



**FIRST**  
**TECH**  
**CHALLENGE**

**FREIGHT**  **FRENZY**

PRESENTED BY  **Raytheon**  
Technologies

**FTC Dutch League Championship (NK)**  
**Zwijzen College, Veghel**  
**April 2, 2022**

*FIRST*® is a global robotics community that prepares young people for the future.

**FIRST**  
**LEGO**  
**LEAGUE**

**FIRST**  
**TECH**  
**CHALLENGE**

**FIRST**  
**ROBOTICS**  
**COMPETITION**

# Welcome to *FIRST*® Tech Challenge

*FIRST*® Tech Challenge is designed for students in grades 7-12 to compete head to head, using a sports model. Teams are responsible for designing, building, and programming their robots to compete in an alliance format against other teams. The robot kit is powered by Android technology, reusable from year-to-year and is programmed using Java. Teams, including coaches, mentors and volunteers, are required to develop strategy and build robots based on sound engineering principles. Awards are given for the competition as well as for community outreach, design, and other real-world accomplishments.



*“...to create a world where science and technology are celebrated...  
where young people dream of becoming science and technology leaders.”  
- FIRST Founder, Dean Kamen*

## About *FIRST* Tech Challenge

*FIRST* Tech Challenge is an exciting and fun global robotics program that ignites an enthusiasm for science, technology and discovery in young people and teaches them STEM skills and concepts, principles of leadership, and how to work as a team.

The competitions are the result of focused brainstorming, dedicated mentoring, project timelines and teamwork. Paired with technical mentors, teams learn from and play with the “pros” to experience engineering problem solving first-hand.

- Entices kids to think like scientists and engineers
- Provides a fun, creative, hands-on learning experience
- Teaches kids to experiment and overcome obstacles
- The skills they learn make math and science tangible, accessible and real
- Endorsed by the National Association of Secondary School Principals
- Teams learn to document their design ideas and discoveries
- Builds self-esteem and confidence
- 90% of participating students report learning how STEM can solve real-world problems

## Tournament Schedule

08:30	Team registration
09:00 - 09:15	Drivers Meeting
09:00 - 09:15	Coach Meeting
09:20 - 12:30	Inspections & Practice
09:20 - 12:30	Judge Interviews
12:30 - 13:15	Lunch Break
13:15	Opening
13:30 - 17:00	Qualification Matches
13.30 - 15.00	Pit Visits
17:00	Alliance Selection
17:30 - 18:30	Dinner
18:30 - 19:30	Elimination and Final Rounds
19:30	Award Ceremony
20:00	Pits Close

\*Please note that the tournament schedule might have changed after this program book went to print. All times are subject to change.

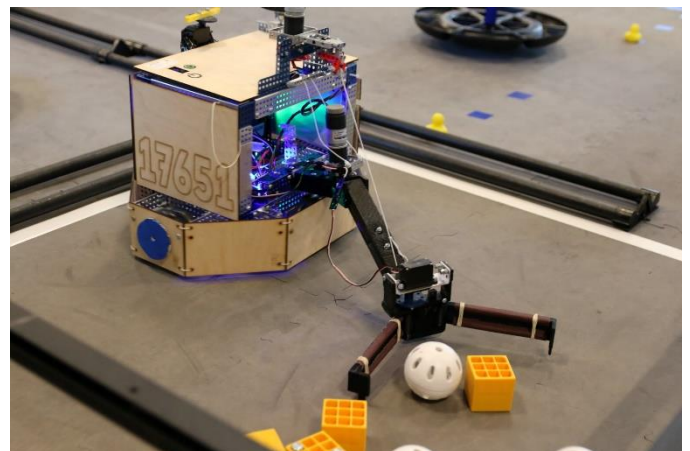
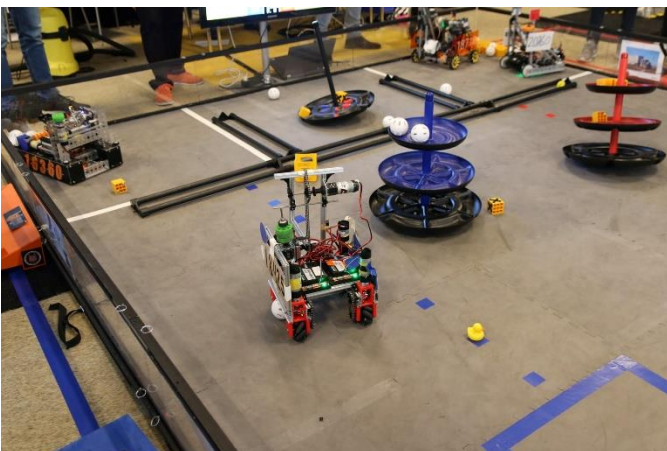
## Match Play and Elimination Rounds

**During the Qualifying Matches:** After all teams have gone through the robot and field inspections, they are randomly assigned into alliances of two teams. A team's alliance partner in one match may be their opponent in another match.

