



Training and
Support

2018-2019 *FIRST*[®] Tech Challenge Control System Advisor Manual

ROVER RUCKUS



Presented By **Qualcomm**

www.firstinspires.org

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FOR INSPIRATION & RECOGNITION OF SCIENCE & TECHNOLOGY

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Volunteer Thank You

Thank you for taking the time to volunteer for a *FIRST*® Tech Challenge event. *FIRST*® and *FIRST*® Tech Challenge rely heavily on volunteers to ensure events run smoothly and are a fun experience for teams and their families, which could not happen without people like you. With over 5,500 teams competing yearly, your dedication and commitment are essential to the success of each event and the *FIRST* Tech Challenge program. Thank you for your time and effort in supporting the mission of *FIRST*!

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Revision	Date	Description
1	09/10//2018	Initial Release
1.1	11/12/2018	Appendix A – Added event on call support lines

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Introduction

What is FIRST® Tech Challenge?

FIRST® Tech Challenge is a student-centered program that focuses on giving students a unique and stimulating experience. Each year, teams engage in a new game where they design, build, test, and program autonomous and driver operated robots that must perform a series of tasks. To learn more about FIRST® Tech Challenge and other FIRST® Programs, visit www.firstinspires.org.

FIRST Core Values

We express the FIRST® philosophies of *Gracious Professionalism®* and *Coopertition®* through our Core Values:

- **Discovery:** *We explore new skills and ideas.*
- **Innovation:** *We use creativity and persistence to solve problems.*
- **Impact:** *We apply what we learn to improve our world.*
- **Inclusion:** *We respect each other and embrace our differences.*
- **Teamwork:** *We are stronger when we work together.*
- **Fun:** *We enjoy and celebrate what we do!*

Gracious Professionalism®

FIRST® uses this term to describe our programs' intent and *Gracious Professionalism®* is not clearly defined for a reason. It has different meanings to everyone. Some possible meanings of *Gracious Professionalism* include:

- Gracious attitudes and behaviors are win-win.
- Gracious folks respect others and let that respect show in their actions.
- Gracious Professionals make valued contributions in a way that is pleasing to others and to themselves.

In the end, *Gracious Professionalism®* is part of everyday life. When professionals use their knowledge graciously and individuals act with integrity and sensitivity, everyone wins, and society benefits.

Watch Dr. Woodie Flowers explain *Gracious Professionalism* in this [short video](#).

Gracious Professionalism for Volunteers

It is a good idea to spend time going over this concept with volunteers. Provide volunteers with real-life examples of *Gracious Professionalism* in practice before, during, and after the event and recognize great *Gracious Professionalism* when you see it in action!

FIRST Volunteer Rights and Responsibilities

NOTICE OF NON-DISCRIMINATION

For Inspiration and Recognition of Science and Technology (FIRST®) does not discriminate based on race, color, national origin, sex, disability, age, status as a veteran who served in the military, religion, gender, gender identity, or gender expression in its programs and activities.

Keep updated at: <http://www.firstinspires.org/about/legal-notice>

Volunteer Rights and Responsibilities

Volunteers are the most valuable asset to FIRST®. Your selfless contribution of time and resources are instrumental in accomplishing our mission of inspiring the next generation of science, technology, engineering, and mathematics leaders and innovators. The foundation of the relationship between FIRST and our volunteers is respect.

It is your right to:

- Be treated with *Gracious Professionalism*®. *Gracious Professionalism* is a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community.
- Feel valued. FIRST recognizes the significant efforts that volunteers contribute. The time that you donate not only helps FIRST succeed but also builds the FIRST community.
- Understand your role. FIRST will inform you about what's expected of you, your schedule, any meals you will be provided, any changes to program or policy, and who to contact should you need assistance.
- Expect a safe environment. FIRST strives to create and maintain a safe environment for all volunteers and participants and will always factor safety into program planning.
- Receive fair treatment and inclusion. All volunteers will be treated with respect and dignity in inclusive environments. FIRST does not discriminate on the basis of race, color, national origin, sex, disability, age, status as a veteran who served in the military, religion, sexuality, gender, gender identity, or gender expression in its programs and activities.
- Reevaluate your time commitment. FIRST appreciates all of our volunteers and understands that volunteers experience life situations that may affect their commitment.
- Communicate with your Volunteer Coordinator or your local FIRST leadership about:
 - Concerns or limitations that are affecting your volunteer role.
 - Any mistreatment towards you or others. You may be required to fill out a [non-medical incident form](#).
 - Contact FIRST Headquarters directly if you feel that you are being treated improperly and attempts to resolve issues and conflicts at the local level are not successful. Volunteers can call (800) 871-8326 or email volunteer@firstinspires.org.

It is your responsibility to:

- Treat others with *Gracious Professionalism*®.
- Follow the schedule and the role description provided for your position. Contact your local FIRST leadership if there are any issues.
- Respect others, treat them fairly and kindly. Be inclusive and follow the non-discrimination policy of FIRST.
- Follow safety rules and ensure safety of others. Adhere to all [FIRST Youth Protection Program \(YPP\) policies](#). Report any injuries or safety concerns within 48 hours.
- Adhere to the [FIRST Code of Conduct](#).
- Have FUN!

