CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Organizer and Founder:
FTC 16458
TechnoWizards

Sponsors:

NSF REU site: AI-powered Robotics in 5G Networks

Centers of Excellence in Engineering Education and Research at UTSA

NSF REU

CEEER Center for Excellence in Engineering Education Research

FIRST TECH CHALLENGE

This proceeding is a team effort of TechnoWizards (FTC #16458, San Antonio, TX) and seven other Central Texas FTC teams listed with an alphabet sequence concerning the team name.

Atomic Hawks (FTC #23665, Laredo, TX)

BASIS Some Assembly Required (FTC #21346, San Antonio, TX)

BASIS Batteries Not Included (FTC #18094, San Antonio TX)

LightSaders (FTC #12928, Austin, TX)

Mighty Hawks (FTC #18908, Laredo, TX)

Phoen-X (FTC #12115, University City, TX)

Tech Syndicate (FTC #21233, San Antonio, TX)

TechnoWizards (FTC #16458, San Antonio, TX)

We appreciate our conference advisor Dr. Yufang Jin, our parents, and all team members from TechnoWizards for their support to host this CenTex FTC conference.

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Publicity Chair: Justin Jin and Angela Zhang

Session Chairs: James Lu, Parker Olkowski, Ilias Bakri

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Conference Program: James Lu and Dr. Yufang Jin

Proceeding Cover Pages: Angela Zhang and Vincent Liu

Preface: James Lu

Abstracts and Presentation Editors: Vincent Liu, Isabel Xu, and Dr. Yufang Jin

CENTEX FTC CONFERENCE

LOCATION:
UTSA Main Campus BSE 2.102
Please Park in Lot C (Map attached in email)

ONLINE:
Zoom Meeting ID: 2102016458
No Password Required

PROGRAM COMMITTEE

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Dr. Yufang Jin

SPONSORS

Conference Schedule

1:00 – 1:10 pm	**Commencement Speech- Mr. Maanit Goel (NASA, Environmentalist)**	
1:10 – 2:10 pm **Navigating FTC Dynamics and Team Synergy** Session Chair: James Lu	1:10 – 1:25 pm	BASIS Some Assembly Required; **Teaching Students The Creative Process Through Trial and Error**
	1:25 – 1:40 pm	Mighty Hawks; **Implementing Teamwork: How Teamwork Benefits Mental Health**
	1:40 – 1:55 pm	Angela Zhang; **Sharing Experiences on Portfolio Presentation of FIRST Tech Challenge**
	1:55 – 2:10 pm	BASIS Batteries Not Included; **Beyond the robot: the spillover of FTC**
2:10 – 2:20 pm	**Mr. Joseph Beckman (FTC Program Coordinator for Central Texas)**	
2:20 - 3:35 pm **Empowering communities: Igniting Passion through Outreach** Session Chair: Parker Olkowski	2:20 – 2:35 pm	James Lu; **Improving Accessibility in Robotics: Application Beyond FIRST and its Significance**
	2:35 – 2:50 pm	Vincent Liu; **Strategic FTC Outreach - Enhancing Teams, Captivating Judges, and Achieving Success**
	2:50 – 3:05 pm	LightSaders; **How to Host an FTC Event**
	3:05 – 3:20 pm	Ilias Bakri; **Sponsorships FTC: Best Approaches to Solicit Possible Benefactors**
	3:20 – 3:35 pm	Phoen-X; **Nurturing Passion: Using FTC Mentorship to Cultivate Sustained Interest in STEM**
3:35 - 3:45 pm	**Break/Networking**	
3:45 – 5:00 pm **Exploring Design Excellence and Mechanical Ingenuity** Session Chair: Ilias Bakri	3:45 – 4:00 pm	Tech Syndicate; **Swerve Drive Train**
	4:00 – 4:15 pm	Atomic Hawks; **Design and Innovation: A Design Process to Increase Productivity and Reduce Stress**
	4:15 – 4:30 pm	Justin Jin; **Improvements of Autonomous and Tele-op on "Bruno"**
	4:30 – 4:45 pm	Parker Olkowski; **Initial Brainstorming: The Importance and Process to Creating an Successful Design**
	4:45 – 5:00 pm	Isabel Xu; **Mechanics Behind the Bot**
5:00 – 6:00 pm	**Conference End/Networking**	

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Preface

This edited volume signifies a milestone in the history of FIRST Tech Challenge (FTC) in Central Texas, encompassing abstracts and presentations from the First CenTex FTC Conference held in San Antonio, Texas, on August 19, 2023. The conference was conceived as a kickoff event for the 2023-2024 season, bringing together Central Texas FTC team members, spanning from 7th to 12th graders, to reflect on their experiences in the 2022-2023 season and collectively brainstorm best practices in design, programming, competition, outreach, fundraising, and portfolio preparations. Eight teams from Laredo to Boerne and from Austin to San Antonio attended the one-day conference.

The 1st CenTex FTC conference, organized by the world-ranking TechnoWizards (FTC #16458), involved eight team members collaborating to make it a success. Held on the campus of the University of Texas in San Antonio (UTSA), the conference was sponsored by the National Science Foundation's REU site: (2051113) and the Center for Excellence in Engineering Education and Research (CEEER) under the guidance of Dr. Yufang Jin at UTSA. The conference opened with a keynote speech by Mr. Mannit Goel, a NASA Environmental Engineer, emphasizes the national need for Science, Technology, Engineering, Art, and Mathematics (STEAM) talents and provides insights into steps young students can take to prepare for a career in science and innovation. Mr. Joseph Beckman, FTC Central Texas Coordinator, delivered the second keynote speech, sharing his decades-long experience as a computer science professional and his aspirations for FTC teams. Notably, in 2023, FTC in Texas has experienced growth, with the number of participants surpassing pre-pandemic figures, engaging over 30,000 students in transformative programs offered by FTC in Texas. Mr. Seth Lara, FTC in Texas Event & Logistics Coordinator, attended the conference and encouraged team members to anticipate another high-energy season.

The abstracts and presentations in this volume reflect the collective wisdom of more than 29 student speakers who underwent intensive preparation during their summer break. All presenters went through a rigorous process of abstract submission, review, revision, and finalization, as well as presentation submission and finalization before the conference. Post-conference, they also worked on editing and reformatting their presentations for this proceeding publication.

The first session of the volume focuses on "Navigating FTC Dynamics and Team Synergy." BASIS Some Assembly Required (FTC #21346) presenters underscore the importance of cultivating individual and team growth through trial and error, proposing a new outline of their team dynamic and process centering on more articulated team goals. Mighty Hawks (FTC #18908) members approach teamwork with a special focus on participants' mental health and the benefits of team interactions to improve mental well-being. TechnoWizards's Angela Zhang discusses the importance of portfolio presentation in the judge room, particularly how team members should coordinate their roles and underline achievements in a focused and convincing way. BASIS Batteries Not Included (FTC #18094) members explored the "spillover of FTC,"

elaborating on how they have helped build interests and teams through carefully designed outreach programs.

The second session, entitled "Empowering Communities: Igniting Passion through Outreach," starts with TechnoWizards' two presentations. James Lu establishes the importance of outreach and introduces a framework of innovatively designed programs that promote accessibility of robotics education. Vincent Liu discusses how strategic outreach helps enhance teams and develop captivating stories that enrich team portfolios. LightSaders (FTC #12928) team members take their own experience of organizing after-season events as an example to outline transferrable steps and strategies to materialize similar events. TechnoWizards's Ilias Bakri shares the best approaches to solicit possible benefactors, with a special emphasis on follow-ups that help build long-term relations. Phoen-X (FTC #12115) team member Maria Jimenez proposes using mentorship to cultivate and sustain interests in STEAM in under-resourced areas and schools.

The third and final session focuses on the technical aspects of the FTC experience, entitled "Exploring Design Excellence and Mechanical Ingenuity." Both Atomic Hawks (FTC #23665) and TechnoWizards's Parker Olkowski's presentations deal with the design process, with the former sharing their process targeting increased productivity and reduced stress, and the latter laying out a detailed design process that meets strict timelines yet is flexible enough to allow for innovation, adjustment, and collective cooperation. TechnoWizards's Justin Jin's presentation centers on programming and optimization of an FTC robot while explaining autonomy enhancements, finite state machine, and validation of the programming and design efficacy.

In a time of rapid technological development, we hope this volume will serve as a useful reference for all FTC participants, including students, coaches, mentors, volunteers, parents, and family members, to understand the comprehensive experiences that FTC offers. These experiences include technological advancement, business development, publicity and marketing, leadership and volunteerism, artistic expressions, etc., all centered around critical thinking and thinking outside of the box. We also hope this volume offers a window into FTC in Central Texas in 2023 for anyone interested in one of the most rigorous youth STEAM programs FTC has to offer to budding scientists worldwide. We appreciate the "village" that unfailingly supports us, yet each author takes full responsibility for any mistake in their presentation, understanding that failure and errors are valuable paths to effective learning. Thank you for spending time on this volume!

James Lu
General Chair of 1st CenTex FTC Conference
December 26, 2023

16458

CenTex FTC Conference

David T., Noah H., Vedansh M., Aarav P., Zhe-Wei L., Paul N., Frank L.

Team 21346 Some Assembly Required

Topic

FTC Teaches Students
The Creative Process
Through Trial and Error

Interests

- Medicine/Legos
- MTG
- Reading
- Coding
- Mangement
- Math
- Aerospace

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

FTC Teaches Students the Creative Process Through Trial and Error

BASIS Some Assembly Required

Team: 21346 Some Assembly Required, San Antonio, Texas, USA
Email: john.standifird@basised.com ryan.mendiondo@outlook.com

Significance: FIRST Tech Challenge teaches students from middle to high school how to iteratively attempt and evaluate new designs and strategies in order to achieve maximum efficiency in a collaboratively driven process. Prior to, and throughout, the season, teams work together and delegate tasks to brainstorm, conceptualize, and create different designs to solve a set of unique objectives. This process often incorporates the hallmarks of professional design software in the STEM community.

Methods: One of the most critical parts of this process is failure. Often, in both FTC Robotics and in the field of engineering, failing is a critical step in understanding and fixing weaknesses and flaws. Last season, our team was met with many setbacks and demotivating shortcomings. While this was demoralizing, it was also an invaluable experience. One of the struggles we encountered during our rookie year was an inefficient and uncoordinated design process due to a lack of communication, an insufficient amount of investment into the software aspect of the game, and a lack of cooperation, outreach, and fundraising due to the confusion of how to participate in this process along with our lack of coordination.

Results: While building there are many mistakes that can occur in FTC Robotics, by far the greatest is not learning from previous errors; a mistake we strived to avoid. After we finished the most recent season, we dedicated ourselves to learning and improving. One of the most crucial steps of this process was enhancing and deepening our team communication. We ensured that every member was in the team discord and delegated tasks to separate teams in order to work more efficiently. Additionally, we began hosting regular general and specific meetings to talk about a variety of topics, such as outreach, hardware design, and our plan for the upcoming season. This allowed us to strengthen our team bonds and work significantly more efficiently than we have in the past, allowing us to move into this next season more confident than ever.

Conclusion: Overall, we believe that the FTC experience allows students to learn and improve by continuously trying and reviewing their previous mistakes. Our vision is for other teams to not fear making mistakes while being wise to learn from them and implement the improved processes in their team strategy.

FIRST Teaches Students the Creative Process Through Trial and Error

David T, Noah H, Vedansh M,
Ryan M, Aarav P, Zhe L, Paul N,
John W, Frank L
Team: 21346
BASIS Some Assembly Required

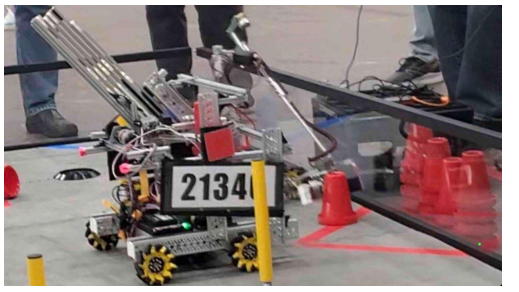
Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

CenTex FTC Conference, August 19, 2023

- What we did
- Why we did it
- How we did it
- Results & Discussions
- Q & A

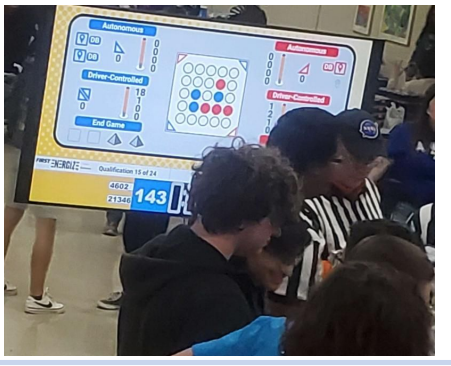
Time Management

- We failed to estimate the time needed to create the robot. In turn, it affected our schedule resulting in us having less time to practice.



