FIRST
INNOVATION
CHALLENGE

PRESENTED BY Qualcomm

2020-2021 *FIRST*® Tech Challenge

Guide

Challenge and Submission

Overview and Challenge

The *FIRST*® Innovation Challenge presented by Qualcomm Overview

In the *FIRST*® Innovation Challenge presented by Qualcomm, registered teams identify a real-world problem related to this season's theme *FIRST*® GAME CHANGERS℠, powered by *Star Wars: Force for Change*, design a solution, build a business model, and deliver a pitch to compete with other *FIRST* Tech Challenge teams for judged awards and a chance to be one (1) of twenty (20) Finalist teams invited to the *FIRST* Global Innovation Awards powered by *Star Wars: Force for Change*, a multi-day experience where students showcase their innovations, participate in workshops, and receive mentorship from experts.

Science, technology, engineering, and math (STEM) have always been the catalyst for innovation that moves our world forward. As our societies continue to evolve and become more inclusive and connected, our sports - and the activities that make us physically and mentally strong - must change along with us. This means redefining where and how we move and play. We actively play and move for ourselves, but also with and as a community to attain optimum health. This means inventing and innovating places, ways, sports, tools, and concepts so people of all abilities and skill levels can thrive through active play and movement.

Think About it

- In 2006, the Nintendo® slogan 'Experience a new way to play' took the world by storm as it introduced the Nintendo Wii. Game developers and engineers developed a revolutionary new game controller that worked in three dimensions and allowed users of all ages to be active while playing a video game. This solution won the Game Critics Awards for Best Hardware. When coupled with the new software and accessories, it had people off their couches engaging in everything from bowling and dance competitions to tennis and go-kart driving.
- For tracking athletic performance, the stopwatch was once one of the few pieces of measuring technology available. Now, companies are refining wearable tech, but athletes have a rapidly growing number of sophisticated options from smart clothing to advanced wearable tech. These have ushered in a new age of performance tracking with metrics such as position, distance, velocity, and acceleration. Heads-Up

Display (HUD) cycling glasses are an example of one piece of sports tracking equipment that helps cyclists make mid-ride adjustments when competing, not to mention enhances overall safety.

- In 2019, a *FIRST*® LEGO® League team invented a community sports field that used LED lights to light up fields in different patterns, allowing for the instant and seamless changing of demarcation lines for different types of sports play.

FIRST Innovation Challenge

Identify a problem or opportunity and design a solution to help people (or a community of people) keep, regain, or achieve optimum physical and/or mental health and fitness through active play or movement.

Criteria

Teams who participate in the *FIRST* Innovation Challenge will:

- Identify and define a problem or opportunity,
- Brainstorm and design an innovation to seize the opportunity or solve the problem,
  - o The innovation can be entirely new and novel or may significantly improve an existing invention
- Create a business model,
- Show and be evaluated on the soundness of the design,
- Develop and present a pitch for the innovation, and
  - o Each team develops a two (2) minute business pitch, to be presented live
- Use technology in either the solution development process and/or design.
  - o The use of technology in either the solution itself or the development of the solution will fulfill this requirement.

Submission Information

Initial Submission Information

We encourage teams to let FIRST know if they are planning to participate as soon as possible by starting their application, but teams have until March 4 to submit their entry and finalize their summary.

- Teams will indicate their participation and submit their information via innovationsubmissions.firstinspires.org. For the *FIRST* Innovation Challenge, teams are asked the following questions when they submit, **due March 4, 2021**:
- Two (2) contact emails (must be mentors over the age of 18)
- Time zone

- *FIRST* Innovation Challenge Title
- Solution brief description (10-word limit)
- Executive summary. Think of this summary as a very brief overview; it does not mean the team needs to have all of the *FIRST* Innovation Challenge figured out! On the contrary, because the information in the executive summary is only reviewed (*not* judged), it is expected that teams expand and iterate upon the solution between the submission deadline and interview.
    1. Please describe the problem/opportunity the team is focusing on (200-word limit).
    2. Please describe how the team proposes to solve the problem/opportunity (200-word limit).
    3. What technology the team used (or planning to use) in the design or solution development? (This does not have to be a comprehensive list but will help align any specific technical expertise a judge may have to the judging group.) (100-word limit).

