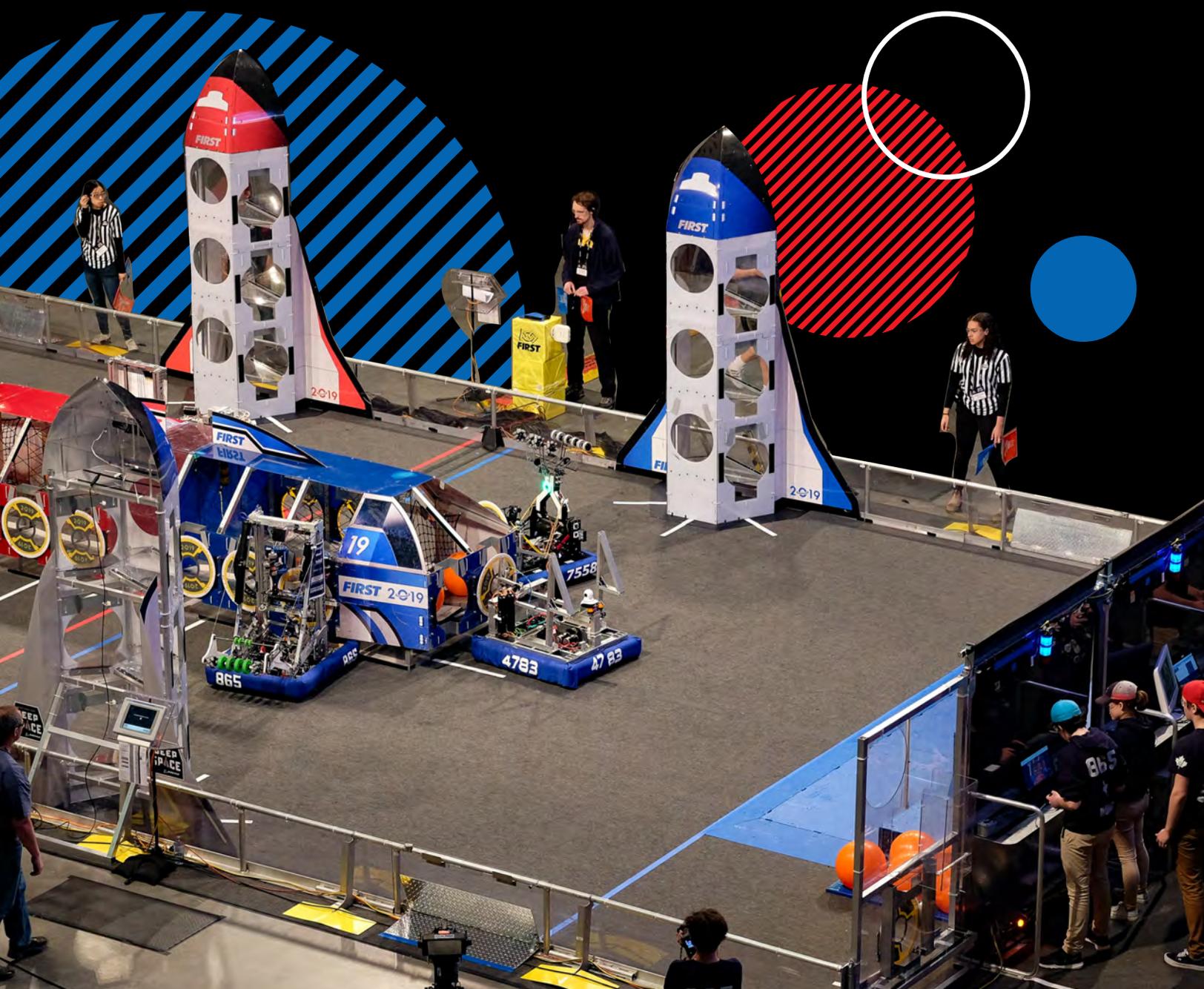


FIRST Robotics COMPETITION GUIDE

Presented by the *FIRST* Canada Youth Council



Foreword

Hello!

We, the *FIRST* Canada Youth Council, are pleased to present our *FIRST* Robotics Competition Guide. This guide will introduce you to the basics about how the *FIRST* Robotics Competitions work. It will give you the basics of what you need to know about competition structure, what alliances are, tips so that you can be a great representative of your team at competition, and more!

This guide is not 100% comprehensive, so please remember to refer back to the official game manual for all the specifics!

We hope you will enjoy this guide and learn a lot about the wonderful world of the *FIRST* Robotics Competition.