**Team Rank:** After all qualifying matches, all teams will be ranked from first through last based on their total Ranking Points (RPs). If multiple teams have the same number of ranking points, then the teams will be ranked based on their total tiebreaker points (TB). If multiple teams have the same tiebreaker points total as well, the teams will be ranked based on their highest match score. If this comparison still results in a tie, the next highest match score will be used until the tie is broken.

**Alliance Selection:** After all the qualifying matches are held, the Alliance Section begins. Four alliance captains are selected based on team rank. These captains then pick one or two additional teams (based on event size) to be their alliance partners for the Elimination Matches.

**Elimination Matches:** Alliances get a win, loss or tie. The advancing alliance is the first one to win two matches.



# Game Description

## The Game:

FREIGHT FRENZY<sup>SM</sup> presented by Raytheon Technologies is played on a 12 ft. x 12 ft. (3.7m x 3.7m) square field with approximately 1 ft. (0.3 m) high walls and a soft foam mat floor. There are two Alliances – “red” and “blue” made up of two Robots each. The Alliance neutral scoring elements are called Freight. There are 60 boxes which consist of 30 light, 20 medium, and 10 heavy Boxes, and 20 Cargo game pieces. At one end of the field are two Alliance neutral Warehouses which contain the freight. 20 Alliance neutral Ducks also make up Freight.

Robots must traverse over barriers to access Freight in the Warehouse. Two Alliance Shipping Hubs are located toward the center of the field, and one Shared Shipping Hub toward the back of the field. There are 4 barcodes, 2 for the red alliance and 2 for the blue alliance. The Carousels are located in the corners of the field towards the audience, and in front of the alliance stations. The Carousels are used to introduce Ducks onto the field and into play.

Prior to the start of the Match, Robots must be touching the wall closest to their alliance station and must possess one Pre-Load Box. Teams may swap the Duck located on the Barcode with their Team Shipping Element.

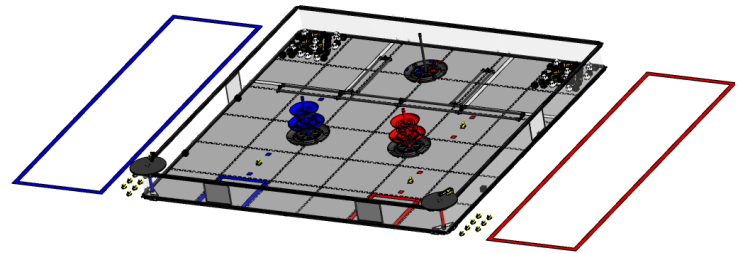
Matches have two distinct periods of play: a 30-second Autonomous period followed by a two-minute Driver-Controlled period. The last thirty seconds of the Driver-Controlled period is called the End Game which adds new scoring opportunities for the Robots to achieve.

### Autonomous Period:

Robots may Deliver Pre-loaded Boxes to a randomly selected level of the Alliance Shipping Hub. Teams may opt to use the Duck placed on the field, or may use their Team Shipping Element, which provides more points when used to determine where Freight is delivered to the correct level of the Alliance Shipping Hub. Alliances also earn points by Navigating to the Storage Unit or Warehouse, Scoring Freight in the Storage Unit or Alliance Shipping Hub, and Delivering Ducks onto the Playing Field Floor via the Carousel.

### Driver-Controlled Period:

Alliances earn points by collecting Freight from the Warehouse and Scoring the Freight in the Storage Unit, their Alliance Shipping Hub, or the Shared Shipping Hub



### End Game:

Alliances may Deliver Ducks onto the Playing Field via the Carousels. If the Team Shipping Element was not introduced during pre-Match setup, Alliances may also Deliver their Team Shipping Element. The Team Shipping Element may be used to Cap their Alliance Shipping Hub to earn points. An Alliance will earn Balance points for the Alliance Shipping Hub being Balanced. If an Alliance’s section of the Shared Shipping Hub is contacting the tile floor, the Alliance will earn points.