Additional Requirements for *FIRST* Innovation Challenge Semi-Finalist Teams

The following requirements are *only* for advancing Semi-Finalist teams. Teams will be contacted by *FIRST* with instructions on how to submit these additional requirements, **due April 21, 2021**. These are *in addition* to the previously submitted requirements above:

- *Public* project description (150-word limit; may be used for public promotion of the *FIRST* Innovation Challenge.)
- *Public* team description (150-word limit; may be used for public promotion of the *FIRST* Innovation Challenge.)
- Team logo
    o accepted formats include gif, jpg, jpeg, png
    o files must be no larger than 10 MB.
- A video of the team's business pitch
    o Videos may not exceed two (2) minutes.
    o Accepted formats include flv, m4v, mov, mp4, mpeg, mpeg4, mpg, ogm, ogx, swf, wmv. Most common codecs used in these containers are accepted, for a complete list of accepted container/codec pairs Supported Input Codecs and Containers.
- A description of the innovation impact (500-word limit)
- A description of the design (500-word limit)
- A description of the business model (500-word limit)

It is okay if the descriptions fall short of the word limit. Teams should concisely convey information first and foremost and there is no advantage to 'filling' the entirety of the word limit.

The following items are optional:

- The team can update or refine any answers to the three questions they made for the Executive Summary submitted earlier; word counts are expanded to 350 for the problem and solution descriptions.
- Up to 1 page (8.5 x 11 or A4) of supplemental documentation; we recommend this is used to illustrate any data, drawings, photographs to help show the design.
- An image of the innovation
    o can be a sketch, a photo of a physical model, a CAD image, etc.
    o accepted formats include gif, jpg, jpeg, png
      files must be no larger than 10 MB.
- A video to show the design, for example CAD animation or prototype in action

- o Videos may not exceed 0:30 seconds.
- o Accepted formats include flv, m4v, mov, mp4, mpeg, mpeg4, mpg, ogm, ogx, swf, wmv. Most common codecs used in these containers are accepted, for a complete list of accepted container/codec pairs Supported Input Codecs and Containers.

Please note: We recommend teams use a minimum resolution of 720p (1280x720px) when recording videos. There is no system limit to supported filed size, however .5GB uploads typically work on high-speed internet connections. The greater your file size, the greater the potential for an interrupted upload. Please plan accordingly.

Judging and Guidelines

Judging Logistics

Teams must submit the required information by the deadline and participate in an interview with judges to be eligible for advancement. Working in a team is a core tenet of *FIRST* and critical for successful innovation, the *FIRST* Innovation Challenge is not designed for individual participants.

Semi-Finalist Advancement

Teams who advance to become a Semi-Finalist in the *FIRST* Innovation Challenge receive both a physical award and designation as a:

- **FIRST Innovation Challenge Semi-Finalist**– Semi-Finalists are teams that achieve excellence across all areas of the criteria. Teams will advance out of their judging groups; multiple Semi-Finalists advance from each group.

FIRST Innovation Challenge Emphasis

Team(s) who perform strongly *in each* of the core areas are most likely to advance in the *FIRST* Innovation Challenge. Because learning the innovation process is essential to develop the critical thinking skills and creative problem-solving competencies of our future workforce, judges only look for elements described in judging criteria. Judges are not looking for the next big idea or disruptive innovation, i.e. they are not judging based on their predictive outcomes of your innovation. Although given a GAME CHANGERS mindset, it's likely that teams develop an idea just as competent as today's top innovators. Whether or not a team's solution is likely to go to market is not considered. What is important is concisely articulating all the outlined requirements.

Judging Groups

For the *FIRST* Innovation Challenge, teams are placed into non-geographic, randomized groups. Teams are competing against each other within these groups for advancement. Teams are grouped by program, so *FIRST* Tech Challenge teams are only placed into a group with other *FIRST* Tech Challenge teams, not with any *FIRST* Robotics Competition teams participating in the *FIRST* Innovation Challenge.

Teams are assigned to group by *FIRST*. Group size will be between 15-30 teams, pending the total number of teams participating. The following considerations will be made in the group assignments:

- o   Rookie teams will be spread evenly across all groups
- o   Veteran teams will be spread evenly across all groups
- o   Teams with like problems/opportunities and/or solutions will be spread evenly across all groups to the extent possible.

