FIRST FORUM
LATAM

FIRST FORUM LATAM

The FIRST LATAM Forum was created with the purpose of sharing experiences and knowledge about FRC and FIRST around Brazil and the world. The forum takes place during the pre-season, where we discuss topics related to outreach, such as the FIRST Impact Award, Engineering Inspiration and the Rookie All-Star. In addition, we also discuss robot areas such as mechanics, electrics, programming and more.

OUTREACH

FIRST IMPACT AWARD

"The FIRST Impact Award (formerly the Chairman's Award) is the most prestigious award at FIRST, it honors the team that best represents a model for other teams to emulate and best embodies the mission of FIRST. It was created to keep the central focus of FIRST Robotics Competition on the ultimate goal of transforming the culture in ways that will inspire greater levels of respect and honor for science and technology, as well as encouraging more of today's youth to become science and technology leaders."

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

DOCUMENTATION

Although it is not mandatory to submit documentation, teams are encouraged to do so, proving that their team's actions well 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 a few points to consider for a good result:

- Plan and organize documentation throughout the year and not just during the season;
- Only include documents for actions mentioned in your essay, documents for actions not mentioned will not be considered;
- Try to include photos in your documents, so that they are more truthful when they are assessed.

ESSAY

The essay is the first contact the judges will have with your team and is an extremely crucial element in the evaluation, where the essay should be the basis of your presentation and an introduction to your team. The winners of previous seasons told us a little about how to make this process easier:

- FIRST offers a number of resources on its website to help with the writing process, including the essays and videos of previous winners;
- Start by brainstorming your ideas about the structure and what points should go into the essay, then 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 once you've written the first version or draft of your essay, show it to your teammates, mentors, alumni and other trusted teams;
- Reread your essay several times, because as well as checking for spelling mistakes, the readings can help the team when answering the judges' questions.

PRESENTATION AND Q&A

The presentation is the moment when you go into greater detail about your team, so always remember to:

- Determine the format of the presentation, whether it will be formal, interactive, dynamic and so on;
- Do not repeat all the same details from your essay in the presentation, just highlight the most important;;
- If the presentation involves memorized lines, rehearse frequently (without causing exhaustion) and make sure that all the 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 in some questions. (We will provide some links at the end of the document);

- For teams whose native language is not English, have a moment to practice English during the day, where constant practice will build confidence in the presentation;
- It is 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 the following years;
- Also remember that the judges are not your enemies, they are not there to judge your mistakes or successes, but just like you, they are passionate about robotics and want to celebrate FIRST in the best possible way.

ENGINEERING INSPIRATION

The Engineering Inspiration award recognizes and honors the team that has its own unique way of spreading science and technology in its community and around the world, contributing to the growth of the next inspiring STEM engineers and leaders. Engineering Inspiration is an award presented in the pits, so there are certain techniques to help facilitate the presentation:

- Find out what works best for your team, whether you prefer to rehearse a presentation or just recall the topics;
- The judges also ask questions, so some teams also make them available on Chief Delphi.

MATERIALS

Many teams use support materials when presenting their 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 out their sponsorship plan to show their organization to the judges.
- Menus and Banners. Menus are usually A4 or A3 size sheets containing photos and small texts. Banners, meanwhile, are much larger and almost the size of the sides of the PIT. Both materials assist in the evaluation process, helping your team to remember certain topics through keywords, and containing photos that bring veracity to your team's work.

ROOKIE ALL - STAR

The Rookie All-Star celebrates the Rookie team that exemplifies a young but strong partnership effort, as well as the implementation of FIRST's mission to inspire students to learn more about science and technology. Rookie Inspiration, on the other hand, celebrates the outstanding success of a rookie team in fostering respect and appreciation for engineering and engineers, both in their school and in their community.

EVALUATION

- Like engineering, the Rookie All-Star is also judged in the PIT, so the tips are basically the same, just remember that for this award you have to show the judges how you're already doing extraordinary work even though you're a rookie team and show how your team aspires to continue evolving over the next few years.

ROBOT

The robot area involves various aspects such as mechanics, programming, the composition of the Drive Team and the role of the mentor looking after the robot.

During the forum, we discussed the process of building the robot, where it is clear that it will be different for rookie teams, as this will be the team's first contact with an industrial-sized robot. Due to these factors, some points must be considered for an excellent result:

- Focus on one subsystem or mechanism to perfect, this ensures that the robot can do at least one objective with excellence, standing out among others and complementing several robots;
- During the off-season, study the team's chosen programming and the challenges and mechanisms used by other teams in previous seasons. Also, prepare everything for the season, such as assembling the drive train (chassis);
- Hold meetings with other teams, learning from more experienced teams.