Happy reading,

Victoria, Michelle, Alexander, and Rohan
from the *FIRST* Canada Youth Council



Victoria A.



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GLOSSARY

Competition Structure

How do competitions work?

- There are two types of competitions: **regional** events and **district** events.
- In each competition, three teams compete against three other teams, called **alliances**. One alliance is the blue alliance, and one is the red alliance. In the qualification round, the teams on both alliances are randomly assigned for each match, but in playoffs, top-seeded teams choose their alliance partners.
- Each competition has a qualifying round. Teams are ranked based on how many Ranking Points they have. Since 2016, you can earn up to four Ranking Points in each match. The winning alliance receives two Ranking Points, and the losing alliance receives zero Ranking Points. In the event of a tied score, each alliance receives one Ranking Point. Teams can also win up to two Ranking Points for completing other objectives, regardless of whether or not they won the match.



A semifinals match at the 2020 Durham College District Event

Competition Structure

How do alliance selections work?

- At the end of the qualification matches, the top eight seeded teams become the alliance captains and choose two other teams to join their alliance. The alliance selection process consists of two rounds during which each alliance captain invites a team seeded below them to join their alliance. The invited team can choose to accept or decline the invitation. The first round proceeds in descending order, from the first seeded alliance to the eighth seeded alliance, and the second round proceeds in the opposite order, from alliance eight to alliance one.



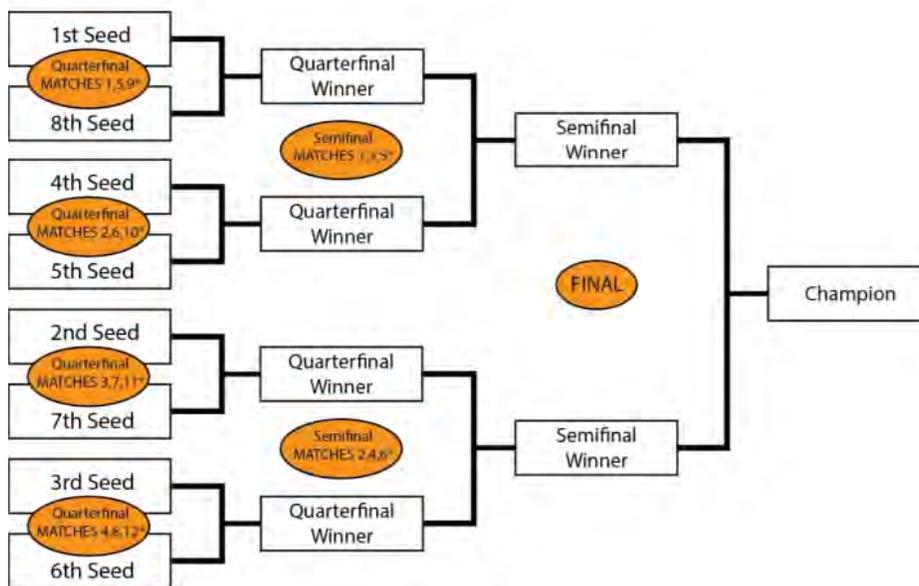
Alliance picture of FRC teams 4270, 5015, and 3256

- Rules for selection include:
 - If an invitation from a top eight alliance captain to another alliance captain is accepted, all lower alliance captains are promoted one spot.
 - The next highest-seeded, unselected team moves up to become the eighth alliance.
 - If the invited team declines, that team is not eligible to be invited again, and the alliance captain extends another invitation to a different team.
 - If an invitation from an alliance captain to another alliance captain is declined, the declining team may still invite teams to join their alliance; however, it cannot accept invitations from other alliances.

Competition Structure

How do alliance selections work?

- In Playoff Matches, teams do not earn Ranking Points; they earn a Win, Loss or Tie. Within each series of the Playoff Match Bracket, the first Alliance to win two matches advances. If after two matches, neither team has won twice, a third match is played.
- In the case where the Quarterfinal or Semifinal Match scores for both Alliances are equal after three matches, the Win is awarded to the Alliance based on other criteria.
- In Finals matches, the Champion Alliance is the first Alliance to win two matches. In the case where an Alliance hasn't won two Matches after three Matches, the Playoffs proceed with up to three additional Finals matches, called Overtime matches, until an Alliance has won two Finals Matches. In the case where the Overtime match scores for both Alliances are equal, the win for that Overtime match is awarded based on other criteria.
- A disqualified team, as determined by the Head referee, causes their Alliance to receive zero match points in a Playoff match.