Strategy

- The strategy we used for the game was fundamentally flawed and did not consider the amount of points for each task. Due to our lack of comprehension of the points system, we fell short of achieving the points we had hoped for.



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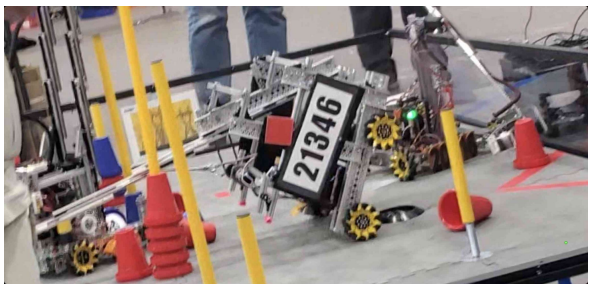
AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Planning

- The robot was not planned thoroughly and the decisions we made along the way deviated from the original plan. The planning stage was not clear to all members, which resulted in parts that did not work well together, which was disastrous for the final result.



Decisiveness

- The time spent was inefficient, leading to information not being distributed between members, which resulted in an incomplete, poor design.

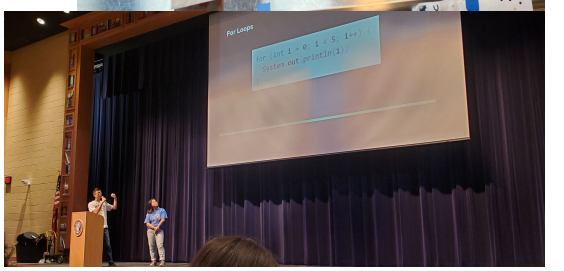
Title: FIRST Teaches Students the Creative Process Through Trial and Error
Presenter: David| 21346 BASIS Some Assembly Required

Budget

- The budget was very strict throughout the season. We weren't able to gain any sponsors nor did we do much outreach for money. The money we had wasn't able to get us the needed parts.

Outreach

- We spent so much time discussing the robot that we didn't focus on outreach. We planned to do outreach to different schools, but due to lack of cooperation, we were not able to execute our plans.



CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Team management

- We chose team leaders and we effectively assigned roles, but we did not stick to the plan. Leading up to competitions, our leaders took it upon themselves to work on the robot rather than delegate the work to everyone. We also had communication issues; leaders often didn't update the team on what they changed, so there was usually confusion on the status of the robot.

Title: FIRST Teaches Students the Creative Process Through Trial and Error
Presenter: David| 21346 BASIS Some Assembly Required

Strategy:

This upcoming year, we want to make a solid strategy depending on the game. We plan on making this immediately after kickoff and putting lots of thought into this as it will be our strategy throughout the season, though it will be adaptable. Specifically, we want to take into consideration the most efficient way to score, optimizing movement, and working efficiently with other teams.

Time Management:

We will improve our time management by estimating the amount of time everything will take. We will give ourselves hard deadlines to build and code the robot and time to practice for the actual competition.

Planning:

This year, we want to reduce the amount of time we put into theoretical planning. We want to CAD the robot and get to building as quickly as possible while maintaining the quality of it by communicating more efficiently. This ties back to strategy and time management.

Decisiveness:

We want to be more deliberate with all our decisions. We are improving our team management, which will help with being more deliberate in decisions. However, while we want to be as deliberate as possible, we want to prioritize our time based on the severity of the decision, i.e. spending more time on important decisions and less on unimportant ones.

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AGENDA | WHAT | WHY | **HOW** | RESULTS & DISCUSSIONS | Q & A

Team Management:

This year we are using separate group chats for each of the subteams (notebook, hardware, software). We are also holding several meetings online each week to discuss urgent topics, as well as to promote team bonding.

Budget:

This year, we are much more prepared monetarily by working on - and succeeding - in getting sponsors to fund various endeavors, such as getting more parts and paying fees.

Outreach:

Through reaching out to several companies for sponsorships, planning events at schools, and attending events such as this one, we are attempting to expand the ways in which we reach our community.

Title: FIRST Teaches Students the Creative Process Through Trial and Error
Presenter: David| 21346 BASIS Some Assembly Required

Problem Identification

- When the theoretical results do not match the observed results, a problem must have occurred. A team can identify a problem using a checklist of potential errors in the overall function of the robot or team function.

Strategy and planning

- A team should have a good, thought out plan to be able to work together.

Time management and decisiveness

- Teams should be on the same page with what they are doing and have a schedule.

CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Team Management

Teams should have good communication systems and leadership where nobody gets confused throughout the season. Teams should have a majority agreement to do anything that can significantly change a team's outcome and planning.

Budget and Outreach

Teams of all sizes and experiences should always seek funding opportunities, so they are not limited by resources.
A team should always be planning engaging events to connect with the community around them.

Title: FIRST Teaches Students the Creative Process Through Trial and Error
Presenter: David| 21346 BASIS Some Assembly Required

Significance:

All teams have flaws in how they operate, and minimizing them is crucial to success.

Process:

- 1st: Identify your mistakes and flaws.
- 2nd: Make changes to prevent the same mistakes.
- 3rd: Implement changes and reflect on them. Is it working?
- 4th: Repeat.

Conclusion:

Growth and improvement only occurs after mistakes have been made and learned from.

CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Q & A

Title: FIRST Teaches Students the Creative Process Through Trial and Error
Presenter: David| 21346 BASIS Some Assembly Required

16458

CenTex FTC Conference

Gerardo L., Karime S., Brandon N., Brian N.

Team 18908 Mighty Hawks

Topic

Implementing Teamwork: How Teamwork Benefits Mental Health

Interests

- Playing video games
- Programming
- Writing
- Basketball
- Building
- Photography
- Driving

CenTex FTC Conference

San Antonio, Texas, USA
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Implementing Teamwork: How Teamwork Benefits Mental Health

Brandon Nino, Brian Nino, Jerry De Llano, Karime Saldivar, and Mariana Benavides

Team: 18908 Mighty Hawks, San Antonio, Texas, USA
Email: marianabenavides855@gmail.com

Significance: One of the foremost values upheld by FIRST is teamwork. Teamwork entails the collaborative effort of a group striving to achieve a shared objective. It necessitates each individual within the group to support one another, both physically and mentally. FIRST actively promotes teamwork through various approaches, contributing to the success of each team. This includes task delegation, cooperative efforts during competitions, and the encouragement of collective brainstorming for optimal results. This emphasis on teamwork also aids in reducing individual stress, thus benefiting mental well-being.

Methods: To initiate, teams are tasked with assigning distinct responsibilities to each member. By segmenting tasks, the ultimate objective becomes more manageable. For example, in robotics teams, tasks such as programming, designing, building, and driving are divided to facilitate the creation of an exceptional robot. This division of responsibilities lessens the individual workload. During robotics competitions, effective teamwork is indispensable for achieving optimal performance. While teamwork remains vital at all times, its significance amplifies during competitions. The absence of teamwork within a team hampers concentration, potentially heightening individual anxiety levels. Thus, to foster a calm and focused environment, effective teamwork among team members is essential. Furthermore, FIRST encourages collaborative brainstorming among team members for various purposes, including design, coding, competition strategies, and more. This platform allows individuals to voice their opinions on specific topics, promoting equal participation in team decisions. This open communication fosters a positive attitude, facilitating better teamwork and, subsequently, contributing to positive mental health outcomes.

Results: In summation, within the spectrum of values that FIRST acknowledges, teamwork stands as one of the most pivotal. It signifies the harmonious integration of every team member's efforts toward accomplishing a defined objective. The concept of teamwork brings about numerous advantages. Notably, one of its profound impacts is the reduction of stress levels among team members. This expounds why FIRST emphasizes practices like task distribution, mutual support during competitions, and collaborative idea generation.

Conclusion: In essence, among the array of principles that FIRST holds dear, teamwork takes precedence as a fundamental value. This value encapsulates the synchronized endeavors of each team member to attain a specific goal. The manifold benefits of teamwork encompass stress reduction, which is particularly pertinent in the context of team dynamics. Hence, it's evident why FIRST promotes practices that facilitate task allocation, mutual support in competitive scenarios, and united ideation. Through the cultivation of effective teamwork, FIRST not only fortifies teams but also cultivates a collaborative and harmonious environment that uplifts mental well-being.

Implementing Teamwork: How Teamwork Benefits Mental Health

Karime Saldivar, Gerardo De Llano, Brandon Niño, Brian Niño
Team: 18908
Harmony School of Excellence- Laredo

Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

CenTex FTC Conference, August 19, 2023

- What we did
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What is Teamwork?

Teamwork is the collaboration of a group with the goal of achieving a common task. Teamwork requires every individual in one's group to try to help each other to make it easier for everyone both physically and mentally.

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AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Why we chose teamwork

Teamwork is one of the most important factors practiced in FIRST. In our perspective, teamwork is necessary to perform at our best in competition and real world. Therefore, we try to implement it as much as we can.

How we did it

We implemented teamwork in many ways purposely as:

- Dividing tasks and roles to get an equal amount of work done individually
- Brainstorming together to hear everyone's opinions
- Respecting/supporting each other at all times, but also be inclusive

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AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

So how does teamwork benefit mental health?

Positive collaborations can increase efficiency and improve the ability to communicate with others. As communication skills increase, you can experience a decrease in misunderstandings. In addition,healthy communication can reduce social anxiety or depression. The result of straightforward effective communication reduces the risk that the project won't be completed, decreases individual responsibility, and teaches new skills.

Title: Implementing Teamwork: How Teamwork Benefits Mental Health
Presenter: Karime Saldivar, Gerardo De Llano, Brandon Niño, Brian Niño|18094 - Mighty Hawks

Results and discussions

Because we tried to implement teamwork as much as we could, our success increased extremely fast. For instance, last year we went to regionals after working, supporting, and motivating each other as much as we could.

Of course, we also achieved many other things as a team. For example, we were able to complete several robots together, and we've won many other achievements.



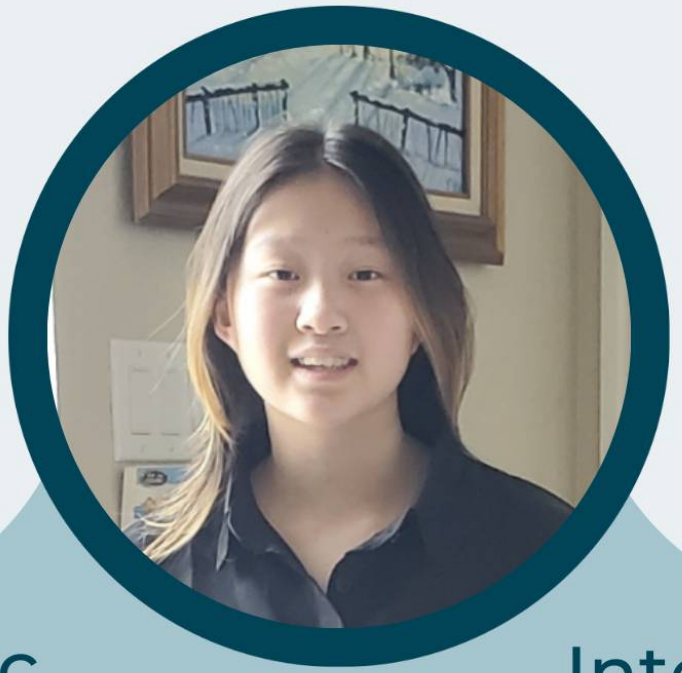

Q & A

16458

CenTex FTC Conference

Angela Zhang

Publicity Chair and Presenter



Topic

Sharing Experiences on Portfolio Presentation of FIRST Tech Challenge

Interests

- Art
- Piano
- Tennis

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Sharing Experiences on Portfolio Presentation for FIRST Tech Challenge

Angela Zhang

Team 16458 Technowizards, San Antonio, Texas, USA
Email: legolegends456888@gmail.com

Significance: The worldwide robotic competition, For Inspiration and Recognition of Science and Technology (FIRST), is a robotic community that incubates young inventors and engineers for the future. Portfolio preparation and presentation is one of the most important tasks for the FIRST Tech Challenge (FTC) competition at League, Region, State, and World levels. Specifically, one of the most important FTC awards, Think Award, is only evaluated by the portfolio submitted by an FTC team. Candidates of Think Award are considered for Inspire Award, leading to a direct
advancement to the next level of the competition. Additionally, the portfolio is used as an information resource for details considering Innovation, Connect, Motivate, and Design Awards. The presentation of a portfolio has a significant impact on the advancement of an FTC team. Therefore, the goal of this presentation is to share some experiences on portfolio preparation and presentation of FTC competition.

