



FIRST FORUM GLOBAL

The FIRST GLOBAL FORUM is an online conference aimed at FRC teams, covering the areas of Outreach and Robot.

The meeting aims to answer questions about awards and competition dynamics from mentors and members of other teams. As a result, teams receive extra support for the next season, and are able to share expectations and knowledge, strengthening the connection within the FIRST community.



OUTREACH

FIRST IMPACT AWARD

The FIRST Impact Award is FIRST's most prestigious award and recognizes the team that best represents a model for other teams to follow, embodying FIRST's mission. It values actions that transform culture, promoting respect for science and technology and encouraging young people to become leaders in these areas. The award highlights teams that spread FIRST's message through impactful projects, and registration is required to compete and advance to the world championship level.

All the rules for submitting this award are available on the FIRST website. The link to this page and all other websites and links mentioned will be available at the end of the document.

IMPACT TIPS

1. It's interesting to discuss with your members and mentors what line of reasoning they will follow when writing the Impact article;
1. During the World Championship, you and your team may feel that you are in a more serious environment compared to the Regionals in Brazil, so for those teams that are not yet fully confident in their English, practice a lot with each other and try to imagine some questions that may be asked during the presentation to know how to answer them.



DOCUMENTATION

Although submitting documentation is not mandatory, teams are encouraged to do so, demonstrating that their actions are planned and organized. Winners of this award say that preparing organized documentation is crucial for a good result in the FIRST Impact Award. Therefore, there are some points to consider for a good result:

Plan and organize your paperwork throughout the year, not just during peak season;

Include only the documents related to the actions mentioned in your essay; documents related to actions not mentioned will not be considered.

Try including photos in your documents to appear more authentic during the evaluation process.

TIPS DOCUMENTATION

Document everything (date, description, photos) throughout the entire year. If there are no records, the event "did not happen" for evaluation purposes.

1. Always include photos. They provide veracity and help judges visualize the true scope of the project.
2. Use documents that serve as guides for the coming years, ensuring that the project does not lose its essence even with changes in members.



ESSAY

The essay is the first contact the judges will have with your team, making it an extremely crucial element in the evaluation. The essay should form the basis of your presentation and an introduction to your team. Winners from previous seasons have shared some tips on how to facilitate this process:

FIRST provides several resources on its website to assist with the writing process, including essays and videos from previous winners;

Start by brainstorming your ideas about the structure and which points you will include in the essay. After that, select the best ideas and organize the order of each topic in your essay.

The more opinions and feedback your team receives, the better the result will be, so after writing the first version or draft of your essay, show it to your team members, such as mentors, alumni, and other trusted teams;

Proofread your essay several times, because in addition to checking for spelling errors, these readings can help the team when answering the judges' questions.

TIPS FOR WRITING

1. Start by brainstorming ideas and organize the topics chronologically. This makes it easier to understand the story for someone unfamiliar with it.
2. Study essays and videos from previous winners on the FIRST website to understand the expected level of detail;
3. Don't keep the text just for the presenters. Show drafts to mentors, alumni, and other teams. An outside perspective helps identify blind spots.
4. Proofread the final version thoroughly. This ensures there are no spelling errors and prepares the team to answer questions confidently.

PRESENTATION AND QUESTIONS

- The presentation is the time for you to go into detail about your team, therefore:

Define the presentation style, whether it will be formal, interactive, dynamic, or other;

Don't repeat the same details from your essay in the presentation; just highlight the most important points.

If the presentation involves memorized lines, rehearse frequently (without becoming exhausted) and make sure all presenters know their lines;

The last 5 minutes in the room are reserved for questions from the judges, so for better preparation, access the lists of questions provided by other teams and discuss what you would answer to some of them;

- For teams whose native language is not English, set aside time each day to practice English; consistent practice will build confidence in your presentations.

It's important that as soon as your team leaves the presentation, you write down all the questions asked in the room, using them as practice for future years;

Remember also that the judges are not your enemies; they are not there to judge your mistakes and successes. Just like you, they are passionate about robotics and want to celebrate FIRST in the best way possible.