*If necessary

FUN FACT!
 FIRST Robotics Canada was established in 2001, and now there are around 270 Canadian teams!

Match number indicates the order that the matches will be played in. In this image, the 1st and 8th seed play the first match, then the 4th and 5th seed, 2nd and 7th seed, and finally the 3rd and 6th seed, and then it loops until all Quarterfinal Winners are determined.

Competition Structure

How do regional competitions work?

- 30 to 70 teams usually attend from anywhere around the world. There are currently four regionals in Canada, located in Calgary AB, Victoria BC, Sherbrooke QC, and Montreal QC.
- To progress, you need to either win an award that qualifies you for the *FIRST* Championships or win the competition. These awards are:
 - Regional Chairman's Award
 - Engineering Inspiration Award
 - Rookie All-Star Award
 - You can earn a wild card qualifying spot if one of the winning teams from the winning alliance has already qualified. Their spot goes to the captain of the finalist alliance, then the first pick of the finalist alliance, and so on.

How do district competitions work?

- District events involve a set geographic area of teams, usually 24–42 teams.
- You gain points for:
 - Qualification round performance
 - Playoff Advancement
 - Draft Order
 - Alliance Captain
 - Judged Team Awards
 - Team Age (10 points for rookie teams, 5 points for veteran teams)
- After all the district events, there is a district championship event. In Ontario, this event is called the Ontario Provincial Championship with 60-80 of the top district points ranked teams competing. You can compete here to earn more points. Then the top 20-30 teams in the entire district qualify for the *FIRST* Championships. Ontario is a district, with several district events taking place across the province.



Competition Structure

How do the World Championships work?

- There are two *FIRST* Championship events. The current locations are Houston and Detroit.
- Currently, teams from eastern Canada compete at the Championship Event in Detroit, while teams from western Canada compete at the Championship Event in Houston.
- There are six divisions at each Championship event, each named after a famous STEM professional.
- Each of the six divisions work like a normal event, with a qualification and playoff rounds.
- The winning alliances from each division, known as division alliances, compete on Einstein Field, which is a round-robin event. In this format, each division alliance plays one match against each of the other alliances. Instead of earning Ranking Points, you earn Championship Points. The winning alliance receives two Championship Points, and the losing alliance receives zero Championship Points. In the event of a tied score, each alliance receives one Championship Point. The top two teams with the most Championship Points compete in the final match to decide the overall winner.
- You can pre-qualify for the *FIRST* Championship by:
 - By being a member of the *FIRST* Hall of Fame, which is all teams who have won the Championship Chairman's Award. One Canadian team, Team 1114, has earned this honour.
 - By being an original and sustaining team since 1992
 - By being one of the previous year's *FIRST* Championship winners
 - By being one of the previous year's *FIRST* Engineering Inspiration Award winners



Tips for a Typical Day at Competition

- Competitions are exciting! Keep in mind that after a long day of fun and competing, you will be TIRED! Make sure to get enough sleep!
- When you arrive at a competition it may be overwhelming at first. Teams usually arrive early in morning, unload, and set up their pit. Then teams have an opportunity to participate in practice matches. (It is advisable to not miss these!) Teams then typically work a bit on their robot and pass inspection. Then they attend opening ceremonies and qualifying matches commence! You will receive a schedule for when your practice time and match time is. Do not forget! (See following page for sample schedule)
- At competitions, team members can take on different roles. A few such roles are scouting and the pit crew. Some teams have a pit crew who stay in the pit, fix the robot, talk to judges and anyone else who may come by to see the pit. Scouting is when students get information about other robots in a match for alliances.
- After a long morning of competition you will be hungry for lunch. Matches will pause for a lunch break, and it's your time to fuel up! Consider eating some fruits or vegetables to give your body the nutrition it needs to compete the best you can!
#FIRSTFoodie
- It's essential that you stay hydrated at events or you will feel more exhausted and drained than you would normally feel. So bring a reusable water bottle!