Tournament Organization Structure

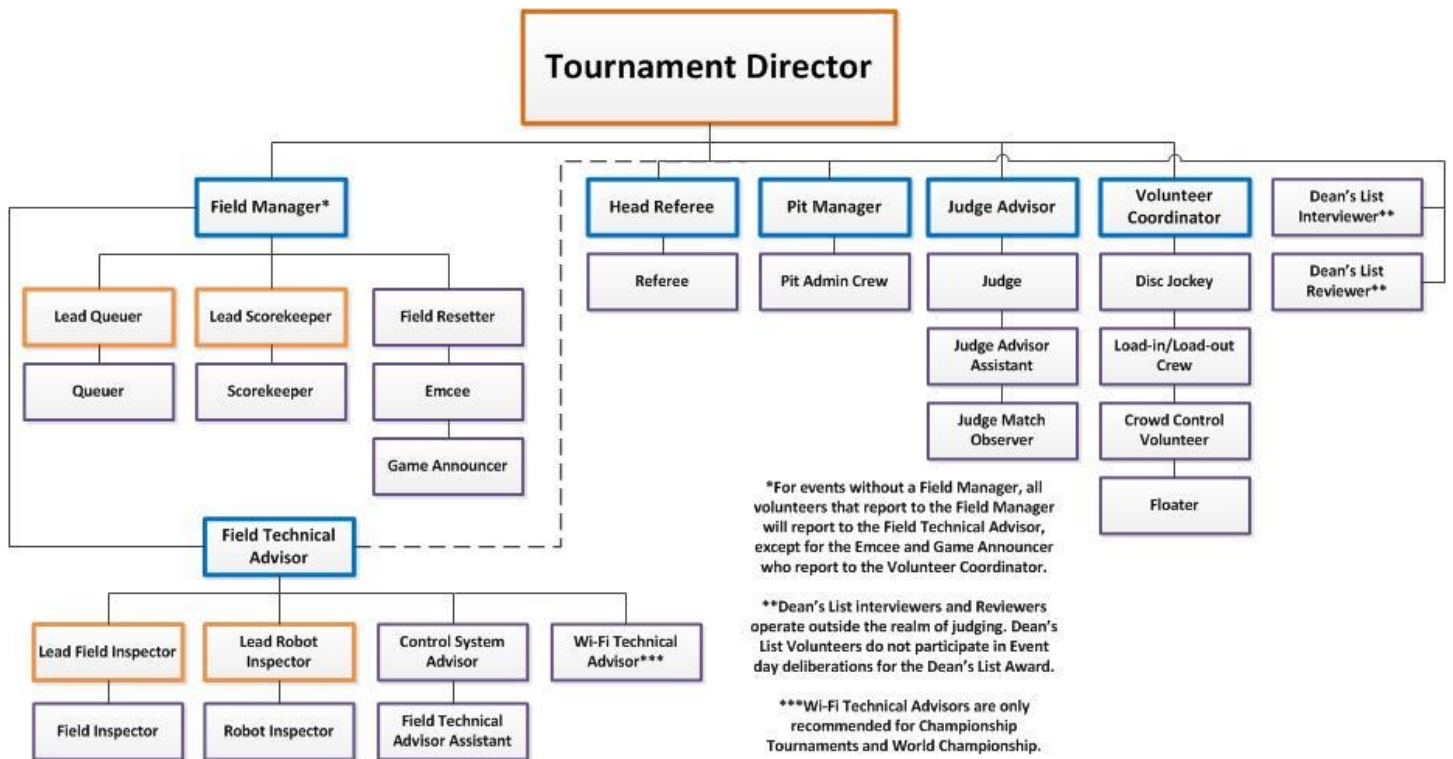


Figure 1 - League Championship, Qualifying Tournament, Championship Tournament Organization

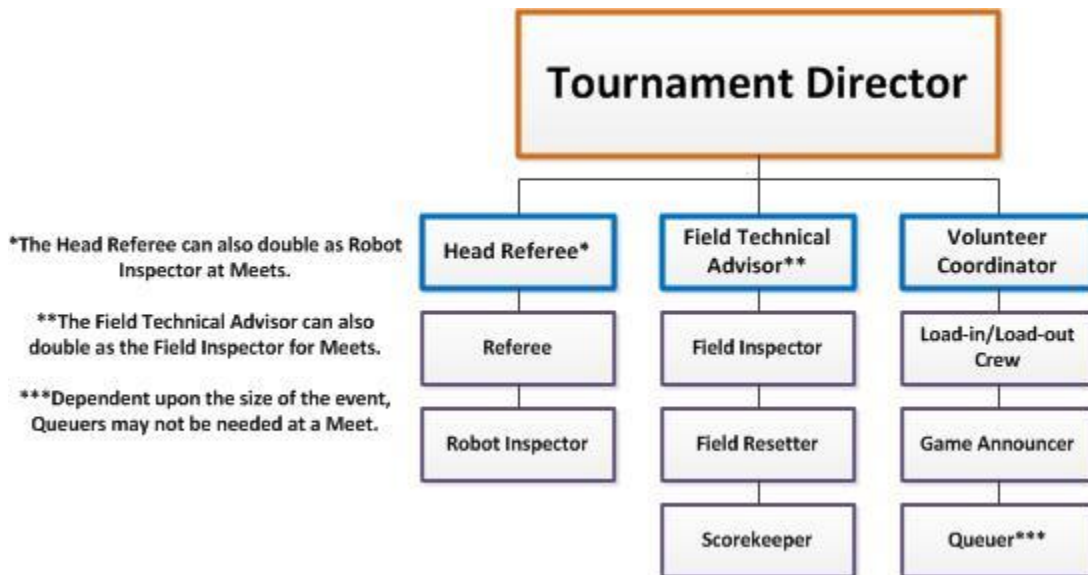


Figure 2 - League Meet Organization

Learn more about the roles of volunteers on our [Volunteer Resources page](#), "Volunteer Role Description".

Job Description

Introduction

The Control System Advisor (CSA) is a volunteer who helps teams with robot control system related issues. The CSA works in collaboration with the Field Technical Advisor (FTA) and/or Robot Inspectors, who may direct teams experiencing issues on the field or in the pits to the CSA for help. This position requires a high level of technical knowledge and interpersonal skills and can affect the quality of the event. While some smaller events combine the Control System Advisor and Field Technical Advisor responsibilities, having separate volunteers for each role will keep the work-load manageable for each volunteer and is recommended by *FIRST*.



FIRST Tech Challenge tournaments squeeze a lot of activity into one day. One of the keys to running a smooth and successful event is for teams and volunteers to show up prepared. Teams spend countless hours preparing for competition day and we ask our volunteers to prepare for tournament day as well.