### Autonomous Period Scoring:

- Delivered Duck via Carousel: .....10 points
- Navigating:
  - Parked In Alliance Storage Unit: .....3 points
  - Parked Completely In Alliance Storage Unit: .....6 points
  - Parked In Warehouse: .....5 points
  - Parked Completely In Warehouse: .....10 points
- Freight Completely In Alliance Storage Unit: .....2 points
- Freight Completely On Alliance Shipping Hub: .....6 points
- Autonomous Bonus:
  - Duck used to detect Shipping Hub Level: .....10 points
  - Team Scoring Element used to detect Shipping .....20 points  
Hub Level

### Driver-Controlled Period Scoring:

- Freight Completely In Alliance Storage Unit: .....1 point
- Freight in Alliance Shipping Hub:
  - Level 1: .....2 points
  - Level 2: .....4 points
  - Level 3: .....6 points
- Freight Completely On Shared Shipping Hub: .....4 points

### End Game Scoring:

- Delivered Duck or Team Shipping Element via Carousel: 6 points
- Alliance Shipping Hub Balanced: .....10 points
- Shared Shipping Hub tipped toward Alliance: .....20 points
- Parked In a Warehouse: .....3 points
- Parked Completely In a Warehouse: .....6 points
- Alliance Shipping Hub Capped .....15 points

# Participating Teams

Team	Team Name	School / Organization	City
3954	Pink to the Future	Maerlant Lyceum	The Hague
10918	SPACE	Newmancollege	Breda
12463	KKST - Keep Keen Show Tech	Königin-Katharina-Stift	Stuttgart
12475	Beyond Reach	Zwijzen College	Veghel
14144	EAGirls	Ernst-Abbe-Gymnasium	Oberkochen, DE
14183	The Dukes of Brabant	Summa College	Eindhoven
14381	Dutch Warriors	Dr.Knippenbergcollege	Helmond
16360	Highland-Lynxes	Highland-Lynxes Robotics Club	Fehraltorf, CH
16382	Casimir Tech	Lorentz Casimir Lyceum	Eindhoven
16383	Frits Philips Robotics team	Frits Philips lyceum-mavo	Eindhoven
16409	Team Orange	Newmancollege	Breda
16410	GentleBotz	Newmancollege	Breda
16441	Pretty Smart Robotics	SRV Pretty Smart / rsg de Borgen	Sebaldeburen
16476	Royal Cats	Königin-Katharina-Stift	Stuttgart
16530	Cadmes Creators	Cadmes Creators	Uden
16785	ProBotix	Pius X College	Bladel
16850	Breul-1	KSG de Breul	Zeist
16977	Roboni Forever	St Bonifatiuscollege	Utrecht
17651	The Probots	Dalton Lyceum Barendrecht	Barendrecht
17652	Team Delta	Willem van Oranje College	Waalwijk
18710	Stanislas Tech Team	Stanislas College Westplantsoen	Delft
18859	Stanislas Tech Academy	Stanislas College Westplantsoen	Delft
18917	lions IEAGue	Ernst-Abbe-Gymnasium	Oberkochen, DE
19444	Lorentz Engineering	Lorentz Casimir Lyceum	Eindhoven
20091	E.T. Expecting Turbulence	Maerlant Lyceum	The Hague
20092	RTF - Robo Tech Froxx	Königin-Katharina-Stift	Stuttgart
20738	secbirdmachine2	d'Oultremontcollege	Drunen
20760	Impossible Robotics	Impossible Robotics	Muntendam

# FIRST Tech Challenge Awards

## **INSPIRE**

### **The highest award that a team can be given.**

This judged award is given to the team that truly embodied the “challenge” of the program. The team that receives this award is a strong ambassador for *FIRST*® programs and a role model team. This team is a top contender for many other judged awards and is a gracious competitor. The Inspire Award winner is an inspiration to other teams, acting with *Gracious Professionalism*® both on and off the Playing Field.

## **THINK**

### **Removing engineering obstacles through creative thinking.**

This judged award is given to the team that best reflects the journey the team took as they experienced the engineering design process during the build season.