We anticipate your judging will take place in early April 2021.

Judging Criteria

The below is used by judges evaluating the submission for the *FIRST* Innovation Challenge for advancement and for awards at the *FIRST* Global Innovation Awards powered by *Star Wars Force for Change*.

Problem or Opportunity

Team had a clearly defined problem or opportunity, supported by evidence.

Beginning	Developing	Accomplished	Exceeds
Problem or opportunity not clearly defined; limited supporting evidence (0-1 sources)	Problem or opportunity partially defined; supporting evidence from more than one source (2-3 sources)	Problem or opportunity fully clear; overwhelming evidence from multiple (4 or more) reputable sources	

Business Model

The team demonstrates the feasibility of their business model with a distinct value proposition and a description of factors/resources necessary for its implementation. The strongest teams will demonstrate the corroboration of their value proposition with experts, potential users, or both. Teams that exceed may have a full cost and revenue structure.

Beginning	Developing	Accomplished	Exceeds
Business model not feasible and/or missing elements. Minimal factors for implementation considered.	Business model feasibility is questionable; some factors for implementation considered.	Model is feasible; spectrum of factors well considered from multiple perspectives. Value proposition corroborated.	

Design

The innovation design shows effective functionality. The team can account for reliability and user experience in their innovation design. All underlying science, math, and/or theory can be articulated. The use of technology in either the development of and/or the solution itself is sound and creative. The strongest teams will be able to articulate efficient innovation capacity and will have plans around how they would use a prototype to test and refine their design.

Beginning	Developing	Accomplished	Exceeds
Design shows promise but is significantly lacking in function, efficiency, reliability, and/or user design.	Some questions about the design functionality remain and/or reliability/user design is absent or lacking.	Use of technology in development or design is sound, creative and overall design is comprehensive.	

Innovation Impact

Team shows a deep understanding of how the innovation will create impact by making life better. Teams will tangibly demonstrate, through surveying, simulation, modeling, prototyping or other methods, the expected impact of their innovation and how it adds value, either by volume, degree of impact, or both.

Beginning	Developing	Accomplished	Exceeds
Little added value or minimal impact articulated.	Potential added value and sound impact.	Demonstrated added value and identification of how to measure it. Compelling impact.	

Business Pitch

Team had a live pitch that included a clear understanding of the customer and market size for their innovation. Team pitch was compelling and visuals were strong and in service of creating understanding.

Beginning	Developing	Accomplished	Exceeds
Unclear, few details to understand either innovation, customer and/or market provided	Pitch was somewhat clear, with one or more elements (customer/ market/visuals) confusing or lacking detail	Pitch was fully clear, compelling and supported with multiple data sets and strong use of visuals	

This team showed immense potential in the following areas: (circle all that apply)

Problem or Opportunity / Business Model / Innovation Impact / Design / Business Pitch

This team showed particular strength and creativity in the following areas: (circle all that apply)

Problem or Opportunity / Business Model / Innovation Impact / Design / Business Pitch

Further Judging Tips and Requirements

Problem or Opportunity

Evidence could include consultations with experts, data, applicable studies/theories, and /or team conducted user surveys.

Business Model

A specific tool or method to present their business model, such as the business model canvas, is not required.

Design

The design must be shown to the judges, but how it is shown is at the team's discretion. Teams may draw or use software to show a 2D or 3D representation of their design. A physical model is not required. If built, a photograph or video of it in use will fulfill the showing of the design. Teams may consider building a prototype or have

plans on how a prototype would be used to test and refine their design if one cannot be built. Teams may consider incorporating an inclusive, universally accessible design.

Business Pitch

A video may be a part of your pitch (such as a CAD animation or video of a prototype) but it should not include pre-recorded audio.

NOTE on Intellectual Property Protection

FIRST cannot give legal advice. We work in collaboration with the USPTO in order to provide intellectual property education to all students, which is a critical part of innovation. Protecting the idea is an important part of any invention or innovation process. For the 20 teams that reach the Finalist level and advance to the *FIRST* Global Innovation Awards, *FIRST* encourages teams to file a United States provisional patent. Teams can learn more on the patent resource page of the *FIRST* Innovation Challenge webpage.