Prerequisite for CSA Role

To serve as a Control System Advisor, in-depth knowledge of the *FIRST* Tech Challenge Android-based control system and diagnostic tools is required.

- **Physical/Technical Requirements:**
 - Technical – High
 - Physical – Low
 - Administrative – Medium
 - Communication – High
- **Time commitment:**
 - Training – About four to six hours
 - Event Day – About eight hours
- **Proper Dress:**
 - Wear comfortable, closed-toe and closed-back shoes, most of the day will be spent standing and walking between the pit area and the competition fields.
 - ANSI Z87.1 certified safety glasses are required in the competition area.

Volunteer Training and Certification

Volunteers must apply to their role using the [Volunteer Registration System](#). After the volunteer has applied to their role, *FIRST* Tech Challenge will send an email to the volunteer with access instructions to training and certifications (if applicable). Emails with access to the training and certifications are sent within one business day from applying to the role. If you have applied for a role but have not received access to the training, please email FTCTrainingSupport@firstinspires.org.

The Control System Advisor should read this manual before the event. She/he should speak to the Tournament Director or Affiliate Partner to check for additional requirements, such as meetings or calls before the event. The estimated training time is four to six hours.

Volunteer Minimum Age Requirement

FIRST requires that *FIRST* event volunteers be at least 13 years old, however, the Regional Planning Committee can increase the age requirement as needed. Adult volunteers cannot have children with them while volunteering nor be responsible for supervising children at the event. Children under the minimum age are welcome at *FIRST* competitions with suitable supervision by someone other than a volunteer.

WTA and CSA Minimum Age Requirement

The minimum age allowed for a Control System Advisor (CSA) and a Wi-Fi Technical Advisor (WTA) is 18.

Bring a Friend!

Volunteers are a huge part of the *FIRST* Tech Challenge Program and continuing to inspire students to seek out careers in science, technology, engineering, and math (STEM). *FIRST* Tech Challenge needs your help in recruiting new volunteers to keep our programs thriving for future generations! If you have a friend or co-worker you think would be interested in volunteering at an event, there are just a few easy steps to help get them involved!

1. Check out our full list of [volunteer opportunities](#) online!
2. Have them apply for the event in the [Volunteer Registration System](#). Volunteers must be screened before volunteering.
3. Have them contact FTCTeams@firstinspires.org with any questions they may have.

If they are concerned about jumping in headfirst, no worries! Job shadowing at a *FIRST* Tech Challenge event is a great way to get a taste of what a full day's worth of competition looks like. New volunteers can discover ways they can fit their personal skills into a volunteer position!

Pre-Event Day Responsibilities

It is important that before the event, the Control System Advisor reviews the CSA Manual and reads the supporting documents listed in the checklist below. These training materials will help CSAs learn how to provide effective technical support to teams.

The training materials provide the technical knowledge needed to help teams with robot and robot control system issues as well as CSA responsibilities at an event. The scheduled CSA discussion calls provide an opportunity to ask questions and share ideas and feedback with other CSAs. Learning about the role ahead of time will go a long way towards keeping the event running smoothly and on time.

The knowledge needed to master the *FIRST* Tech Challenge technology requires specialized study. The robot electronics and behaviors are unique to the *FIRST* Tech Challenge program and completing the pre-tournament checklist below will help CSAs prepare for their important volunteer role and help assure a fun and successful tournament day for teams. The document names that are underlined are hyperlinks to public documents on the *FIRST* Tech Challenge website. The remaining documents are stored in the Schoology learning management system.

Outlined below are the responsibilities a CSA should complete before event day. Make sure to check with the Tournament Director to see if they need help setting up before the event.

- Read this manual and complete all checklists. An electronic or printed copy of this guide will be helpful on tournament day for the technical element references it provides.
- Read the [Control System Troubleshooting Guide](#), which explains how to troubleshoot common problems with the *FIRST* Tech Challenge Android-based control system. An electronic or printed copy of this guide will be helpful on tournament day for the technical element references it provides.