Methods: A portfolio serves multiple roles including 1) a demonstration of an FTC Team and FIRST Core values, 2) an information resource for details in design and innovation for technology transfer and outreach activities for connect and motivate, 3) a document to meet judges' expectations, and 4) training on technical writing and presentation for FTC members future career development. Therefore, the preparation of a portfolio needs to consider all the above roles. A pin-down strategy is presented here for portfolio preparation. Determining the style of presentation is the first step to defining a template. Allocate content for each required category following FTC competition guidelines within the 15-page limit to address the 4 roles. Content on each page should be determined and present the most important information with necessary keywords. As a technical summary, conciseness and accuracy are required for technical writing. Specifically, remember that "A picture is worth a thousand words". Pictures, charts, and graphs can convey complex and multiple ideas and provide evidence of outcomes.

Results and Conclusion: This study summarizes the roles of portfolio and the according

preparation strategy for an FTC competition. Different writing styles and presentation approaches should be considered to better facilitate the judges to acquire desired information accurately and efficiently. The practice of FTC portfolio presentation is a long journey for all FTC teams to enhance their technology transfer and marketing capability, which meets the goal of FIRST to incubate future inventors and engineers.

Sharing Experiences on Portfolio Presentation of FIRST Tech Challenge

Angela Zhang
Team: 16458
BASIS at Shavano Park

Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NSF-REU@UTSA

CENTEX FTC Conference, August 19, 2023

- What we did
- Why we did it
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- Results & Discussions
- Q & A

- Portfolio preparation and presentation is required for competition at League, Region, State, and World levels.
- The **goal** of this presentation is to share some experiences on portfolio preparation and presentation of the FTC competition.

CENTEX FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

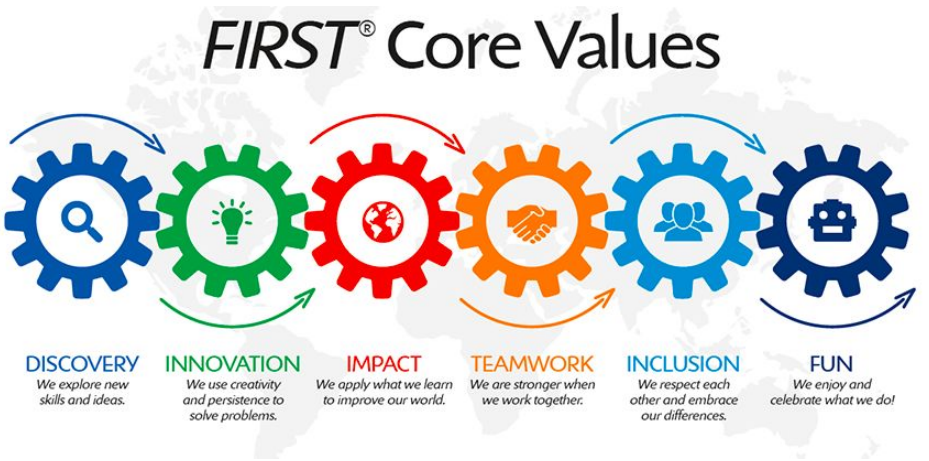
- One of the most important FTC awards, Think Award, is only evaluated by the portfolio submitted by an FTC team.
- Think Award candidates are considered as Inspire Award for advancement to the next level of the competition.
- The presentation of a portfolio has a significant impact on the advancement of an FTC team.

Title: Sharing Experiences on Portfolio Presentation of FIRST Tech Challenge
Presenter: Angela Zhang| 16458- Technowizards

Roles of portfolio

- Demonstration of an FTC Team and FIRST Core values

- An information resource for details in design, innovation for technology transfer and outreach activities for connect and motivate



CENTEX FTC Conference, August 19, 2023

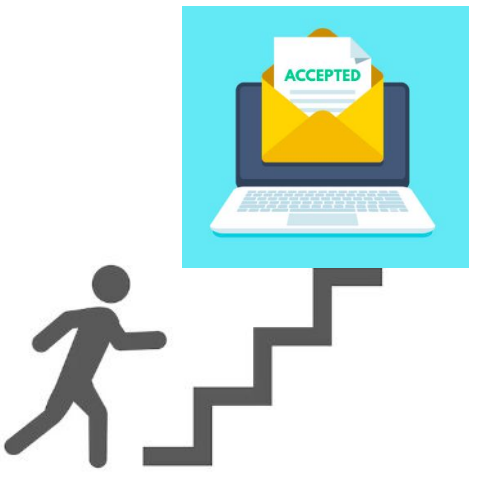
AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Roles of portfolio *Cont*.

- Marketing document for awards based on judges' expectations

- Training on technical writing and presentation for FTC members' future career development

- For example; writing essays and resumes for future college and job applications would be easier because you already have basic training and a foundation



Title: Sharing Experiences on Portfolio Presentation of FIRST Tech Challenge
Presenter: Angela Zhang| 16458- Technowizards

Pin-down Strategy

1. Allocate content for each required category following FTC competition guidelines within the 15-page limit to address the 4 roles.

2. Content on each page should be determined and present the most important information with necessary keywords.

Highlight, font, ***Style***, and color

Outreach Services

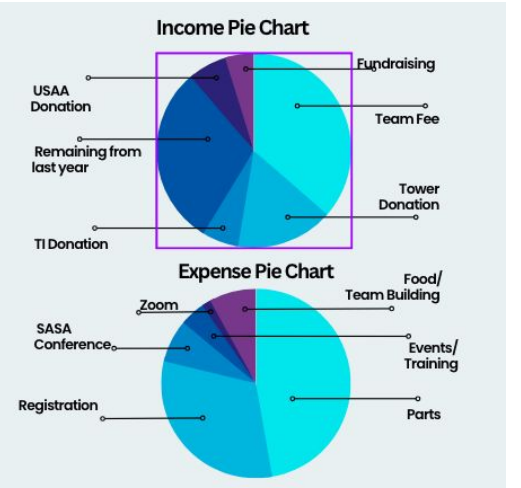
- Connected to **6 new** mentors & maintained relationship with **19 previous mentors**

Tips and guidelines

1. As a technical summary, conciseness and accuracy are required for writing paragraphs.

2. “A picture is worth a thousand words”. A picture can convey complex and multiple ideas and provide evidence of outcomes.

3. Using charts and graphs are some of the best ways to communicate and physically show what you mean.



Correct grammar errors

Grammarly

ChatGPT

- This is the first try to summarize the portfolio preparation for an FTC competition
- Different writing styles and presentation approaches were compared to better facilitate the judges to acquire desired information accurately and efficiently
- The practice of FTC portfolio presentation is a long journey for all FTC teams to enhance their technology transfer and marketing in the future.

Q & A

16458

CenTex FTC Conference

Maria P., Leisha J.

Team 18094 Batteries Not Included

Topic

Beyond the robot: Youth Outreach

Interests

- Debate
- Crochet
- Karate
- Music
- Physics

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Beyond the Robot: The Spillover of FTC

Basis Batteries Not Included

Team: 18049 Batteries Not Included, San Antonio, Texas, USA
Email: mari.g.pelaez@gmail.com, leisha.jhamnani@gmail.com

Significance: BBNI is a shining example of robotics as a starting point for collaboration leading to positive effects on others. Naturally, a passion for stem and all things robots is what drives us all to compete, but as a young team coming out of covid with very few experienced members, we learned to value robotics within a fuller context. Learning and making mistakes together allowed us to establish a tight team bond, part of which is centered around passion for the community.

Methods: One of our shared interests is youth involvement. In February, we visited a BASIS elementary school to give them hands-on experience with a real robot and a short intro to software. Through this event, we were able to interact with around 25 elementary aged kids with an interest in STEM. We've all heard the statistics about how young girls and boys share the same interest in STEM related fields, but by the time they reach high school, that interest is significantly lower, and much less acted on. In efforts to combat this, our outreach covers all ages. We hosted a fundraiser at our school called Dinner with a Robot targeted towards the younger/middle school kids, especially girls, where we showcased our robot and other physics toys (courtesy of our coach) in hopes to continue to foster a passion in the youth. Ultimately, we ended up reaching roughly 30 people. At the highest level, our team is always a safe place for girls to share passion about robotics.

Results: This approach has allowed us to not only succeed on an ideological front but also a competitive one, as this mindset and teamwork helped us to win 3rd place Inspire award at the 2023 League Tournament. and then we got to regionals. The idea of flipping the script on what you prioritize, and seeing robotics in the context of greater trends helps create a stronger team that performs better competitively, while also helping its members to grow as people.

Conclusion: Obviously the hardware is a big part of robotics, but in a larger context, the bond we have created as a team has allowed us to examine robotics in terms of what changes we want to see in the world. It's not all just nuts and bolts.

Beyond the Robot: The Spillover of FTC

Maria Pelaez and Leisha Jhamnani
Team: 18094
Basis

Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

CenTex FTC Conference, August 19, 2023

- What we did
- Why we did it
- How we did it
- Results & Discussions
- Q & A

Medical Center Robotics Club

- Where: BASIS Medical Center campus
- Who: Their Robotics club
- What: Three part activity
  - Who we are and an intro to FTC robotics
  - Software activity
  - Robot demo

CENTEX FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Dinner with the Robot

- What: Invited families to come watch a
- demonstration with our robot and have
- some hands on interaction with it
- Who: Geared mainly toward middle schoolers with an interest in robotics
- How: Multiple forms of exposition
- Where: BASIS MPR

Title: Beyond the Robot: The Spillover of FTC
Presenter: Maria Pelaez and Leisha Jhamnani|18094 - Batteries Not Included

Future Plans

- We recognize huge opportunity for growth!
- Replicate elementary school outreach outside the basis network
  - Especially underprivileged schools
- Camps over the summer or breaks
- Workshops
  - Comes with an increase in our software and hardware experience

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AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Why Youth Outreach?

Longevity	Personal connections and experience
Who does it matters	Community

Goal: Increase participation, help children feel that robotics is an achievable goal- especially for young girls

Title: Beyond the Robot: The Spillover of FTC
Presenter: Maria Pelaez and Leisha Jhamnani|18094 - Batteries Not Included

- Highlighting our personality and differences
  - Seeing people like you is a huge motivator for young kids!
- Intrapersonal relationships matter
  - Basis for school wide outreach
- Language matters!
- Interactive activities are key
- Starting small
  - Especially for newer, smaller, or under resourced teams
- Mindfulness of people's differences

- Increased interest in the girls robotics team!
  - 5 new members, all of which were in
- middle school at the time out outreach
- Increased enrollment in the middle school
- robotics elective
- 50+ kids affected directly
  - 300 indirectly through school

Q & A

16458

CenTex FTC Conference

James Lu

General Chair and Presenter

Topic

Improving Accessibility in Robotics: Application Beyond FIRST and its Significance

Interests

- Piano
- Karate
- Basketball
- Tennis

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Improving Accessibility in Robotics: Application Beyond FIRST and its Significance

James Lu

Team: 16458 Technowizards, San Antonio, Texas, USA
Email: jameslu0405@gmail.com

Significance: FIRST has played a significant role in inspiring and educating young minds in robotics. However, there's an urgent need to expand accessibility to this transformative technology for a broader demographic. This project aims to delve into the vital task of improving accessibility in robotics, extending its application beyond FIRST competitions, and examining its profound impact on individuals and society.