## **CONNECT**

### **Connecting the dots between community, *FIRST*, and the diversity of the engineering world.**

This judged award is given to the team that most connects with their local science, technology, engineering and math (STEM) community.

## **INNOVATE Award sponsored by Raytheon Technologies**

### **Bringing great ideas from concept to reality.**

This judged award celebrates a team that not only thinks outside the box, but also has the ingenuity and inventiveness to make its designs come to life. This judged award is given to the team that has the most innovative and creative robot design solution to any or all specific field elements or components in the game.

## **CONTROL Award sponsored by ARM INC.**

### **Mastering robot intelligence.**

This judged award celebrates a team that uses sensors and software to enhance the robot's functionality on the field.

## **MOTIVATE**

### **Sparking others to embrace the culture of *FIRST*!**

This team embraces the culture of *FIRST* and clearly demonstrates what it means to be a team. This is a team who makes a collective effort to make *FIRST* known throughout their school and community, and sparks others to embrace the culture of *FIRST*.

## **DESIGN**

### **Industrial design at its best.**

This judged award recognizes design elements of the robot that are both functional and aesthetic. All successful robots have innovative design aspects; however, the Design Award is presented to teams that incorporate industrial design elements into their solution.

## **ELIMINATION TOURNAMENT AWARDS**

The winning alliance and finalist alliance are both recognized for their achievement in robot game performance.

# Thank You *FIRST* Tech Challenge Season Sponsors!

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KEY SPONSOR



## About *FIRST*

*FIRST*® (For Inspiration and Recognition of Science and Technology) was founded in 1989 to inspire young people's interest and participation in science and technology. Based in Manchester, NH, the 501(c)(3) not-for-profit public charity designs accessible, innovative programs that motivate young people to pursue education and career opportunities in science, technology, engineering, and math, while building self-confidence, knowledge, and life skills.

*FIRST* is **More Than Robots**™. *FIRST* participation is proven to encourage students to pursue education and careers in STEM-related fields, inspire them to become leaders and innovators, and enhance their 21<sup>st</sup> century work-life skills.

## *FIRST* Values

### ***Gracious Professionalism***®

Dr. Woodie Flowers, *FIRST* Distinguished Advisor and Pappalardo Professor Emeritus of Mechanical Engineering, Massachusetts Institute of Technology, coined the term *Gracious Professionalism*®. *Gracious Professionalism* is part of the ethos of *FIRST*. It's a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community. With *Gracious Professionalism*, fierce competition and mutual gain are not separate notions. Gracious professionals learn and compete like crazy, but treat one another with respect and kindness in the process. They avoid treating anyone like losers. No chest thumping tough talk, but no sticky-sweet platitudes either. Knowledge, competition, and empathy are comfortably blended.

In the long run, *Gracious Professionalism* is part of pursuing a meaningful life. One can add to society and enjoy the satisfaction of knowing one has acted with integrity and sensitivity.

### ***Coopertition***®

*Coopertition*® produces innovation. At *FIRST*, *Coopertition* is displaying unqualified kindness and respect in the face of fierce competition. *Coopertition* is founded on the concept and a philosophy that teams can and should help and cooperate with each other even as they compete.

*Coopertition* involves learning from teammates. It is teaching teammates. It is learning from mentors. And it is managing and being managed. *Coopertition* means competing always, and assisting and enabling others when you can.



Thank You, FTC NL Sponsors!

**DOW**<sup>®</sup>

*KEES JAN  
KOSTER*

**ASML**

Rooster Sync  
Lesrooster op je mobiel

**SOLIDWORKS**

**MICROLAB**



# Thank You, Tournament Volunteers!

Tijn Floor Rob Laurens Ben Bas Bjorn Nigel Renske Gijs Wesley Victor Andrei Radu  
René Guus Jochem Vera Lisa Joep Nathan Djamon Lucas  
Justin Felix Stefan Tessel Jeether Angela Niels Jiri Yagur Wouter Stijn Ine Thomas

Thank you to all our additional volunteers whose names did not make it into the printed program!

## Thank you!



*Thank you to all who help make this program possible for our students. FIRST® could not exist without the support of the army of mentors, parents, teachers, and volunteers who step up to provide their time and expertise to inspire our young people to get excited about science, technology, engineering and math.*



NICOLLE IRENE RONALD RON ROEL BAS