Tips for a Typical Day at Competition – Sample Schedule for a District Event



**2020 FIRST Ontario District Event
Windsor Essex Great Lakes Event**
#WindsorFRC
Mar 26-28

Public Competition Schedule

March 26, 2020		
Start	End	
3:00pm	5:00pm	Team Load In (5 Team Reps)
5:00pm		Pits Open, Inspections
5:30pm	7:30pm	Filler Line Practice Matches
8:00pm		Pits Close
March 27, 2020		
8:00am		Pits Open, Inspections
8:00am	9:00am	Field open for measurement and calibration
9:00am	9:30am	Drivers meeting
9:30am	10:45am	Practice Rounds
11:00am		Opening Ceremonies
11:30am	1:30pm	Qualification Matches
1:30pm	2:30pm	Lunch
2:30pm	7:00pm*	Qualification Matches
8:00pm		Pits Close
March 28, 2020		
8:00am		Pits Open
9:00am	9:30am	Opening Ceremonies
9:30am	1:00pm*	Qualification Matches
1:00pm	1:30pm	Alliance Selections
1:30pm	2:30pm	Lunch
2:30pm	5:30pm	Elimination Matches
5:30pm**	7:00pm	Awards / Closing Ceremonies
7:30pm		Pits Close

* Based on a 32-36 team event and 10 hours of qualification matches.

** Closing ceremonies to occur immediately following the end of elimination matches.

All times are estimated based on flow of rounds. See Pit Administration table for updated times

Safety

Safety *FIRST!* At competition, it is important to stay SAFE while also having fun. Here are some important things to keep in mind:

DO:

- WEAR EYE PROTECTION (Safety glasses):
 - Anywhere in the pit station including walkways and team pits
 - Near the arena, including the playing field
 - On the practice field
 - Any area posted with signs requiring the use of eye protection (such as the machine shop)
 - Your eyes must be clearly visible to others!
- Wear shoes that completely cover the entire foot. Shoes must be substantial and have closed toes and heels to protect against foot injuries, regardless of work location. Flip-flops, sandals, mules, lightweight slippers, etc. are not acceptable in the pit area.
- Tie back or cover long hair.
- Wear gloves to protect hands and fingers when handling the robot or the robot crate; finger injuries are one of the most common injuries at events.



Safety

DO:

- Note that *FIRST* staff and volunteers are distinguished by their name badges.
- Stay aware of your surroundings.
- Always demonstrate safe behaviours, even in the heat of competition.
- Establish a planned, safe lifting procedure of the robot, including cart removal after the lift.
- Make sure the robot is properly secured if you must work underneath it. Never work on the robot on an unstable surface.
- Assist and mentor other teams with safety issues.



Safety

DON'T

- Do not wear dangling jewelry or loose, baggy clothing near the robots.
- Do not use skateboards, 'hoverboards', or drones at events.
- Do not bring bottled gas tanks (e.g. helium) to events.
- Do not throw objects (such as paper airplanes) from the stands/bleachers.
- Do not tape off or save seats.

Your Robot Cart

- While handling your robot cart, keep in mind that:
 - Carts must remain in the team pit area when not in use for robot transportation
 - All carts should fit through a standard 30-inch door
 - Wheels on the cart must not damage site flooring



George the Safety Bear, team 6135



Shep the Safety Sheep, team 2706

- Do not add music or other sound-generating devices to the cart, with the exception of devices of reasonable volume intended to be activated occasionally to make others in the direct vicinity aware that a robot is on the move for safety purposes
- Put your team number on your cart so it can be identified by field personnel

Please note that this is only a consolidated list. Please refer to the full safety manual at <https://www.firstinspires.org/resource-library/frc/safety-manual> before going to competition!

Behaviour

What Should Be The Goal of Watching?

Watching competitions sure is fun, however, there are many more facets to observing different team matches. By watching a team play, you can scout their team to see if they would be good alliance partners.

Watching matches is your opportunity to observe a team's playing style, to see if you will be compatible playing together on an alliance. You can also take in the ingenuity of different teams and their approaches to tackling the year's challenge. Each team comes up with incredible and unique ideas – maybe you could use the ideas you have seen for future challenges!



Behaviour

What You Should Do?

Always remember your Gracious Professionalism® while watching teams in competition on the field. Celebrate all team's accomplishments, no matter the outcome.

Even while watching teams play, you should continue displaying Gracious Professionalism®. Laugh with everyone instead of laughing at teams; never make fun of another team's failure. While your team is not competing, and you have some spare time, you can take time to watch matches, work on your robot, visit other teams, strategize, code, or just take a break.

When working on your robot, other teams may approach you and ask for help. *FIRST* teams compete intensely on the field, but cooperate even more intensely off the field. Always try to help out wherever you can or provide them resources which may hold the answers they are seeking. It's always important to be Graciously Professional when interacting with anyone at events.

Remember, have fun! This event is meant to be enjoyed as well, you can try to talk to different teams, exchange pins, and collect t-shirts! Just remember to get permission before you take photos of other people and their teams.



FUN FACT!