Methods: To achieve the project's goal, a series of outreach events were executed. We introduced robotics to two Title 1 schools, namely Holmes and Bastrop. Notably, Holmes initiated their own robotics team. This engagement aimed to familiarize underprivileged students with the realm of robotics, igniting their interest in STEM fields and providing them with the opportunity to directly experience the excitement of robotics. Furthermore, we organized a week-long summer camp involving 20 participants, representing diverse backgrounds including African American, Hispanic, and female students. This diverse cohort experienced the potential of robotics, leading to 100% of them requesting an extension of the camp. One student even joined their school's FIRST Lego League (FLL) team. Our team also actively engaged with policymakers, liaising with representatives from the offices of congresspersons Cruz, Cornyn, Castro, Roy, and Gonzales. By emphasizing the impact of robotics education aligned with the Every Student Succeeds Act (ESSA), we advocated for resource allocation to support STEM programs and FIRST events. This direct engagement yielded fruitful discussions and garnered support for robotics education. Our team hosted a podcast that reached 487 views, with 34 individuals participating live on Zoom, including 12 alumni. This platform provided an avenue to share our experiences and insights, inspiring others to embrace accessibility and diversity in robotics.

Results: This abstract underscores our team's dedication to augmenting accessibility in robotics and its implications beyond FIRST. Through real-world examples of outreach initiatives, interactions with policymakers, and utilization of technological platforms like podcasts, we are committed to fostering a more inclusive and diverse technological landscape. Our vision is to empower individuals from all backgrounds to actively engage in robotics, contributing to the advancement of both technology and society as a whole.

Conclusion: The commitment of our team to enhancing accessibility in robotics resonates with the transformative potential of this field beyond FIRST. By showcasing various outreach activities, advocating with policymakers, and leveraging technology-driven platforms, our mission is to create an environment where accessibility and diversity thrive. Our goal is to empower individuals from diverse backgrounds to become active participants in robotics, thereby catalyzing advancements in technology and enriching society as a whole.

Improving Accessibility in Robotics: Application Beyond FIRST and its Significance

James Lu
Team: TechnoWizards 16458
BASIS Shavano

Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

CenTex FTC Conference, August 19, 2023

- What we did
- Why we did it
- How we did it
- Results & Discussions
- Q & A

Holmes and Bastrop High School

←

Summer Camp

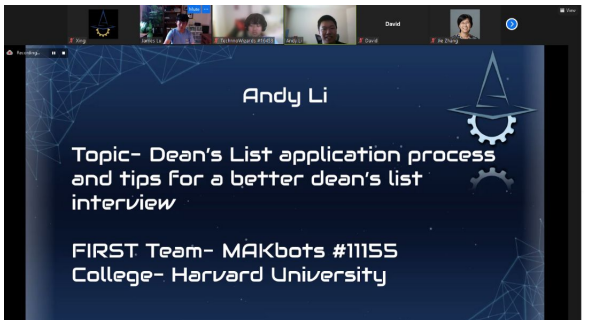
→

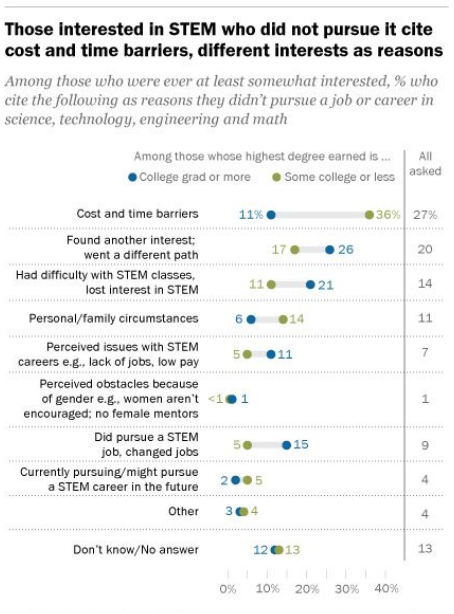
SASA National STEM Advocacy Conference

←

Annual Podcast

→





- Robotics is becoming integral to human society
- Greater amount of people with access → greater amount of innovation
- McKinsey and Company revealed that diverse teams were 35% more likely to outperform less diverse teams in terms of financial returns
- Boston Consulting Group found that diverse management had 19% higher innovation revenue

Sources:

Kennedy, B., Hefferon, M., & Funk, C. (n.d.). *Half of Americans think young people don't pursue STEM because it is too hard*. Pew Research Center. https://www.pewresearch.org/short-reads/2018/01/17/half-of-americans-think-young-people-dont-pursue-stem-because-it-is-too-hard/

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Lorenzo, R. (2018, January 23). *How diverse leadership teams boost innovation*. BCG Global.

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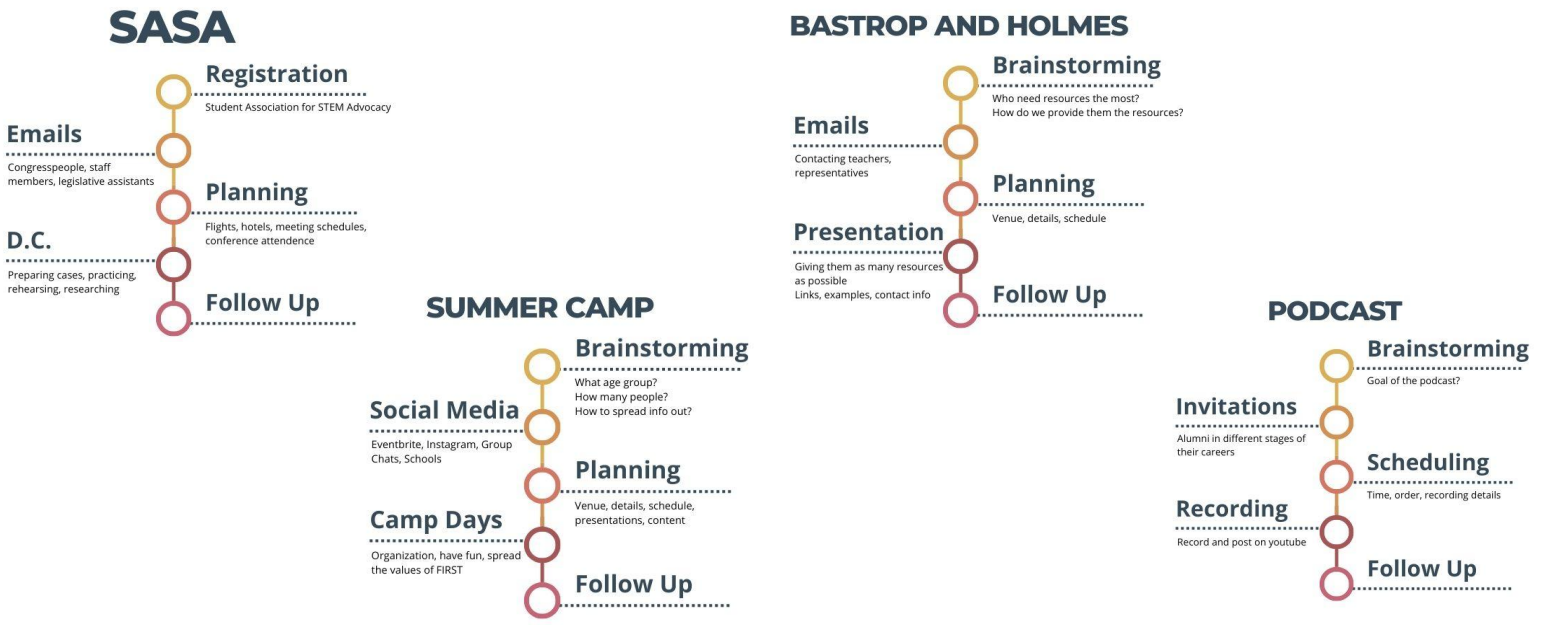


CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

SASA:

- 5 congresspeople (Senator Cornyn, Senator Cruz, Congressman Castro, Congressman Gonzales, and Congressman Roy)
- All voted in favor of ESSA⟶ Increasing funding to over 1.3 Billion Dollars (65 million dollar increase)
- 2 of Congressman Joaquin Castro's representatives visited the FTC Hill Country tournament

Podcast:

- 498 Views with 316 unique viewers
- 34 live viewers on zoom
- 12 alumni involved back into FIRST
- 17 people have contacted us and asked for more info on FIRST

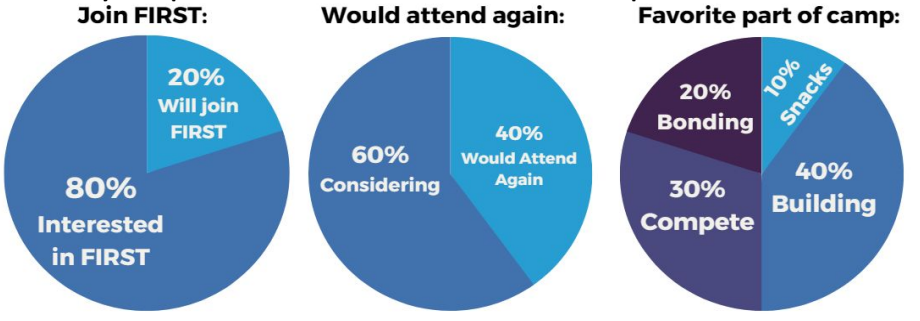
Title: Improving Accessibility in Robotics: Application Beyond FIRST and its Significance
Presenter: James Lu | 16458 TechnoWizards

Holmes and Bastrop:

- Both Schools contacted us and asked for future mentorship sessions
- Holmes is planning on starting an FTC team

Summer Camp:

- 100% of students expressed interest in FIRST
- Parent emails with positive feedback
- 1 student joined his middle schools FLL team
- Many requested us to host a new camp next summer



CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Q & A

Title: Improving Accessibility in Robotics: Application Beyond FIRST and its Significance
Presenter: James Lu | 16458 TechnoWizards

16458

CenTex FTC Conference

Vincent Liu

Publication Coordinator and Presenter

Topic

Strategic FTC Outreach - Enhancing Teams, Captivating Judges, and Achieving Success

Interests

- Running
- Orchestra
- Robotics

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Strategic FTC Outreach - Enhancing Teams, Captivating Judges, and Achieving Success

Vincent Liu

Team: 16458 Technowizards, San Antonio, Texas, USA
Email: vincentyl505@gmail.com

Significance: As a worldwide robotics competition, the FIRST Tech Challenge (FTC) aims to comprehensively evaluate all teams in terms of robot gameplay, portfolio, innovation, design, control, connectivity, and motivation. Each year, fewer than 200 teams advance to the FTC World Championship, underscoring the need for highly competitive teams to excel in nearly all aspects. Consequently, outreach plays a pivotal role in determining a team's success. Presently, four major awards correlate with a team's outreach endeavors: the Inspire award, Think award, Connect award, and Motivate award. These awards showcase a team's outreach prowess and can serve as a pathway to advancement. While it's widely acknowledged that quality surpasses quantity, what if a team can achieve both? This approach will not only enhance an FTC team but also captivate judges. Indeed, substantial effort will be required from all team members, but the payoff will be significant.

Methods: To achieve this substantial task, a team must initially convene to brainstorm various outreach ideas. Judges appreciate not only local outreach events but are also deeply impressed by global outreach initiatives, emphasizing the importance of diversity. During the brainstorming phase, ensure that all team members' ideas are documented, even if some appear challenging to implement. Subsequently, the team should evaluate which outreach events are feasible and most beneficial. For instance, while establishing teams in a FIRST-less country might be ambitious, conducting global team interviews is attainable. Finally, assign each outreach event to teammates who are enthusiastic about participating, treating it as a passion project.

In outreach events, the team typically needs to identify a point of contact, such as a mentor, another team, or an organizer. This step can be easily accomplished through various social media platforms like LinkedIn, Instagram, Twitter, and Facebook. Expanding the team's social media presence is advantageous for facilitating communication with others. Additionally, team members' parents and coaches might have valuable connections to share.

Results: Team 16458, the TechnoWizards, has implemented these strategies and achieved success. They have organized numerous local outreach events, including participation in local kickoffs in San Antonio, collaboration with the Southwest Research Institute, and training sessions with various central Texas teams. Their impact isn't limited to the local level; they've also made a global impression. For instance, the team engaged with Congressmen during the SASA conference in Washington D.C., hosted podcasts with teams and alumni from around the world, and established connections with FTC teams in China.

Conclusion: In the broader context, orchestrating outreach events demands extensive effort and dedication, but the rewards can be significant. The success of the TechnoWizards underscores this, as they secured the first-place Inspire award in the Central Texas division just

last year. Commitment and passion are pivotal for creating a successful outreach portfolio. Teams should engage in activities that offer maximum benefit to them and have a positive impact on the community. Through diligence, pursuit of opportunities, and enthusiasm for outreach endeavors, the path to success is boundless.