TIPS FOR PRESENTING AND ASKING QUESTIONS

1. Decide if the presentation will be formal, interactive, or dynamic. The important thing is to show the "soul" of the team and how you share your hearts and projects;
2. For international competitions, the environment is more serious and pressured. Practice the language daily to gain confidence and avoid communication errors that could hinder your message.
3. The judges' questions are crucial. Practice with lists of questions from other teams and discuss the best answers as a group.
4. As soon as you leave the room, write down everything that was asked. This is the most valuable training material for the upcoming seasons.
5. Remember that judges are also passionate about FIRST. They are there to celebrate your work, not to look for errors;



ENGINEERING INSPIRATION

The Engineering Inspiration Award recognizes teams that excel at inspiring interest in engineering, science, and technology both within and outside of competitions. It values initiatives that positively impact the community, such as educational projects, social actions, events, and partnerships that encourage others to learn about and participate in the STEM world. This award demonstrates that robotics goes beyond building robots, highlighting teams that share knowledge, promote inclusion, and help expand engineering to new generations.

MATERIALS

- Many teams use supporting materials when presenting PIT awards, such as:

Portfolios and books. These materials are used to explain the robot and the team's Sustainability Plan. In addition, many teams also print their sponsorship plan to demonstrate organization to the judges;

Menus and Banners. Menus are A4 or A3 sized sheets containing photos and short texts. Meanwhile, banners are much larger, almost the size of the sides of the PIT (Performance Evaluation Tool). Both materials assist in the evaluation process, helping your team remember certain topics through keywords, and also contain photos that lend authenticity to your team's work.



TIPS FOR ENGINEERING

- Focus on projects that improve each year and that can be shared;
 1. Some teams opt for rigorous daily training during the season, while others focus on building a narrative that speaks to the heart to demonstrate the purpose and passion for robotics;
 2. Because it's a difficult award with many criteria, dedicate time to learning everything that benefits the team and how to operate within this sustainable dynamic.
 3. In international competitions, judges tend to focus heavily on numbers, concrete data, and measuring impact;
 4. In national competitions, the focus is usually more on the purpose of the project, the impact it generates, and the story the team wants to tell;
 5. Transforming projects into teaching tools and sharing the team's genuine feelings impresses the judges;
 6. Clearly demonstrate how engineering is used to strengthen the community and what the team's vision is for the future of these projects.



ROOKIE ALL - STAR

The Rookie All-Star Award recognizes rookie FIRST teams that, in their first year, demonstrate the organization's core values. The award highlights teams with effort, passion, good organization, efficient communication, and a strong team spirit. The evaluation focuses on the real and sustainable impact of projects on the community, the potential for continuity of actions, the team's clear identity, and its evolution throughout the season, valuing growth potential more than initial perfection.

ROOKIE TIPS

Putting a lot of passion into your project is key. Being a Rookie means you're new to the FRC world and don't know everything yet, so putting a lot of passion into what you're saying shows the judges the FRC spirit that's being created in your team, always being confident even when facing difficulties.

ASSESSMENT

- Just like Engineering, the Rookie All-Star award is also evaluated in the PIT, so the tips are basically the same. Just remember that in this award you must show the judges how you are already doing an extraordinary job, even as a rookie team, and show how your team aspires to continue evolving in the coming years.

DEAN'S LIST

The Dean's List is an award given to students who stand out not only for their results, but primarily for their dedication, leadership, continuous effort, and positive impact within and outside the team. It values passion for what they do, proactivity, the ability to overcome challenges, and commitment to personal and collective growth. More than an award, the Dean's List recognizes attitudes, learning over time, and the connections created during the journey, highlighting those who truly live and represent the values of robotics.

DICAS DEAN'S LIST

1. One way to tell your story is by showing all the passion that robotics has brought into your life, with great confidence and examples;
2. Another way is to show this in chronological order;
3. Work hard and demonstrate proactivity so that your team recognizes your efforts and all your hard work;
4. Be yourself, create a narrative that shows how you influenced all of this, what you did. The judges need to see your impact as a whole person.
5. Show through practical examples how your impact has changed someone's trajectory, extending beyond your community;
6. Show which social actions you actively participated in, as well as those you led, demonstrating how your involvement in team activities makes you a leader.