Judging Interview

Interview Logistics

Teams who complete the *FIRST* Innovation Challenge submission will be scheduled for a remote interview with a panel of Judges. We encourage team members presenting information to judges have access to a web camera and be on screen; information on the platform utilized for this judging interview will be sent to teams prior to their scheduled interview.   Please note: judges will be instructed that some team members may not be able to be on camera depending on their location; being on camera is not a requirement.   A call-in number can be provided if needed. We encourage all teams to be prepared to adapt to any technical difficulties by having multiple team members prepared to present all materials.

Teams are allowed and encouraged to share their screens and use video as part of their presentation. Teams may have as many team members in the interview as they believe they need but teams are encouraged to create a succinct presentation for the Judges. Additional requirements and limitations are:

- An adult mentor should be present during judging. (Remember, if the mentor provides any assistance during the interview, Judges will respectfully remind the mentor to let the team member answer all questions.)

- If necessary, the mentor or other adult may provide interpretation for students who do not speak English or who need sign language interpretation. Please identify this need to your judging group point of contact in order for this to be accommodated by judged.
- Recording video, audio, or taking pictures (including screenshots) are prohibited during the interview.

Interview Format Details

The Business Pitch (2 min)

Participating teams receive educational webinars full of advice on the business pitch; participation is highly encouraged. Please see the Timeline and Content Series below for more details.

At the Finalist level, *FIRST* Innovation Challenge teams who advance to the *FIRST* Global Innovation Awards receive expert pitch advice from real-world entrepreneurs before their final judging and a 1:1 coaching session with staff from one of the top social impact business incubators

The pitch communicates the business model and is designed for an external stakeholder audience. Even though teams are delivering it to judges, it should have a compelling tone as is if were being delivered to an external audience, not just a judging panel.

The elements of a strong business pitch typically consist of an introduction of the problem and solution, an explanation of how it works, an overview of any competition for the business (if applicable), progress to date, validation (from experts/partners/data), an ask, and a closing.

We recommend the use of visuals in the pitch, especially if teams are communicating complex ideas or data; however, they are not required. If teams use a slide show, teams should not use more than eight (8) slides. A video may be a part of the pitch (such as a CAD animation or video of a prototype), however because the pitch is live, the video should not have pre-recorded explanative audio.

Uninterrupted Presentation (3 min)

The presentation is designed to communicate information to the judges on how the innovation matches the criteria. It can be given in any style (i.e. this can be creative and less formal than the pitch), and it should not be pre-recorded. Whereas the pitch focuses on the business model, this presentation should focus on articulating the impact and design of your innovation, as well as how the team used technology in its development and/or design. Teams may use drawings, photographs, CAD animations, model/prototype, or video to assist in this presentation. If teams use a video, it should not take more than 90 seconds and should not have pre-recorded explanative audio.

Judges use this time to ask questions they may have based on the pitch or presentation. Judges finish each live judging session with the question: Is there anything else you'd like us to know?

Advancement and the *FIRST* Global Innovation Awards

Advancement

For teams to be eligible for advancement, as a guideline, they should rank accomplished or higher in at least 3 out of the 5 categories. We realize in some regions where fewer teams may participate in the Innovation Challenge; some teams *may not* achieve accomplished in 3 of the 5 categories. That's okay; teams will still advance out of their judging groups even if that metric is not achieved by all advancing teams.

Please note if there are fewer than 100 *FIRST* Tech Challenge teams who submit for the *FIRST* Innovation Challenge, advancement to the Finalist level occurs directly and there will not be a Semi-Finalist layer of advancement/judging. Twenty (20) *FIRST* Robotics Teams are chosen as Finalists and move on to compete at the *FIRST*® Global Innovation Awards powered by *Star Wars: Force for Change*. Finalist teams are expected to continue to iterate and refine their work.

The table below shows how many Semi-Finalists are chosen per GROUP depending on the number of teams that applied.