Strategic FTC Outreach - Enhancing Teams, Captivating Judges, and Achieving Success

Vincent Liu
Team: 16458
Brandeis High School

Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

CenTex FTC Conference, August 19, 2023

- What we did
- Why we did it
- How we did it
- Results & Discussions
- Q & A

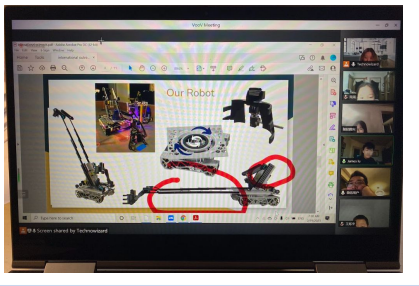
Global Outreach

SASA STEM Conference

- Advocate for STEM to Congressmen in Washington D.C to increase funding.

Mentorship session

- Mentored middle schools in China & Canada.



CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

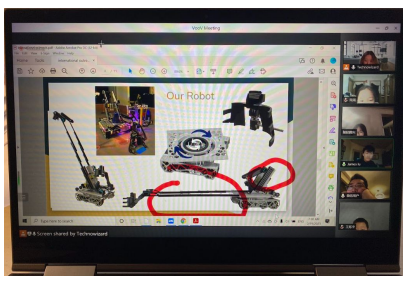
Local Outreach

Summer Camp

- Hosted summer camp in San Antonio for 20 students ages 9-12

Book Fair

- Participated in the San Antonio book fair. Impacted 100+ people.



Title: Strategic FTC Outreach - Enhancing Teams, Captivating Judges, and Achieving Success
Presenter: Vincent Liu| 16458 TechnoWizards

Impresses Judges

- Global outreach events
- Shows your team is passionate about FIRST

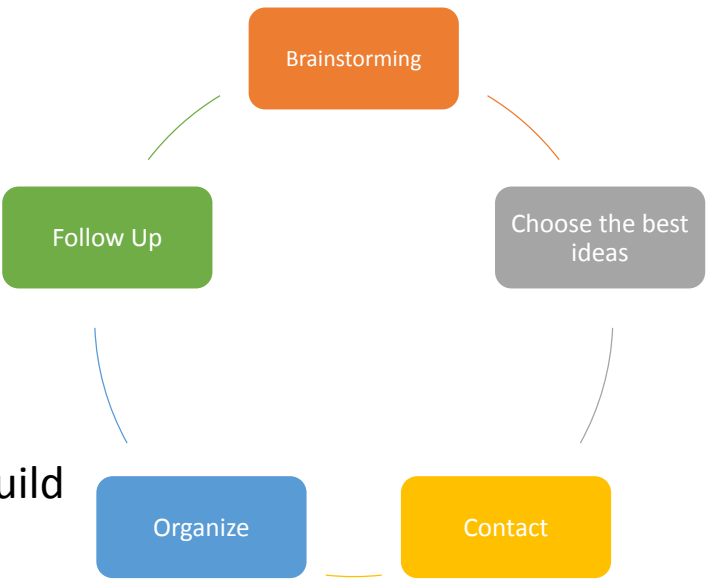
Enhances a team

- Skill Development
- Inspiration and Impact
- Team Reputation
- Learning Opportunity

CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | **HOW** | RESULTS & DISCUSSIONS | Q & A

1. Brainstorm - Blurting (Every idea)
2. Choose the best ideas - Can be attainable
3. Contact - Social Media platforms, parent connections
4. Organize - Determine logistics (Date, location, promote, preparation)
5. Follow up - Letter of appreciation to participants, volunteers, speakers, etc. (Build relationship)



Title: Strategic FTC Outreach - Enhancing Teams, Captivating Judges, and Achieving Success
Presenter: Vincent Liu| 16458 TechnoWizards

Judging Rooms

- Leave a good impression with the judges
- Great outreach resume can help tremendously
- Make sure to always note the impact of your outreach
- Practice makes Perfect

TechnoWizards Achievements 2023

- World Championship - Think Award 2nd
- TX-Central Regional Championship - Inspire Award
- TX-Central North San / Hill Country League Tournament - Inspire Award

CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Q & A

Title: Strategic FTC Outreach - Enhancing Teams, Captivating Judges, and Achieving Success
Presenter: Vincent Liu| 16458 TechnoWizards

16458

CenTex FTC Conference

Nash Dahl and Cyrus Mende

Team 12928 LightSaders

Topic

How to Host an FTC event

Interests

- Music and Theater

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

How to Host an FTC Event

Lightsaders

Team: 12928 Lightsaders, San Antonio, Texas, USA
Email: robotics@smca.com

Significance: Throughout the season, many teams organize various events, such as conferences, scrimmages, and tournaments, to enhance the FTC experience. However, numerous teams encounter difficulties in successfully hosting such events, facing challenges like low participation and lack of resources. We aim to share our insights into hosting a prosperous FTC event, drawing from our experience with the Rookie Invitational.

Methods: The initial step involves defining your event's objectives and selecting a suitable venue. Determine the requirements to achieve your goals and compile a comprehensive list of necessary resources. In our case, we identified the need for fields, event volunteers, a scoring system, catering, and prizes. We secured our school's gymnasium for the event date. Our aim was to establish a student-led event, enhancing team continuity and reducing the dropout rate among rookie teams.

Subsequently, ascertain how to acquire the required resources. For instance, we engaged Hot Robotics for the scoring system, fields, and lunch funding. We partnered with GoBilda to sponsor event prizes. Additionally, we reached out to experienced teams, requesting their assistance as volunteers. The key takeaway is not hesitating to seek help and connect with potential sponsors.

Moving forward, effective event promotion is essential. A well-attended event necessitates reaching out to potential participants. Distributing flyers at other events and enlisting the support of influential platforms like the Centex Padlet can effectively spread the word about your event.

Results: On the event day, despite meticulous planning, there's always a chance of overlooking some last-minute details. For instance, we forgot to prepare pens for award judges and signs for restrooms. To enhance future events, maintain a record of items you overlooked and ensure they're addressed next time. Anticipate unforeseen challenges and be prepared to swiftly address and resolve them.

Conclusion: Hosting a successful FTC event requires strategic planning and effective execution. Defining your goals, gathering necessary resources, seeking help from sponsors, and promoting the event are crucial steps in ensuring its success. Remember that despite thorough preparation, minor glitches may occur on the event day. By learning from each experience and continuously improving, you can pave the way for more engaging, well-organized, and prosperous FTC events in the future.

How to Host an FTC Event: Through Our Experience Hosting the Rookie Invitational

Nash Dahl and Cyrus Mende
Team: 12928
St. Michael's Catholic Academy

Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

CenTex FTC Conference, August 19, 2023

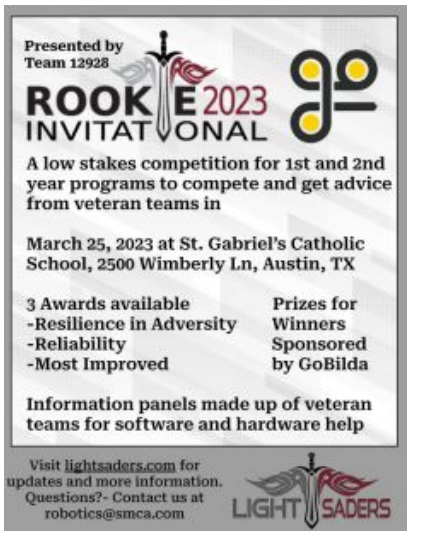
- What we did
- Why we did it
- How we did it
- Results & Discussions
- Q & A

What We Did:

Reach Out

Businesses or organizations might be willing to contribute and help

- Hot Robotics
- GoBilda
- Our School Administration
- Other Veteran Teams



CENTEX FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

What We Did:

- Pushed out flyers at events, put a pdf on the Centex padlet
- Emailed rookie teams directly
- Pens for judges, signs for bathrooms
- Game fields, scoring system, tvs, prizes, food for lunch, inspection materials, tables, microphones, and volunteers
- Ran very smoothly

Title: How to Host an FTC Event: Through Our experience Hosting the Rookie Invitational
Presenter: Nash Dahl and Cyrus Mende|12928 - Light Saders

- What do you need to accomplish that goal?
- When and where would it take place? What would a schedule look like?
- What is your goal for the event?

What We Answered:

- Game fields, scoring system, tvs, prizes, food for lunch, inspection materials, tables, microphones, and volunteers

Why we did it

- To host a completely student volunteer run tournament for Rookie FTC teams

- What do you need to accomplish that goal?
- When and where would it take place? What would a schedule look like?
- What is your goal for the event?

What We Answered:

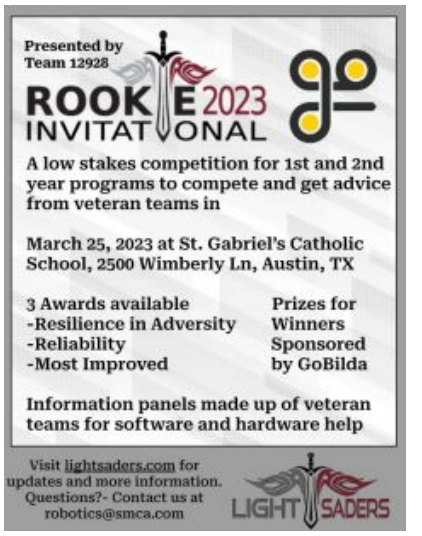
- Game fields, scoring system, tvs, prizes, food for lunch, inspection materials, tables, microphones, and volunteers

CENTEX FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | **HOW** | RESULTS & DISCUSSIONS | Q & A

- How will you get all the resources you need? An event needs attendees
- Teams need to know its happening
- Flyers, handouts, speeches,

emails



Title: How to Host an FTC Event: Through Our experience Hosting the Rookie Invitational
Presenter: Nash Dahl and Cyrus Mende|12928 - Light Saders

- Be prepared to forget something, or to run behind
- Keep a record of attending teams
- If you plan on a repeat event, write down the things you forget

CENTEX FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | **RESULTS & DISCUSSIONS** | Q & A

Making a Plan

- What's your goal? What do you need?

Sponsors and Partners

- How will you get those resources?

Advertisement

- How will you get teams to attend?

Event Day

- Things won't run perfectly, but that's okay.

Title: How to Host an FTC Event: Through Our experience Hosting the Rookie Invitational
Presenter: Nash Dahl and Cyrus Mende|12928 - Light Saders

Q & A

16458

CenTex FTC Conference

Ilias Bakri

Session Chair and Presenter

Topic

Sponsorships in FTC: Best Approaches to Solicit Possible Benefactors

Interests

- Basketball
- Robotics
- Tennis

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Sponsorships FTC: Best Approaches to Solicit Possible Benefactors

Ilias Bakri

Team: 16458 Technowizards, San Antonio, Texas, USA
Email: ibakri2007@gmail.com

Significance: For individuals participating in a First Tech Challenge (FTC) robotics team, the pursuit of sponsorships holds great importance for the team to reach new heights and aspirations. Seeking financial support through sponsorships becomes crucial for various aspects of the team's journey. Firstly, sponsorships enable the organization of impactful outreach events, providing opportunities for team members to engage with their communities, inspire young minds, and foster a passion for STEM education. Secondly, securing sponsorships allows FTC participants to afford essential parts and materials, assisting the development of innovative robot designs. Being a more financially stable team empowers the team members to optimize their prototypes and compete effectively. Lastly, sponsorships play a vital role in easing the financial burden associated with travel and registration fees, enabling the team to participate in regional and national competitions. By doing so, individuals gain exposure to diverse challenges, expand their skill sets, and build invaluable connections within the global robotics community. In essence, reaching out to obtain sponsorships paves the way for FTC robotics team members to make a significant impact, promoting STEM education, driving innovation, and setting the course for a promising future in the field of robotics.

Methods: Achieving heightened success in securing sponsorships for an FTC team involves a systematic approach that encompasses five essential steps. First and foremost, the team should craft compelling sponsor incentives, clearly articulating the value of partnership in terms of exposure, community engagement, and fostering STEM education. Thorough research follows, where the team identifies potential sponsors aligning with their vision and goals. This information serves as the foundation for generating a specialized sponsorship proposal that resonates with each prospective sponsor's interests and objectives. Leveraging this tailored approach, the team reaches out to a diverse range of companies, showcasing the unique advantages of collaboration. A crucial aspect often overlooked is the strategic plan for follow-up. This step ensures that communication remains consistent, nurturing relationships with potential sponsors and addressing any queries promptly.