It's also important to always pay attention to all the rules in the manual. As soon as you launch the challenge, read all the rules so that you have an idea of what you can and can't do on the robot, avoiding wasting time in the future, such as discarding the current project because of an unread rule. In addition, consider all aspects of the arena, from the material to each and every piece that composes it.
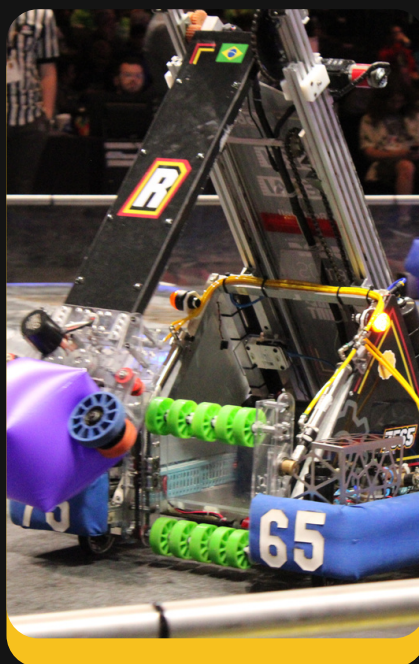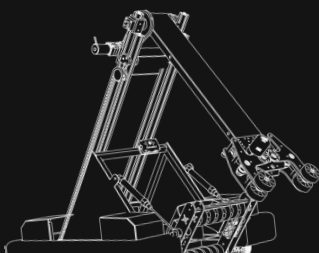
PROTOTYPING

The prototyping period is of major importance, as it enables us to gain a detailed understanding of the interaction between the game pieces and the various mechanisms involved. The specialist teams shared their experiences in the process of assembling the prototypes.

- Firstly, prototyping using 3D modeling software is recommended. This makes it possible to obtain precise measurements and conceptual visualization of the project. This process allows for the evaluation and possible refinement of ideas related to the robot, which can result in the elimination or improvement of concepts;
- Subsequently, proceed with the construction of the physical prototypes. These models can be made from materials such as MDF, PTG or reused parts. The assembly can be simple, intended mainly to represent the initial idea;
- The purpose of prototyping is also to acquire information about how the game pieces interact with the mechanism, assessing their effectiveness and analyzing potential maintenance challenges;
- Make lots of prototypes and make as many mistakes as possible to achieve perfection.

3D MODELING

The use of modeling makes it possible to plan the assembly, providing a comprehensive view of possible interferences during the robot construction process. This helps to 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.

PROTOTYPING

For the robot to work, your team needs programming. To build a good program, your team should discuss the language your robot will use. The main language that teams use is Java through WPILib, a language supported by FIRST, which provides several documents about it on its website. In Brazil, the most widely used language is Labview. This is due to the influence of the team members, if a 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.

PID

Eliminating errors often has several possible solutions, either 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.

The importance of fine-tuning the PID should be emphasized, which can be done using graphical user interfaces (GUIs) and iterative experimentation.

AUTONOMOUS

In the autonomous phase of the match, the robots are prepared to carry out specific tasks, such as moving objects, navigating a route 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 fulfill the tasks assigned to them.

- Get to know your robot's abilities and take them into account when building an autonomous one, always trying to use its best capabilities;
- Program a second autonomous (if there is time). In this way, your team will be versatile and can adapt to different strategies;
- The secret of autonomy is consistency. What helps in this task are sensors, cameras or encoders. It is extremely important that the robot collects as much information as possible to help with this consistency.

PATHPLANNING

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

ODOMETRIA

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

SCOUTING

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

- Researching various strategies for carrying out scouting, holding meetings with other teams;
- Preparing an organized and efficient strategy for data collection;
- To make it easier to scout other teams, put together a portfolio or menu with the main information.

MANUFACTURING

fter planning and prototyping the robot, it's time to build it. The teams shared their process during this period and the ways in which they do it:

- The main form of manufacturing is CNC, because of the time it provides;
- They also use milling machines, bench drills, lathes, laser/plasma cutting machines, with the aim of achieving fast manufacturing and excellent quality;
- Some teams also have allied companies, where they make parts that the team cannot manufacture, always taking into account the delivery time of the parts;
- To optimize time, we divide the team into subsystems, such as: gripper, intake, drive train, etc. Remember to maintain communication so that no system interferes with the other or occupies the same space;
- For all these tips to work, staying organized is crucial.

LINKS

- **Submission info about the impact, such as essays and videos:** https://www.firstinspires.org/resource-library/frc/submitted-awards
  - https://www.firstinspires.org/resource-library/frc/first-impact-award-resources

- **ChiefDelphi (The platform used by many teams to share experiences and questions):**
  - https://www.chiefdelphi.com/

- **Judges questions (Impact):**
  - 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:**
  - https://quizlet.com/495301104/engineering-inspiration-questions-flash-cards/

  - - **Questions related to all awards :**
  - 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/

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

-**Programming**
  - https://docs.wpilib.org/en/stable/docs/zero-to-robot/introduction.html

- **Introduction of PID:** https://docs.wpilib.org/en/stable/docs/software/advanced-controls/introduction/pid-video.html

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