- Read the [FIRST Tech Challenge Wireless Event Guide](#) and [Wireless Event Checklist](#) in case you are asked to help assess and oversee the Wi-Fi environment.
- Read the [Wi-Fi Technical Advisor Manual](#) if you will also cover this important volunteer role.
- Read the [FIRST Tech Challenge Robot Wiring Guide](#).
- Watch the [FIRST Tech Challenge Game Animation/Video](#). Focus on understanding what the teams are trying to accomplish during a match and the names of the playing field elements.
- Download the [Game Manual Part 1](#) and read section 5 to become familiar with the tournament terminology and structure. It would be beneficial to also read section 8 for the robot construction rules and the [Game Manual Part 2](#) to learn the game rules.
- Take part in the monthly CSA discussion calls or listen to their recordings. The call schedule and recordings are in the Control System Advisor folder in Schoology.
- Read the Control System Advisor Discussion Forum in Schoology in the Control System Advisor folder. This is a discussion forum where volunteers can ask questions, or share tips and best practices with one another. FIRST staff will respond to posts and share tips and important technical information in this forum.
- Before event day, the WTA or CSA should conduct a wireless survey of the venue to make sure the wireless environment is clear and there are no Wi-Fi suppressors running. The FTA will perform this task if a WTA or CSA is not available. Coordinate this activity and share the results with the Tournament Director and the FTA. The CSA can use one or more pair of Android devices to measure the ping time in different areas of the venue and on different Wi-Fi channels of the spectrum.
- Select preliminary Wi-Fi channels for the Wi-Fi Direct robot communications and any other Wi-Fi Access Points needed to run the event based on the Wi-Fi site survey of the venue. Share the channel recommendations with the Tournament Director and the FTA.

Event Day Responsibilities

Tournament Set-Up Day for the CSA

- Dress for the day includes safety glasses or side shields on shatterproof prescription eyeglasses as they are required around the competition playing fields and in the pit areas. Comfortable clothing that will allow you to move easily and closed-toed and closed-backed shoes that will not harm the foam playing fields floor covering is also required.
- Tournament set-up generally occurs on the day before the competition. Setting up the competition area and testing the wireless environment normally takes two to three hours for a single field event and three to four hours for a two-field event, although those times will decrease with experience. If a WTA is not available, the CSA or FTA will survey the wireless environment in the competition area and practice area. It is helpful to have a pair of Android devices running the FIRST Tech Challenge apps (*FIRST Tech Challenge Driver Station* and *FIRST Tech Challenge Robot Controller*) to test the wireless environment on the field.
- Be sure to have all passwords of the computers or devices being used, if applicable.
- The Android-based robot control system does not need any centralized control infrastructure. Teams will bring their own driver stations and robot controllers to the event which will help to avoid troubleshooting wireless issues immediately before an event. Feel free to contact the on-call technical support person if there are any problems with the setup or the wireless spectrum on event day. The

FIRST Tech Challenge Affiliate Partner or the Tournament Director will have the telephone number for the on-call Technical expert. Ask for this telephone number before you need it and have it handy.

Event Day for the CSA

- Arrive early; the CSA should be one of the FIRST volunteers to arrive on event day.
- If the event does not have a WTA, the CSA or FTA should verify the reserved wireless channels for the competition are clear and that low ping times are observed for a test robot controller-driver station (RC-DS) pair running on these channels.
- Help with field inspection when not helping a team.
- The rest of the day will be spent helping teams that are in the queue preparing for their match, or those who have technical issues that cannot be resolved by an FTA. Note that even though the CSA's role is to provide more in-depth technical support to teams and mentors, the CSAs should still prioritize support issues to make sure they are addressing the most critical issues in a timely manner to help as many teams as possible.
- The CSA might also be consulted to troubleshoot potential wireless issues, such as wireless interference or possible malicious activity on the wireless spectrum.