Results: Our team, the TechnoWizards, have followed these steps and as a result, we have achieved several different sponsorships including a $25,000 grant from Toyota, allowing us to donate to other first-year rookie teams to help them.

Conclusion: In essence, reaching out to obtain sponsorships paves the way for FTC robotics team members to make a significant impact, promoting STEM education, driving innovation, and setting the course for a promising future in the field of robotics. In the dynamic landscape of sponsorship acquisition, using these steps can be the catalyst that propels an FTC team towards remarkable accomplishments. By integrating these five strategic stages, teams not only bolster their visibility and financial resources but also cultivate a network of dedicated partners

who share their vision. FTC teams are equipped to chart a trajectory of sustained success while fostering innovation, community engagement, and growth in their STEM knowledge.

Sponsorships in FTC: Best Approaches to Solicit Possible Benefactors

Ilias Bakri
Team: 16458
Brandeis High School

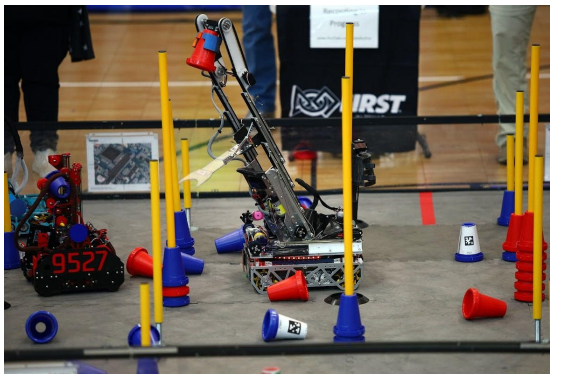
Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

CenTex FTC Conference, August 19, 2023

- Why we did it
- How we did it
- Q & A

Why your team should acquire sponsors

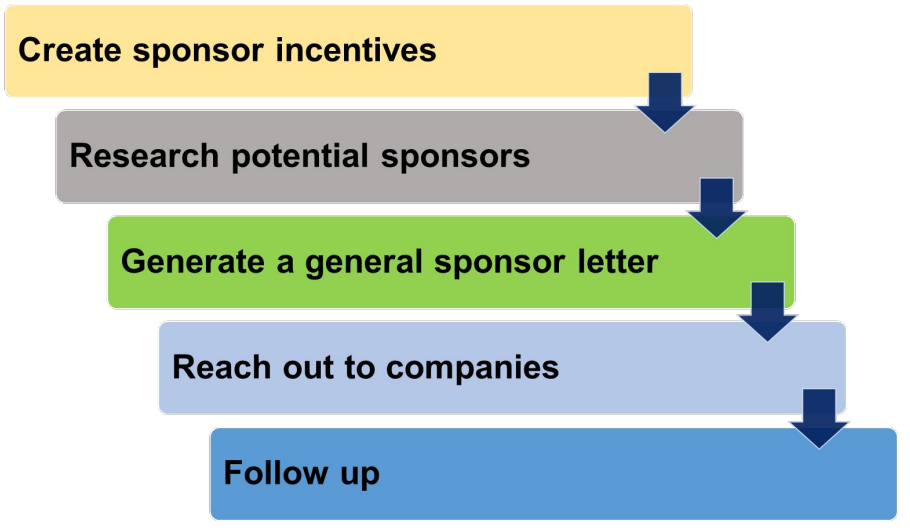
- Enables the team to organize outreach events with their community
- Afford essential parts and materials to build an effective robot
- Ease the financial burden associated with team travel to competitions and the associated fees



CenTex FTC Conference, August 19, 2023

WHY | HOW | Q & A

How to obtain sponsors



Title: Sponsorships in FTC: Best Approaches to Solicit Possible Benefactors
Presenter: Ilias Bakri| 16458 - Technowizards

Create a set of incentives for sponsors

- Feature the sponsors branding
  on your team t-shirt, posters, and brochures
- Adopt public acknowledgement, such as on team website and social media
- Provide a FTC/robot demonstration to company personnel (and families)

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WHY | HOW | Q & A

Research potential sponsors

- Identify your target sponsors
  - Show interest and understand the value of STEM
  - Have a positive reputation with helping the community and non-profits
  - Can provide financial support
- Create a list of prospects to approach
  - Find a name of the right person to contact

Title: Sponsorships in FTC: Best Approaches to Solicit Possible Benefactors
Presenter: Ilias Bakri| 16458 - Technowizards

Creating a personalized sponsorship letter

- Use the target sponsor's name
- Introduce yourself properly
- Write a tailored opening to show that know something about the company
- Be clear about what you need and why it's important
- Include the benefits of sponsorship
- Add visuals
- Keep it clear and concise

CenTex FTC Conference, August 19, 2023

WHY | HOW | Q & A

Reach out to companies for potential sponsorship

- Find the correct contact to reach out to
- Acknowledge on team website and social media
- Provide a FTC demonstration to company personnel (and families)

Plan To Follow up

- Identify your target sponsors
  - Show interest and understand the value of STEM
  - Have a positive reputation with helping the community
  - Can provide financial support
- Create a list of prospects

Title: Sponsorships in FTC: Best Approaches to Solicit Possible Benefactors
Presenter: Ilias Bakri| 16458 - Technowizards

Q & A

16458

CenTex FTC Conference

Maria Jimenez

Team 12115 Phoen-X

Topic

Nurturing Passion: Using FTC Mentorship to Cultivate Sustained Interest in STEM

Interests

- Outreach

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Nurturing Passion: Using FTC Mentorship to Cultivate Sustained Interest in STEM

Maria Jimenez Montilla

Team: 12115 Phoen-X, San Antonio, Texas, USA
Email: mariajimenezmontilla9@gmail.com

Significance: While FIRST successfully engages students in science, technology, engineering, and mathematics (STEM) fields, concerns have arisen regarding its accessibility and long-term impact. To foster a diverse and enriched environment, teams must exceed the expectation of having a diverse roster and strive to establish strong connections for all individuals, especially those from minority backgrounds, within the STEM industry. In this project, we explore the importance of role models for students of all ages and backgrounds. Addressing these issues requires a multifaceted approach involving outreach programs, mentorship, and the creation of an inclusive and supportive culture within the FTC community.

Methods: To ensure lasting FTC impact, we introduced FIRST to young students via Title-1 Elementary schools. As a Title-1 team, we grasp challenges in underfunded schools. At events like the Wortham Oaks Elementary STEAM Fair, our team was able to reach hundreds of eager minds. We also engaged in a mentorship program with Rolling Meadows Elementary, forming meaningful connections and guiding young students in their academic journey. By nurturing an early passion for STEM and FIRST, we enriched the legacy and inspired the next generation of diverse innovators.

Results: Mentorship thrives within our team across roles and grades, aiding in responsibilities, academics, and personal matters. Peer mentorship allows all members to feel solidified in their skills and sense of belonging, especially for our female students, as we are a predominantly female team. We find this internal mentorship to be just as effective as the mentorship we receive from coaches. Additionally, our team aimed to obtain mentorship from representatives across multiple STEM disciplines. This initiative sought out skilled members of the community to provide critical mentorship and develop the skills of both our team and our sister team. We were able to connect with FIRST alumni, digital media specialists, machinists, mechanics, engineers, and outreach specialists. This mentorship is ongoing, but our team continues to experience the benefits of these relationships and aims to pass forward such knowledge to younger teams.

Conclusion: In conclusion, FTC robotics bridges innovation and inclusivity, guided by mentorship and outreach. By addressing accessibility and impact concerns, teams create a diverse environment that nurtures students' aspirations. Mentor roles, both internal and external, guide young minds, reflecting FIRST's core values. These efforts enrich FTC's legacy, paving the way for a future characterized by diversity, creativity, and dedication to advancing technology and humanity.

Nurturing Passion: Using FTC Mentorship to Cultivate Sustained Interest in STEM

Maria Jimenez Montilla
Team: 12115
Judson Early College Academy

Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

- What we did
- Why we did it
- How we did it
- Results & Discussions
- Q & A

Who we are

At the Judson Early College Academy, Phoen-X and its sister team, RoboRaptors, are the only hands-on engineering experience. Being part of a predominantly Title-1 district, our team understand the hardship other students in our community face and aim to be a role model for them. Phoen-X is a home for curious and creative souls. Students are taught to come together under one dream, one mission, and one team.

Regionals Qualifier 2022-2023 Season

Team Photo 2022-2023 Season

CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

What we did: Step 1- Cultivating Team Morale

The first step to ensuring long-term interest in FIRST and STEM Careers is making sure your team is a welcoming space. Mentorship among team members is also key

YAM Fridays:

Team members participated in a weekly counseling session. These were hosted by the Youth Aware of Mental Health Organization. With all the pressure, stress, and high adrenaline that can arise, we learned to work through obstacles and focused on overcoming them.

Team Dinners:

We hosted a thanksgiving dinner and winter holiday gift exchange. We also had periodic team dinners, including BJ's Judson ISD Fundraiser. Mentorship thrives within our team across roles and grades, aiding in responsibilities, academics, and personal matters.

Title: Nurturing Passion: Using FTC Mentorship to Cultivate Sustained Interest in STEM
Presenter: Maria Jimenez Montilla | 12115

What we did: Step 2 - Securing a Legacy

As a Title-1 team, we grasp challenges in underfunded schools. At events like **Wortham Oaks Elementary STEAM Fair**, our team was able to reach hundreds of eager minds. We also engaged in a mentorship program with **Rolling Meadows Elementary**, forming meaningful connections and guiding young students in their academic journey. By nurturing an early passion for STEM and FIRST, we enriched the legacy and inspired the next generation of diverse innovators.

CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

What we did: Step 3 - Securing a Future

Our team aimed to obtain mentorship from representatives across multiple STEM disciplines. This initiative sought out skilled members of the community to provide critical mentorship and develop the skills of our team and our sister team. We were able to connect with FIRST alumni, digital media specialists, machinists, mechanics, engineers, and outreach specialists. This mentorship is ongoing, but our team continues to see the benefits of these relationships and aims to pass forward such knowledge to younger teams.

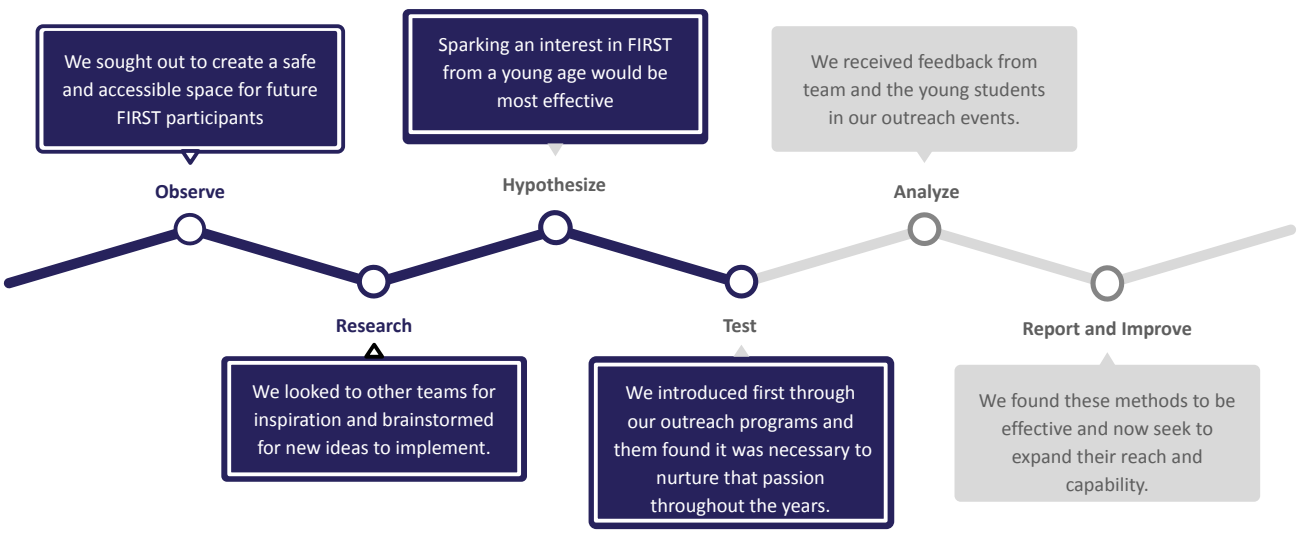
Title: Nurturing Passion: Using FTC Mentorship to Cultivate Sustained Interest in STEM
Presenter: Maria Jimenez Montilla | 12115

Why we took this approach:

While FIRST successfully engages students in STEM fields, there have been concerns about its accessibility and long-term impact. To foster a diverse and enriched environment, teams must **surpass** the expectation of having a diverse roster and strive to establish strong connections for all individuals, especially those of **minority** backgrounds, within the STEM industry. Through this outreach, we explore the importance of role models for students of all ages and backgrounds. Addressing these issues requires a multifaceted approach that involves outreach programs, mentorship, and creating an inclusive and supportive culture within the FTC community.

CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | **HOW** | RESULTS & DISCUSSIONS | Q & A



Title: Nurturing Passion: Using FTC Mentorship to Cultivate Sustained Interest in STEM
Presenter: Maria Jimenez Montilla | 12115

Results and Discussions

Although we've seen positive interaction with our team and the community we can't realistically know if this work has any impact in their career choices or participation in FIRST until years from now. This will not deter us from outreaching and teaching students of all backgrounds about FIRST. We will continue to use our tools to reach new students and create hands-on learning experiences for them. Future discussions will focus on how to quantify our results and how to implement long term connections within our team and community.

Q & A

16458

CenTex FTC Conference

Karim, Adrian, Sean

Team 21233 Tech Syndicate

Topic

Swerve Drive Train

Interests

- Management
- Building
- Coding
- Design
- Marketing
- Building

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Creating a Swerve Drivetrain

Tech Syndicate

Team: Tech Syndicate #21233
Email: techsyndicate0519@outlook.com

Significance: The 2022-2023 FTC season witnessed the emergence of multiple new drivetrains that not only competed with but also surpassed the dominance of the mecanum drive. Among these innovative designs, a more compact and maneuverable version of the coaxial swerve drive was pioneered by Kookybotz. This design had a profound impact on the potential outcomes of the subsequent 2023-2024 season.

Methods: Project ECLIPSE, initiated in February of 2023, underwent a series of developmental phases and iterations before culminating in its final construction on July 14th. Throughout its development, three iterations of the robot were created, each time refining key components such as the main plate, motors, and servos. These upgrades consistently aimed to enhance the robot's compactness and maneuverability. The team followed the standard engineering design process, with the completion of the Computer-Aided Design (CAD) serving as the final stage.

To support Project ECLIPSE, the team employed a range of marketing strategies, resulting in the collection of $1000 in funding. After creating a 3D-printed replica for preliminary testing, the official swerve drivetrain was assembled. In its post-production design, the swerve proved to be more compact than the previous mecanum drive, with dimensions of 12x12x4 inches. Although comprehensive testing with full autonomous code has not yet been conducted, initial manual turning tests indicate the expectation of a faster and more maneuverable robot compared to a majority of mecanum drivetrains. This improvement is achieved without significant torque loss and with increased traction. While the success of Eclipse is evident in its design and servo programming aspects, further evaluations of its movement capabilities are required to unlock its full potential.

Results: Despite the need for more comprehensive testing, Project ECLIPSE has already demonstrated significant achievements. The robot's innovative design and well-executed servo programming underline its potential to outperform traditional mecanum drivetrains. The successful marketing tactics employed by the team have also allowed for the accumulation of funds, supporting the development and realization of the final design.

Conclusion: In conclusion, the advancements made in the 2022-2023 FTC season through designs like Kookybotz's compact coaxial swerve drive have paved the way for greater innovation in subsequent seasons. Project ECLIPSE's journey from concept to final construction exemplifies

the potential for enhanced compactness and maneuverability in robotic drivetrains. While this success is already notable, further evaluations and comprehensive testing will be crucial in fully harnessing the capabilities of the swerve drivetrain and unlocking its complete potential on the field.

Designing Complex Robots: Swerve Drive

Karim Ali, Adrian Garcia-Tovar
Team: 21233
Northside San Antonio

Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

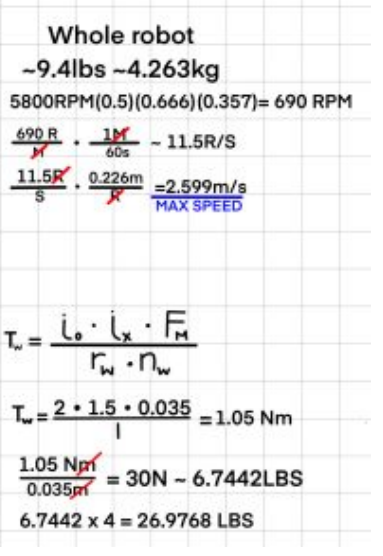
CenTex FTC Conference, August 19, 2023

- What we did
- Why we did it
- How we did it
- Results & Discussions
- Q & A

What We Did:

Developed a swerve drive to improve maneuverability in competition by shrinking dowr the drivetrains size while being as space efficient as possible regarding hubs, motors, and Servos.

Theoretical values were calculated for the speed and Torque which will be tested in the coming weeks.



CENTEX FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Why we did it

To push our teams capabilities in 3D designing, building, problem solving and long term project management

This design works well, as opposed to mecanum, or a different variation of swerve for 3 reasons

1. Practicality in maintenance
2. More traction
3. Structurally sound in building

Pros: Compact, Small, Aesthetic, Traction

Cons: Expensive, Time Consuming, More Technical


Syndicate Bots INC.

Expense Report

02/04/23 - 07/14/23

Name

Department

Manager

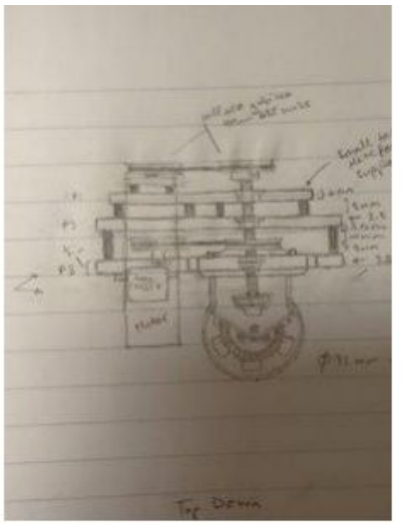
Purpose

Date	Category	Description	Notes	Amount
4/2	Mechanical	4x Axon MAX	(Wrong Size)	$319.96
4/2	Programming	Servo Programmer		$6.99
2/28	Mechanical	GoBilda parts	(1st module)	$129.78
6/5	Mechanical	GoBilda parts	(Swerve)	$414.08
6/20	Mechanical	GoBilda Motors	(New Motors)	$84.96
6/5	Mechanical	McMaster-Carr	(Belts, pulley)	$161.73
7/13	Mechanical	V-Belt Easy	(New Belts)	$24.95
4/23	Mechanical	Swerve Plate	(Bronz Bolts)	$60.00
5/27	Mechanical	4x Axon MAX		$319.96
6/1	3D Print	Overture filament	(Swerve parts)	$20.00
7/5	Mechanical	Swerve Plate	(Fatweeks)	$156.52

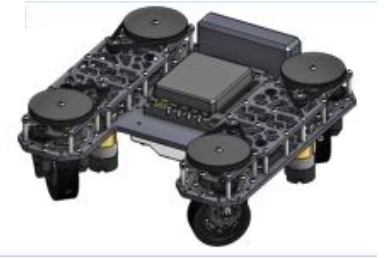
$1,659.24

Signature

Date



The design process started with scale hand drawings of each individual parts. To make the design space efficient horizontally, the motor is connected by belts and rotational movement is controlled by servos. Similar to the other swerve design, the motors are vertical to conserve space. Once the designs were established, we started CADing in Onshape. Our first version is shown below.



CENTEX FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | **HOW** | RESULTS & DISCUSSIONS | Q & A

A third design was made with the following

things in mind:

- To minimize overhead, we decided to reduce the number of plates.
- We simplified the rotational gear drive to a 1:1 gear ratio to track with position precisely with a built in servo encoder.
- We utilized GT2 belts with 2mm pitch to have more space efficient pulleys.
- Combined motor mounts in one to simplify maintenance procedures.

Title: Designing Complex Robots: Swerve Drive
Presenter: Karim Ali, Adrian Garcia-Tovar | 21233 - Tech Syndicate

Results and Discussions

Although still untested for competition and more expensive and time consuming, the design has been a success in several ways.

- Comments: As our first major project, we learned much through trial and error. Therefore, we have a better understanding for project management in the future.

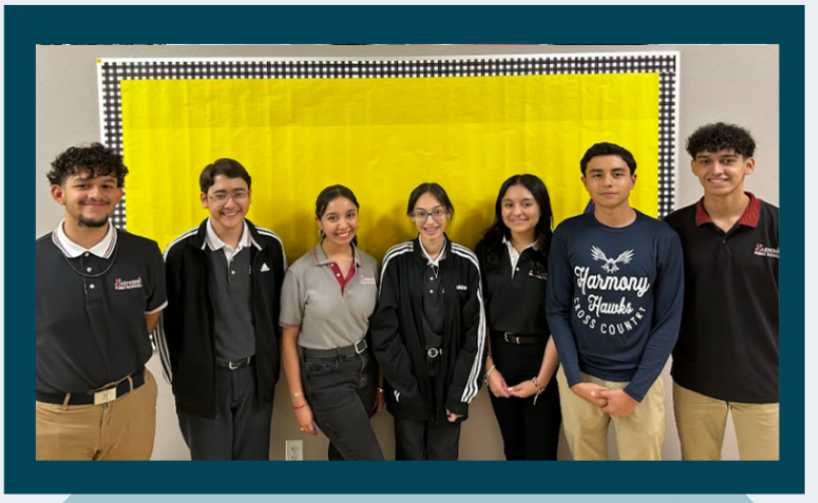
Q & A

16458

CenTex FTC Conference

Isaias V., Shelsea O., Jose M.

Team 23665 Atomic Hawks



Topic

Design and Innovation: A Design Process to Increase Productivity and Reduce Stress

Interests

- Biomedical engineering
- Writing
- Reading
- Pilates
- Mechanical engineering
- Basketball

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Design and Innovation: A Design Process to Increase Productivity and Reduce Stress

Isaac Valadez

Team: 23665 Atomic Hawks, San Antonio, Texas, USA
Email: atomic.hawkshselaredo@gmail.com

Significance: Leading a rookie team can be very challenging, especially without proper methods to increase productivity among your team. Though we barely started the Atomic Hawks this season, we have avoided stressful situations involving solution design by using a design process I modified from the engineering design process.

Methods: As a member of our team's build and design group, it's often difficult not knowing where or how to start designing a solution to an engineering problem I encounter. When I noticed my teammates were getting overwhelmed and lost, I decided to make a flowchart where we could solve any engineering issue using a modified version of the commonly-seen engineering design process: First, learn more about the issue you are trying to solve (Who is the problem affecting? Why is it necessary to solve it? What type of problem is it?). Next, conduct research (Has this problem been encountered before? How was it solved? Do these past solutions apply to our situation?). After you conduct research, come up with a solution and get it down on paper (Make a rough sketch, then add measurements and make a detailed blueprint, (if necessary) make a 3D model). Then, present your sketches to the team and get feedback (if necessary, go back and redesign your solution). After your solution is approved and ready, build and test it (you may need to return to the design stage until it can solve the problem).

Results: When inventing or innovating solutions to engineering problems, it is easy to get lost and overwhelmed when you don't know what technique to use. This process simplifies solution design down to reading an instruction manual, which is a relief for new and recurring teams. After showing my team the flowchart, they were impressed with how easily they were able to create new solutions to any problem they had with our robot, Atom.

Conclusion: In conclusion, whether you are a rookie or a veteran of FTC robotics, it is beneficial to create techniques for easing solution design and other engineering problems. These processes can help increase productivity among a team and even reduce the stress commonly seen with beginner teams at the start of the FTC season. In my opinion, any algorithms, like this flowchart or even a checklist, used to simplify complicated tasks are a huge relief, not just in FTC but in real life.