Total Number of Teams	# of Semi-Finalists per GROUP
0 – 150	4 teams receive the *FIRST* Innovation Challenge Semi-Finalist Award and become Finalists
151 - 1000	4
1,001 - 1900	3
1901 - 3000	2

The *FIRST* Global Innovation Awards
powered by *Star Wars: Force for Change*

Overview

Advancing *FIRST*® LEGO® League Challenge, *FIRST*® Tech Challenge, and *FIRST*® Robotics Competition teams showcase and celebrate their innovative solutions at the 2021 *FIRST*® Global Innovation Awards held June 28-30, 2021 at a remote event in front of *FIRST* Strategic Partners and a global audience of peers and industry leaders. Teams participate in judging, workshops, expert mentoring, and fun during a 3-day event that culminates in a live Awards Broadcast featuring the work of all Finalist teams. Teams vie for Awards within their own program only, not against teams in other programs.

Past *FIRST* Global Innovation Awards teams have received patents, brought products to market, won pitch competitions, received funding grants and university partnerships, and national press coverage.
Teams who participate are expected to have availability on June 28-30 for the majority of team members to be judged and participate in the remote event should they become one of the 20 Finalist teams. A stable internet connection and device are required for all Finalist team members who advance to the *FIRST* Global Innovation Awards.

Preparing for the Remote Event

The twenty (20) Finalist *FIRST* Robotics Competition Teams are provided with a separate judging guide to prepare for the *FIRST* Global Innovation Awards; however, the remote judging format follows the same format as the initial judging. Finalist teams should plan on being seen multiple times by judges for a longer duration to allow for longer Q&A.

Finalist teams may have additional non-judged requirements for the *FIRST* Global Innovation Awards, such as submitting materials for remote pits, updating their submission with additional written information and/or an Engineering Change notice to help judges understand the work in advance, and submitting answers to questions in the form of videos or images for use in our social media campaign, etc. A full calendar of due dates for these addition elements is provided to coaches of Finalist teams the third week in May.

Each program recognizes a *FIRST* Global Innovation Awards winner, two (2) runners-up, and one (1) award each for Business Model Design, Innovation Design, and Innovation Impact. The overall winner and the two (2) runners-up for each program are teams that achieve excellence across all criteria as described in the Judging Criteria section.

Awards for Business Model Design, Innovation Design, and Innovation Impact look for particular excellence *just* in those respective criteria described in the Judging Criteria section. The overall *FIRST* Global Innovation Award winner and runners-up are determined by judges first and are not eligible for these Awards.

Finalist teams are asked to create a brief (30 second) public pitch for their *FIRST* Innovation Challenge. These pitches are made publicly available and family, fans, and the *FIRST* community can vote on their favorite. Three (3) Community Choice winners are recognized, one (1) from each *FIRST* program. Because this Award is based on a public vote, a team may win the Community Choice Award in addition to another Award at the *FIRST* Global Innovation Awards.

Timeline and Content Series

Timeline

- **March 4, 2021:** Deadline for teams to indicate their participation in the *FIRST* Innovation Challenge; this is the cut-off date in order for all teams to be groups and judged.
- **April 21, 2021:** Deadline for Semi-Finalist teams to submit further requirements.
- **May 7, 2021:** The 20 Finalists from each program for the *FIRST* Global Innovation Awards are chosen on or around this date. Teams should anticipate receiving an e-mail from *FIRST* at this time. In May and June, Finalists continue to iterate and refine their work.
- **June 28-30, 2021:** The 20 Finalist teams should be available for judging, workshops, and mentoring on these days to participate in the *FIRST* Global Innovation Awards remote event. Please note this event typically has a commitment of ~5 hours a day, with plenty of breaks and time of day dependent on time zone. Via our closed App platform, open just to coaches, team members and sponsors, teams also engage in a real-time activity feed and with each other. On June 25th and (the Friday before the event) and throughout, teams are given the opportunity to meet 1:1 or in small groups with other Finalist teams.

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Content Series – Innovation, Inspiration & Education

As part of the *FIRST* Innovation Challenge presented by Qualcomm, *FIRST* will host a content series featuring conversations with innovators and essential tips teams can apply to succeed in the challenge.

Topics may include pitch advice, business model education, intellectual property, careers in innovation, product development, using CAD to show design, and more. The series will be a combination of informative webinars and live panel discussions featuring dynamic *FIRST* alumni and experts from our sponsors, allowing teams exclusive access to engage with real-world innovators and entrepreneurs.

Teams may access the content series and additional resources at the Innovation Content Series webpage.