ASSESSMENT

- The evaluation begins with the documentation, answering questions in the template provided by FIRST. After that, during the tournaments, the competitor participates in a 30-minute interview, talking about themselves and the narrative that was constructed from the questions.

WOODIE FLOWERS

The Woodie Flowers Award recognizes mentors who excel at inspiring students through teaching, leadership, and example in robotics. It values those who encourage learning, creativity, and teamwork, going beyond the technical aspects. This recognition highlights the importance of mentors who motivate, guide, and help students grow both as competitors and as individuals, leaving a lasting impact on the team and the community.

WOODIE FLOWES TIPS

- 1.The essay should be written primarily with the mentor's impact on the team in mind, avoiding a focus solely on winning the prize;
- 2.It is crucial to understand that the mentor's effort and work are not erased if the prize is not won;
- 3.Describe the team's trajectory of evolution under the mentorship, showing how the team consistently progressed to reach the level of other competitive teams;
- 4.Describe how a mentor influences who students want to become in the future, encouraging personal development and the pursuit of a life purpose;
- 5.Emphasize the importance of the connections and friendships made during the process, showing that impact work generates human value beyond competition.

ASSESSMENT

- Woodie Flowers' evaluation is based on the essays that the contestants write about their mentor. From this, the winner of the prize is decided.

ROBOT

The area of robotics involves several aspects such as: mechanics, programming, Drive Team composition, and the mentor's role in caring for the robot.

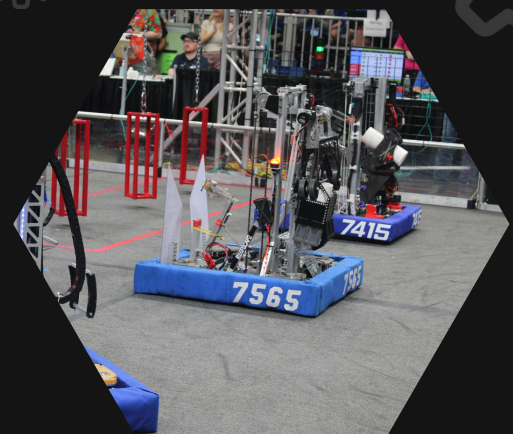
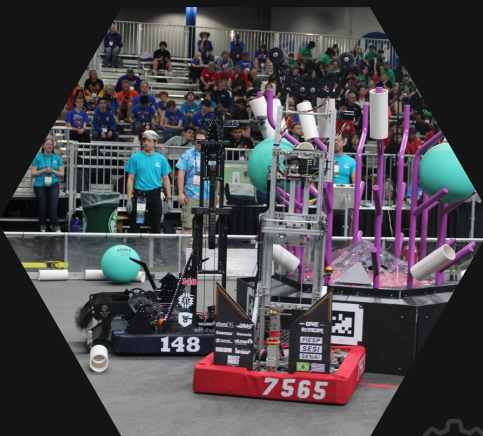
During the forum, we discussed the robot construction process, where it's clear that it will be different for rookie teams, as this will be their first experience building an industrial-scale robot. Due to these factors, several points should be considered for optimal results:

Focus on one subsystem or mechanism to improve; this ensures that the robot can perform at least one objective with excellence, standing out among others and complementing various other robots.

During the off-season, study the team's chosen schedule and the challenges and mechanisms used by other teams in previous seasons. Additionally, prepare everything for the season, such as assembling the drivetrain (chassis);

Hold meetings with other teams, learning from more experienced teams.

Furthermore, it's important to always pay attention to all the rules in the manual. As soon as you launch the challenge, read all the rules so you can understand what you can and cannot do with the robot, avoiding future time losses, such as discarding the current project due to an unread rule. Additionally, consider all aspects of the arena, from the materials to each individual component.



