connect Award



FTC - Safety and Other tips

- ▶ Safety Glasses are required in several areas of the event
 - ▶ Competition Area - All Drive team members must wear
 - ▶ Pit Area -All team members, mentors and guests must wear
- ▶ Robots must be powered off when transporting
- ▶ Long hair should be tied
- ▶ Closed toe shoes
- ▶ Follow all posted safety rules
- ▶ Event volunteers and judges will be watching
- ▶ No food in Competition Area, Pit Area or Judging Rooms
- ▶ Keep your snacks at your table
- ▶ Scouting



FTC - Scouting

- ▶ While not essential, developing a scouting sheet can help you keep track of other team's performance
- ▶ Every year scouting sheets are customized for the challenge
- ▶ Informed Alliance Captains will make the best selection
- ▶ Great way to compare your performance against other teams





**Thank
You!**