Suggested Event Day Equipment & Document List for the CSA

- Safety glasses.
- Closed-toe and closed-back comfortable shoes (that will not damage the field).
- Small battery-powered flashlight or headlamp.
- Multifunction Voltmeter/Ammeter/Ohmmeter with probes.
- Needle nose pliers.
- Multi-bit screwdriver (with various-sized Philips and slotted style bits).
- TETRIX-compatible tool kit.
 - TETRIX hex key set (Pitsco Part #W39104, sizes 7/64", 3/32", 5/64", and 1/16").
 - TETRIX Max wrench set (Pitsco Part #W38001)
- REV Robotics-compatible tool kit (REV Part #'s 41-1376, 41-1377, 41-1374, and 41-1119).
 - Metric hex key set (including 1.5mm and 2mm keys).
 - Metric 5.5mm nut driver.
 - Metric 5.5mm combination wrench.
- A pair of ZTE Speed (or other compatible) Android phones.
 - Current FIRST Tech Challenge Driver Station App installed on one phone.
 - Current FIRST Tech Challenge Robot Controller App installed on the other phone.
 - Current Channel Change App installed on Robot Controller phone.
 - Wi-Fi Analyzer app (available from the Google Play Store) installed on Driver Station phone.
- Laptop with Android Studio, FIRST Tech Challenge SDK and an enhanced editor like [Notepad++](#) installed.
- USB Flash drive with current FIRST Tech Challenge apps (Driver Station, Robot Controller, and ZTE Speed Channel Change).
- Hard copy or electronic copy of the CSA Manual.
- Hard copy or electronic copy of the Control System Troubleshooting Guide.
- Hard copy or electronic copy of the Wi-Fi Event Checklist.

Non-Allowed Wi-Fi Communication

This rule is in the [Game Manual Part 1](#). It is important for the CSA to read and understand this rule and how to interpret potential violations.

<T4> No team, team member, or tournament attendee is allowed to set up their own Wi-Fi 802.11 (2.4GHz or 5GHz) wireless communication in the venue. Non-allowed wireless communications include, but are not limited to:

- a. Cellular hot spots (for example, cell phones, tablets, MiFi).
- b. Ad-hoc networks.
- c. Nintendo DS peer-to-peer.
- d. Bluetooth communication with robots in the competition area.



No team, team member, or tournament attendee shall interfere with a team's Wi-Fi Direct® communication with their own robot.

The penalty for violating rule **<T4>** is disqualification of the entire team from the tournament and their removal from the venue property. Teams may not appeal the penalty and no refunds will be given for registration fees, prepaid meals, etc. *FIRST* may conduct a post-tournament review and decide if any added penalties will be imposed on the offending team.

Teams are encouraged to report wireless security vulnerabilities to the Field Technical Advisor (FTA) at a tournament. Teams should always keep in mind Gracious Professionalism®, and therefore only report valid and verifiable violations of this rule. After the Field Technical Advisor is alerted of a potential rule violation, he or she will confer with the Head Referee. The Field Technical Advisor and Head Referee will further explore the potential violation of this rule. The Head Referee will work with *FIRST* Headquarters staff to find out if rule **<T4>** has been violated, and to disqualify the offending team.

<T4> Rule Interpretation

The Head Referee will work with the FTA, CSA, and WTA to determine the cause of any un-allowed Wi-Fi communications and to decide if the rule has been violated. Finding the source is an important step when notified of a possible violation of this rule. There are times when an audience member could accidentally violate this rule, without knowledge or intent to cause harm. It is important for the FTA, WTA, CSA, and the Head Referee to evaluate the situation and to decide whether the interference was intentional. The final determination to disqualify a team or not will rest with the Head Referee with the guidance of *FIRST* Headquarters staff if the Head Referee's recommendation is to disqualify the offending team.