PROTOTYPING

The prototyping phase is of utmost importance, as it allows us to gain a detailed understanding of the interaction between the game pieces and the various mechanisms involved. The expert teams shared their experiences in the prototype assembly process.

First, it is recommended to carry out prototyping using 3D modeling software. This allows for obtaining precise measurements and a conceptual visualization of the project. This process allows for the evaluation and possible refinement of ideas related to the robot, which may result in the elimination or improvement of concepts;

Next, proceed with the construction of the physical prototypes. These models can be made from materials such as MDF, PTG, or repurposed parts. The assembly can be simple, mainly intended to represent the initial idea;

The purpose of prototyping is also to acquire information about the interaction of the game pieces with the mechanism, evaluating their effectiveness and analyzing potential maintenance challenges;

Create many prototypes and make as many mistakes as possible, striving for perfection.

For the robot to function, your team needs programming. To build good programming, your team should discuss the language your robot will use. The main language used by teams is Java through WPILib, a language supported by FIRST, which provides various documents on its website. In Brazil, the most used language is LabVIEW, due to the influence of team members, if any student or mentor is already familiar with LabVIEW, or Java/CPP. Another language is Python, which from 2024 will be the language supported by FIRST.

Prototyping Tips

1. Use recyclable materials (wood, cardboard, parts from previous years) to quickly validate ideas. Making mistakes at the beginning of the season is the secret to a winning robot in the end;
2. Don't just test if it "works." Test how much you can push the prototype to its limits before it breaks. Compare two different prototypes to create a superior third version.
3. One idea is to create a record of mechanisms from years past, like a database of past methods and what worked and what didn't. Many challenges repeat themselves, and the solution may lie in the past.

3D MODELING

The use of modeling enables assembly planning, providing a comprehensive view of potential interferences during the robot construction process. This helps identify situations where different systems are in contact with each other, as well as providing an accurate visualization of the robot's final product, preventing errors from occurring.

3D MODELING TIPS

1. Choose software that your team can learn quickly. SolidWorks is cited as intuitive for beginners, while Onshape facilitates collaborative work in the cloud;
2. Use the software (Onshape or SolidWorks) not only for designing, but also for predicting physical conflicts and facilitating manufacturing.

PID

Eliminating errors often presents several possible solutions, whether through mechanical adjustments, such as the implementation of limiters, or in programming, through the use of sensors. The underlying logic must ensure that the robot has a solid reference point in order to minimize the occurrence of errors. The integration of the PID controller is highly recommended due to the robustness it provides to the robot's mechanisms, conferring speed and precision, characteristics of extreme importance in the FRC competition. It is important to highlight the fine-tuning of the PID, which can be achieved through graphical user interfaces (GUIs) and iterative experimentation.

PID TIPS

1. Before deploying the code to the actual robot, use simulators to validate the PID constants and avoid damaging the hardware;
2. Automation (such as automatic alignment for scoring) relies on a well-calibrated PID so that the driver can be confident that the robot will respond exactly as expected.



SELF-EMPLOYED

In the autonomous phase of the game, the robots are prepared to perform specific tasks, such as moving objects, navigating a course, or performing actions that are part of the tournament challenge. At this point, they need to function independently, without direct human intervention, relying on sensors and autonomous algorithms to accomplish the tasks assigned to them.

Understand your robot's capabilities and take them into account when building an autonomous robot, always trying to utilize its best features;

Schedule a second autonomous unit (if there's time). This way, your team will be versatile and able to adapt to different strategies.

The key to autonomous robots is consistency. Tools that help achieve this include sensors, cameras, or encoders. It's extremely important that the robot collects as much information as possible to aid in this consistency.

TIPS FOR FREELANCERS

1. First, secure the exit points for the initial zone and for a delivered part before attempting multi-part routines;
2. Program the robot to abandon an action if it takes too long. This prevents it from getting stuck trying to pick up a fallen piece.
3. Have at least three options on the Dashboard: one standalone option for the right, one for the center, and one for the left of the field;
4. Use PathPlanner to draw smooth turns. Fluid movements save time and battery compared to sharp turns and abrupt stops.