IFRC World Championships have been held in:

- Houston, Texas;
- Detroit, Michigan;
- St. Louis, Missouri;
- Atlanta, Georgia;
- Walt Disney World's Epcot.

FAQ

• What are alliances?

- Alliances are usually comprised of 3 teams each. There is a red alliance and a blue alliance that face off against each other in each game. During qualification matches, alliances are random, but during playoffs, the top 8 seeded teams have the ability to pick their alliance partners. (See: *How do alliance selections work?*)

• What is scouting?

- Scouting is a crucial part of match strategy – through scouting, teams can figure out which robots they work best with and how to best increase their odds of winning a match.
- There are many different types of scouting:
 - Match scouting is typically done with a group of 6 students minimum, one for each robot. Scouts sit in the stands and watch every match. They record quantitative information (ex. when a game piece was scored) about an assigned robot on a sheet of paper or on an app. This information can be referenced later at scouting meetings.
 - Qualitative scouting is also done in the stands but records a different type of information. Qualitative scouts watch each match but write down information that can't be expressed in numbers (ex. Team XXXX has a new drive team).
 - Pit scouting involves team members visiting each pit and talking to members of other teams about their robot. They usually ask questions about robot abilities, autonomous modes, or any other information that is deemed useful. They also take pictures of the robot in the pit.



FAQ

- **What is a pit?**

- The pits are a section of the venue where each team has their own separate space to work on their robot. Think of it as a miniature workspace! The pit is usually 10 x 10 x 10 feet and is customizable by each team. As well as containing all of a team's parts and tools, the pit also usually contains some team pamphlets and some fun souvenirs for the people that visit!

- **When are you being judged?**

- Throughout the duration of the qualification matches, judges will wander through the pits to ask team members questions about their robot and team. However, even if you're not being judged, you're always a representative of your team – so remember to exhibit Gracious Professionalism® at all times!

- **What do these numbers mean?**

- When a new team registers for FRC, they receive a team number. The team number is permanent and unique to that team. The numbers given increase every year as more rookie teams register. Say you are team 1234 – you are around the 1234th team registered (give or take – some numbers are skipped every year, some teams stop registering, etc.)
- There is a trick to saying these team numbers! It is quite difficult to say “team one thousand two hundred and thirty-four”. Instead, four digit team numbers are generally read two digits at a time – as “twelve thirty-four”. Three digits are usually read as one digit and then two digits (as “one twenty-three”).



FRC team 5406 member showing the robot to a judge

Glossary

Auto: The autonomous part of the game

Blue Banner: The physical prize for the biggest awards in *FIRST*; Event Champion, Chairman's Awards, and Woodie Flowers Award

Bypass: The state assigned to any robot which is unable or ineligible to participate in that match

CAD: Computer-aided design

Cheesecake: A prebuilt part that is intended to be attached to another team's robot

Coopertition®: The philosophy that teams can cooperate and compete at the same time

Core Values: Values that are core to the *FIRST* Experience: discovery, innovation, impact, inclusion, teamwork, and fun

Einstein: The final division at the World Championship – the winners of this division are crowned the World Champions

Enable/Disable: To turn on/off your robot

FIRST: For Inspiration and Recognition of Science and Technology

FLL: *FIRST* Lego League

FRC: *FIRST* Robotics Competition

FTC: *FIRST* Tech Challenge

Gracious Professionalism®: A way of doing things that encourages high-quality work, emphasizes the value of others and respects individuals and the community. It is not clearly defined for a reason. It can and should mean different things to everyone!

Human Player: The team member that interacts with game objects during the match

KOP: Kit of Parts, the kit of parts all teams receive at Kickoff

Offseason: Unofficial robotics competition usually held between May to February

OPR: Offensive power rating; how much a robot contributes to the alliance

Pits: Your team's robot workspace during competitions, usually 10ft x 10ft x 10ft.

Queuing: Waiting in line to start competing on the field

Rookie: A first-year team in *FIRST*, or a person who is new to *FIRST*

Glossary

RP: Ranking Points; points your alliance receives for winning or completing tasks during the match. Your average amount of Ranking Points is your rank, which is used for alliance selection

Teleop: The driver-controlled part of the match, as opposed to autonomous

Wildcards: A team that earns a qualifying spot at the *FIRST* Championship based on an already qualifying team at that event earning an additional qualifying award

FUN FACT!

In 1992, the inaugural FRC competition was hosted in a high-school gymnasium with 28 teams competing. The playing field was covered in 1 inch of corn kernels to provide a challenge for the robots. It was called Maize Craze!



Special Thanks

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