<T4> & <T5> Rule and the Robot Controller Hosted Development Tools

The *FIRST* Tech Challenge Blocks Programming Development Tool and *FIRST* Tech Challenge OnBot Java Programming Tool lets teams use a web browser to edit their op modes directly on the Robot Controller. The tool is hosted by the robot controller and it requires that a team connect their laptop to the robot controller's Wi-Fi Direct network. This Wi-Fi Direct network is the *same* wireless network the driver station uses to communicate with the robot controller. The use of the *FIRST* Tech Challenge Blocks Programming Development Tool or *FIRST* Tech Challenge OnBot Java Programming Tool does not violate rule **<T4>** or **<T5>** as long as this is done in the pit area, and not the competition area.

Match Replays

The most important role of the FTA is correctly diagnosing the problem and working with the Head Referee to decide if the issue will cause the match to be replayed. The FTA will likely consult with the WTA and/or CSA when wireless interference is suspected. Matches should be replayed if the issue or problem can be **absolutely traced back to excessive wireless interference**. Issues caused by the team's robot do NOT warrant a match replay.

Rule <G26> in the Game Manual Part 2 addresses match replays:

<G26> Match Replay – Matches are replayed at the discretion of the Head Referee only for a failure of a non-team supplied game element or verified Wi-Fi interference that was likely to have impacted the outcome of the match.

Unexpected robot behavior will not result in a match replay. Team-induced failures, such as low battery conditions, processor sleep time-outs, robot mechanical/electrical/software/communication failures, etc. are NOT valid justifications for a replaying of a match.

If a match does need to be replayed, the FTA, WTA, and possibly the CSA must present their case to the Head Referee as soon as possible. The Head Referee will make a final decision on the replay of the match.

CSA Robot Triage

If there is a robot issue on the field the FTA cannot resolve in a timely manner, the team who is experiencing the issue will be directed to the CSA for support. The CSA should work with the team off the field and away from the competition area to help diagnose and resolve the technical issues. When problems arise, the CSA should troubleshoot with the following guidelines:

- Talk with members of the affected team.
- Recommend corrective action to the team.
- Check the status of the robot by visual inspection of the robot, the robot controller, and the driver station.
- Check the status of the robot by viewing the log file on the robot controller and possibly on the driver station. Note that this might require (with the team's permission) the CSA connect the Android devices to a laptop.
- Check the voltage level of the robot controller, driver station and main robot battery.
- Check the wiring of the electronic modules.
- If necessary, look at the source code of the team's op modes.

Consult the Control System Troubleshooting Guide for details on the available tools that can be used to troubleshoot a problematic robot.

The CSA may spend extended time helping a team, but if there are multiple teams who need in-depth assistance, the CSA should rank the issues and try to provide support to as many teams as possible.

While the CSA is working with the team, they should suggest the other members of the team watch the match schedule while they are troubleshooting the problems with the robot.

Even if the robot cannot function, it is important that at least one team member be in the competition playing field alliance station for each match. If not, they will not be credited with the results of the match. In some case, just having the robot on the field can score points even if it does not function.

Dealing with Team Issues/Concerns

One of the CSA's responsibilities is to decide if unexpected robot behavior is caused by a problem with the Android-based control system, robot, or the Wi-Fi environment. Tell the FTA and the affected team (s) once the source of the problem is identified. When robot error is the cause of the unexpected match behavior, it is important the CSA explain to the team exactly what caused the problem and if time allows, suggest a course of action to fix the robot. Spending several minutes helping a team will make a huge difference in the team's event experience. It is best to identify the source of the problem, share your findings with the team, and listen to the team's feedback. The CSA's role at an event is to provide more in-depth support to teams than the FTA has time to offer. If multiple teams need help, then the CSA will need to prioritize the cases and work efficiently to try to provide in-depth technical support for all the affected teams.



The CSA's job is to help teams with their robot's technical issues, not a person to answer and take complaints. There are ways to present issues to a team that helps them to solve their issue or accept the match play ruling that can make your life easier and make the teams feel that you are there to help them solve their problem. Simply listening to a team's issue is often what is needed to smooth over a situation.