PATHPLANNING

In many teams, path planning plays a vital role in the autonomous performance of robots. A widely recognized resource by these teams is pathplannerLib, a tool frequently used in Java programming. This library plays a critical role in creating effective trajectories, ensuring that the robot executes its autonomous actions with the necessary precision.

Pathplanning Tips

1. Use tools like PathPlanner not only for autonomous purposes, but also to create automated routes during teleoperation;
2. Java is widely recommended because it is more accessible, has a larger support community, and facilitates collaborative problem-solving with other teams.
3. As members graduate, document the code and use the off-season to teach new programmers how to combine existing skills with new tools.

ODOMETRIA

The use of odometry is a technique that allows the robot to determine its position in the arena, providing valuable information for the execution of other programs. It is important to note the potential accumulation of errors that can occur, for example, when a wheel spins incorrectly. In this case, cameras or sensors play a crucial role in correcting these errors and ensuring the accuracy of the robot's location.

Odometry Tips

1. Use high-precision encoders on the motors (or external encoders like the CANcoder) to measure wheel displacement;
2. Don't rely solely on encoders (they can slip). Use the Limelight or Orange PI with AprilTags to periodically "correct" the odometry position;
3. Ensure the odometry loop runs quickly and steadily. If the robot freezes for even a millisecond, the actual position will differ from the position in the code.
4. A mechanically strong base prevents the wheels from losing contact with the ground, which "tricks" the odometry calculations;
5. A mechanically strong base prevents the wheels from losing contact with the ground, which "tricks" the odometry calculations.

MANUFACTURING

After planning and prototyping the robot, it's time to build it. The teams shared their process during this period and the ways they carry it out:

The main form of manufacturing is CNC, due to the speed it provides;

They also utilize milling machines, bench drills, lathes, and laser/plasma cutting machines, keeping in mind the need for fast manufacturing and excellent quality;

Some teams also have partner companies that produce parts that the team cannot manufacture, always taking into account the delivery time of the parts;

- To optimize time, we divided the team into subsystems, such as: gripper, intake, drive train, etc. Remember to maintain communication so that no system interferes with another or occupies the same space;
- For all these tips to work, staying organized is crucial.

MANUFACTURING TIPS

1. A flawless electrical system isn't just about aesthetics; it prevents fatal failures and increases your chances of being chosen for an alliance. The robot must be "rugged" to withstand the arena;
2. A practical technique is to lift the robot 30 cm off the ground and drop it. If anything breaks or comes loose, it's not ready for competition;
3. The foundation must be perfectly precise with millimeter accuracy. If the lower structure is solid and heavy (in the case of tension foundations), everything built on top will function better.

SCOUTING

Scouting plays a crucial role for a team, helping them make the right choices when forming alliances and providing valuable information about the robots competing in the arena. This process involves collecting data during matches, and often the students themselves use customized apps and tools for this task. One example of an effective tool is Google Sheets, which makes organizing the collected data much easier. Additionally, another way to conduct scouting is by visiting the PIT areas, where it's possible to talk directly to the teams and obtain important information about their robots. To ensure successful scouting, it's essential to consider the following:

Research various scouting strategies, including holding meetings with other teams;

Prepare an organized and efficient strategy for data collection;

To make scouting other teams easier, create a portfolio or menu with key information.

SCOUTING TIPS

1. Go beyond "the robot looks good". Use spreadsheets (Excel/Forms) to count exact points, cycles per match, and climbing successes;
2. Use the average score to simulate matches. This helps you decide whether your strategy should focus on winning the match or securing Ranking Points (RP) in difficult matches.
3. In the playoffs, data should be used to win the game at all costs, assessing risks and the consistency of partners.
4. Don't just note how many points the team scores ideally. Observe how the driver reacts defensively or when the robot malfunctions. If the driver loses emotional control or the robot "freezes" after a hit, this team is a risk in high-intensity finals.
5. Instead of simply counting the total number of pieces, use a stopwatch to measure how long it takes the team from the Loading Station to the scoring point. A team that completes 5 quick cycles is much more valuable to an alliance than one that takes 7 slow cycles and "blocks" the others' path.

LINKS

- Informações sobre o Impact Award e redações anteriores:

- <https://www.firstinspires.org/resource-library/frc/submitted-awards>
- <https://www.firstinspires.org/resource-library/frc/first-impact-award-resources>

- ChiefDelphi (Plataforma que diversos times usam para compartilhar experiências e dúvidas):

- <https://www.chiefdelphi.com/>

- Perguntas dos juízes (Impact Award):

- <https://www.chiefdelphi.com/t/chairmans-questions-from-judges/155570>
- <https://www.chiefdelphi.com/t/2021-chairmans-award-questions/392393>
- <https://team3313mechatronics.blogspot.com/2014/03/what-do-chairmans-judges-ask.html>
- https://drive.google.com/file/d/126HNzcuUNzltBgDo4d_pK_r2WLADQZcu/view
- <https://www.adambots.com/wp-content/uploads/2021/11/2018-Chairmans-Questions.pdf>
- <https://quizlet.com/387109646/chairmans-interview-questions-flash-cards/>

- Perguntas sobre o Engineering Inspiration Award:

- <https://quizlet.com/495301104/engineering-inspiration-questions-flash-cards/>

- Perguntas relacionadas a todos os prêmios:

- <https://www.smithtownrobotics.com/wp-content/uploads/2017/02/2017PracticeJudgeQuestions-2.pdf> (Material feito pelo time #810)
- <https://roboticseducation.org/documents/2023/06/team-interview-tips-and-sample-questions.pdf/>

- Experiencia Rookie

- <https://pt.slideshare.net/cpolack/a-rookies-perspective-frc-judging-101> (Material feito pelo time #4064)

- Programação

- <https://docs.wpilib.org/en/stable/docs/zero-to-robot/introduction.html>

- Introdução ao PID

- <https://docs.wpilib.org/en/stable/docs/software/advanced-controls/introduction/pid-video.html>

LINKS

Information about the Impact Award and previous essays:

<https://www.firstinspires.org/resource-library/frc/submitted-awards>

<https://www.firstinspires.org/resource-library/frc/first-impact-award-resources>

ChiefDelphi (Platform used by various teams to share experiences and questions):

<https://www.chiefdelphi.com/>

- Questions from the judges (Impact Award):

<https://www.chiefdelphi.com/t/chairmans-questions-from-judges/155570>

<https://www.chiefdelphi.com/t/2021-chairmans-award-questions/392393>

<https://team3313mechatronics.blogspot.com/2014/03/what-do-chairmans-judges-ask.html>

https://drive.google.com/file/d/126HNzcuUNzltBgDo4d_pK_r2WLADQZcu/view

<https://www.adambots.com/wp-content/uploads/2021/11/2018-Chairmans-Questions.pdf>

<https://quizlet.com/387109646/chairmans-interview-questions-flash-cards/>

Questions about the Engineering Inspiration Award:

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Questions related to all awards:

(Material created by team #810) <https://www.smithtownrobotics.com/wp-content/uploads/2017/02/2017PracticeJudgeQuestions-2.pdf>

<https://roboticseducation.org/documents/2023/06/team-interview-tips-and-sample-questions.pdf/>

- -_Programation

<https://docs.wpilib.org/en/stable/docs/zero-to-robot/introduction.html>

Introduction to PID

<https://docs.wpilib.org/en/stable/docs/software/advanced-controls/introduction/pid-video.html>

ACKNOWLEDGEMENTS

We want to express our immense gratitude to all the teams that participated in the FIRST Global Forum. It was inspiring to see the exchange of knowledge between veterans and newcomers in the Outreach and Robot sessions. Thanks to the presence and willingness of each mentor and student to answer questions and share experiences, we strengthened our community and ensured that everyone starts the next season with much more support and confidence. Thank you for reinforcing the connection that makes the FIRST network so unique! See you in the pits!

- Robotics #7565





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