Common questions asked by teams and suggested responses are shown below:

Q1: Why aren't you going to replay that match?

A1: *There are only certain situations that warrant replaying a match. Unless we can prove that it was a field fault or Wi-Fi interference, we cannot replay a match.*

Q2: Why did you replay a match for someone else, but not us?

A2: *Explain the team's situation versus the other situation. How were they different?*

Q3: Why won't you fix that score? We have video (or photographs) to prove the score is wrong! (This is not a question for the CSA to answer, but one for the Referee to answer officially. Scoring questions should always be deferred to the Head Referee).

A3: *Direct the team to the question box so they can discuss this issue with the Head Referee. Note that referees cannot accept video replay as per Section 4.3, Rule <T3>, a - The Referees may not review any recorded match plays or pictures.*

Q4: Why don't you fix/cleanup the wireless environment? It's obvious the wireless environment is disruptive and causing disconnects.

A4: *We have been overseeing the field's wireless channel throughout the day and then state the relevant facts about the wireless environment for the tournament.*

Q5: The Referees scored our match wrong or they put the wrong score into the computer. (This is not a question for the CSA to answer, but one for the Referee to answer officially. Scoring questions should always be deferred to the Head Referee).

A5: *Teams may formally protest a match for a period of time not to exceed three matches following the match in question. If a team wants to dispute a score, one student representative should wait patiently in the designated Question Box area for the Head Referee (do not interrupt matches for this conversation). If the Referees agree that they made a mistake, they can correct it. If the Referees are confident in their score, the team should accept that decision.*

End of the Day

At the end of the day, walk away from the event knowing you have done your absolute best to be an exemplary role model and provide in-depth technical support to ensure that the competition runs smoothly for all teams. These are the most important goals of the CSA position.

Appendix A – Resources

Game Forum Q&A

<http://ftcforum.usfirst.org/forum.php>

Anyone may view questions and answers within the FIRST® Tech Challenge Game Q&A forum without a password. To submit a new question, you must have a unique Q&A System User Name and Password for your team.

Volunteers that apply for a specific volunteer role will receive an email from FTCTrainingSupport@firstinspires.org with their username and password to the forum. You will receive access to the forum thread specific to your role.

FIRST Tech Challenge Game Manuals

Part 1 and 2 - <https://www.firstinspires.org/resource-library/ftc/game-and-season-info>

FIRST Headquarters Pre-Event Support

Phone: 603-666-3906

Mon – Fri

8:30am – 5:00pm

Email: firsttechchallenge@firstinspires.org

FIRST Tech Challenge Event On-Call Support

*These numbers are available for event personnel only. Please **do not** call these numbers if you are a team looking for a ruling, a decision, or help. We trust that you will not misuse this resource.*

Day of Event Robot Control System, and Scoring System Support: 603-206-2450

All other Day of Event support: 603-206-2412

FIRST Websites

FIRST homepage – www.firstinspires.org

[FIRST Tech Challenge Page](#) – For everything FIRST Tech Challenge.

[FIRST Tech Challenge Volunteer Resources](#) – To access public Volunteer Manuals.

[FIRST Tech Challenge Event Schedule](#) – Find FIRST Tech Challenge events in your area.

FIRST Tech Challenge Social Media

[FIRST Tech Challenge Twitter Feed](#) - If you are on Twitter, follow the FIRST Tech Challenge Twitter feed for news updates.

[FIRST Tech Challenge Facebook page](#) - If you are on Facebook, follow the FIRST Tech Challenge page for news updates.

[FIRST Tech Challenge YouTube Channel](#) – Contains training videos, game animations, news clips, and more.

[FIRST Tech Challenge Blog](#) – Weekly articles for the FIRST Tech Challenge community, including Outstanding Volunteer Recognition!

[FIRST Tech Challenge Team Email Blasts](#) – contain the most recent FIRST Tech Challenge news for Teams.

Feedback

We strive to create support materials that are the best they can be. If you have feedback about this manual, please email firsttechchallenge@firstinspires.org. Thank you!