Design and Innovation: A Design Process to Increase Productivity and Reduce Stress

Isaias Valadez, Shelsea Ortiz and
Jose Martinez
Team: 23665
Harmony School of Excellence- Laredo

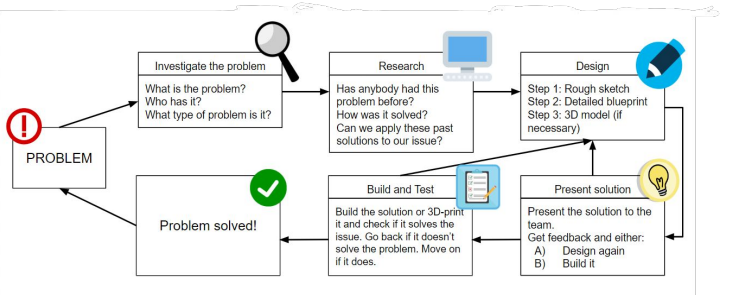
Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

CenTex FTC Conference, August 19, 2023

- What we did
- Why we did it
- How we did it
- Results & Discussions
- Q & A

What we did

- Modified version of the design process
- Prioritizes presenting the solution to the team and gathering feedback
- Get approval before building
- Used for designing solutions to engineering problems
- Multiple purposes/uses

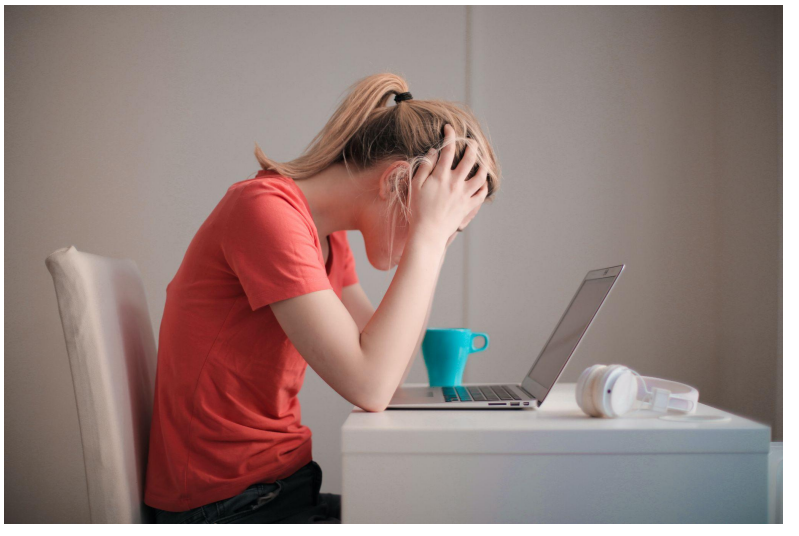


CENTEX FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

Why we did it

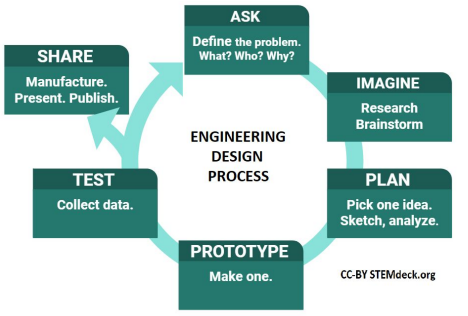
- Noticed design team was having difficulty effectively coming up with solutions
- Stressed out after building a mediocre, short-term solution
- Often times, we got lost and ended up getting burnt out from just one solution without a plan



Title: Sharing Experiences on Portfolio Presentation of FIRST Tech Challenge
Presenter: 23665 - Atomic Hawks

How we did it

- Observations showed overwhelmed designers
- Lost and couldn't decide what problem to tackle first
- Building first, planning later (WRONG)
- We modified the commonly-seen engineering design process to fit our needs and prioritize planning before action.
- We also modified it to make it work for a design team and not just an individual.

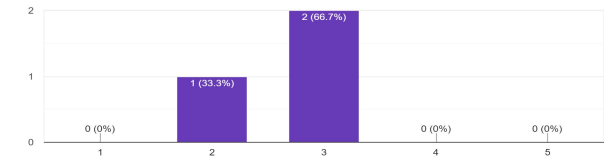


CENTEX FTC Conference, August 19, 2023

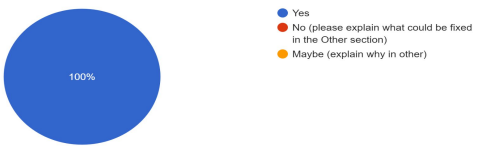
AGENDA | WHAT | WHY | HOW | **RESULTS & DISCUSSIONS** | Q & A

Results and Discussions

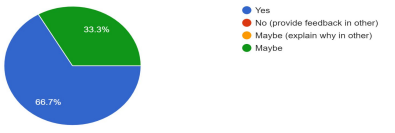
How stressed out do you get when designing new solutions? (1 = low) (5=high)
3 responses



Would you use this engineering design process?
3 responses

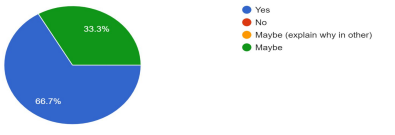


Do you think following this design process will help you design effectively and reduce stress?
3 responses



How many solutions are you able to come up with compared to the problems per week? (Choose how many engineering problems you get per week and how many solutions you can come up with)
3 responses

Do you see yourself using this design process to design any problem (not for robotics or engineering specifically)?
3 responses



Title: Sharing Experiences on Portfolio Presentation of FIRST Tech Challenge
Presenter: 23665 - Atomic Hawks

Results and Discussions

- It can be stressful coming up with solutions without a plan
- After noticing overwhelmed designers and short-term solutions being produced, we came up with a modified design process
- Prioritizes team collaboration and feedback
- Most of the designers on the team reported some stress, less solutions to their problems, and were willing to follow the design process
- Most of them thought that this design process would help them come up with effective solutions in an easier way.

CENTEX FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | **Q & A**

Q & A

Title: Sharing Experiences on Portfolio Presentation of FIRST Tech Challenge
Presenter: 23665 - Atomic Hawks

16458

CenTex FTC Conference

Justin Jin

Publicity Chair and Presenter

Topic

Improvements of Autonomous and Teleop of "Bruno"

Interests

- Marching band
- Coding

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

TechnoWizards' Robot Design and Components

Justin Jin

Team: 16458 Technowizards, San Antonio, Texas, USA
Email: tige64779@gmail.com

Significance: TechnoWizards' autonomous robot, named "Bruno," was meticulously designed for the FIRST Tech Challenge. This robotic creation featured four mecanum wheels powered by conventional brushless GoBilda motors, operating with a 19.2:1 gear ratio, resulting in an impressive speed of 312 RPM. The REV Control Hub efficiently managed data from ten sensors, overseeing the control of eight motors and nine servos. The sensor array included four drive encoders, three odometry encoders, one magnetic sensor, one distance sensor, and one camera sensor. The game field was mapped onto a Cartesian plane, with the camera utilizing the AprilTag library for accurate robot position detection. The Roadrunner library was utilized for motion profiling, ensuring precise velocity control through closed-loop encoders.

Methods: The team enhanced autonomy by incorporating various sensors. The distance sensor facilitated the automatic closure of the intake claw, while the magnetic sensor retracted the delivery slides to their home position. A Finite State Machine (FSM) played a pivotal role in orchestrating asynchronous task execution based on temporal and sensor inputs. This governed actions involving the intake/delivery slides, arms, and claws. The project employed over 240+ defined states to ensure comprehensive control and functionality.

Results and Impact: Bruno, the robot, exhibited exceptional performance. The camera detection achieved 100% accuracy even in varying lighting conditions and environments. The employment of closed-loop control algorithms and the RoadRunner Library maintained an impressively slim trajectory error margin of just 1/2 inch. Notably, the implementation of the Finite State Machine (FSM) led to a remarkable 50% enhancement in autonomy and operational efficiency when compared to non-FSM algorithms. Bruno's participation in the FTC World Championship 2023 culminated in securing the 2nd place in the Ochoa division's Autonomous mode. This achievement stood as a testament to the project's successful programming and design efficacy.

Conclusion: The development and performance of TechnoWizards' robot, Bruno, underscored the team's prowess in designing and programming for the FIRST Tech Challenge. By optimizing various components and integrating advanced sensor-driven features, the robot showcased exceptional accuracy and efficiency. The incorporation of the Finite State Machine (FSM) yielded substantial gains in autonomy and task execution. Bruno's remarkable success at the FTC World Championship 2023 validated the team's dedication, skill, and effectiveness of their design and programming strategies.

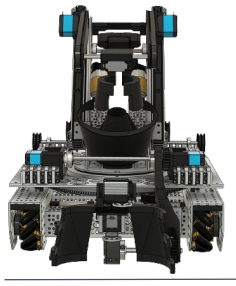
Improvements of Autonomous and Teleop on “Bruno”

Justin Jin
Team: 16458
Brandeis High School

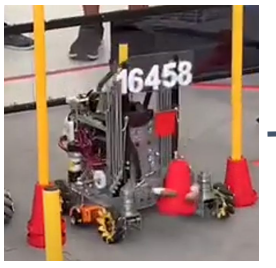
Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

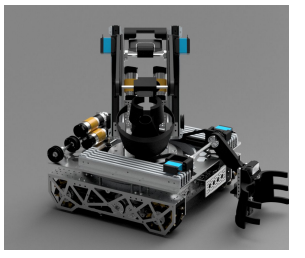
- What we did
- Why we did it
- How we did it
- Results & Discussions
- Q & A

What is Bruno?
The Name of our Robot!



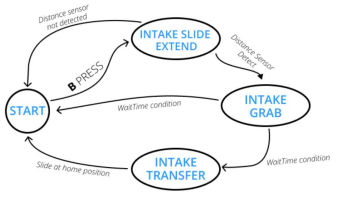
Our robot went from this… to this!



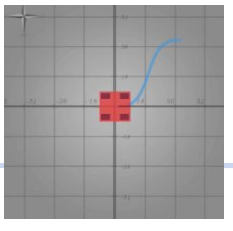


Autonomous and Teleop Improvements via..

Finite State Machine



Roadrunner Odometry

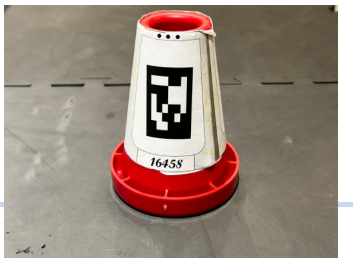


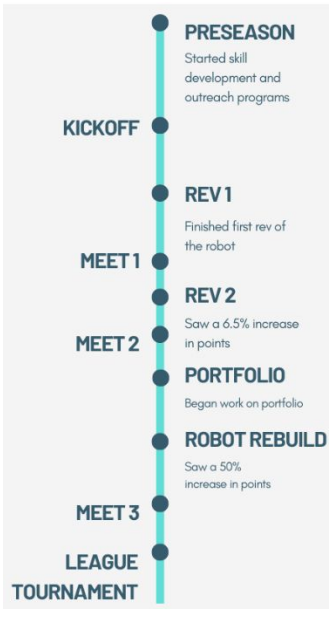
Sensors

Logitech Camera:	Distance Sensor:
• Detection of AprilTag in Auto	• Automate intake claw + FSM condition
	

Magnetic Sensor:	Odometry Encoders:
• Reset Delivery Slide to home position	• Localization in Autonomous
	

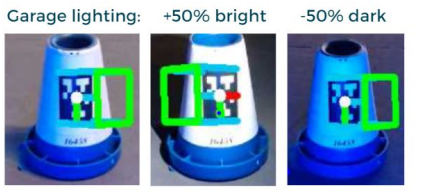
AprilTags





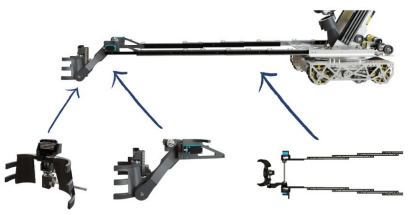
With a completely new robot, a new program had to be written for the robot, as well as new improvements.

Vision:
Before - Machine Learning
Slow, Sensitive, and Inconsistent
After - OpenCV
Fast, Very-Tolerant, and 100% Accuracy



New Robot:
- Over 8 independent motors and 9 servos

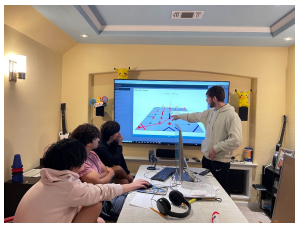
If we ran each component linearly, our robot would be too slow and we would have no way to compete. → **Lead to using FSM**



Title: Improvements of Autonomous and Teleop on "Bruno"
Presenter: Justin | 16458

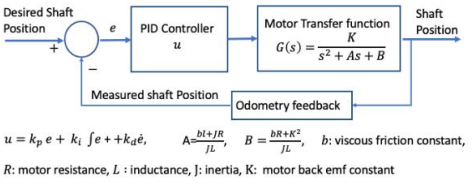
Preseason Training:

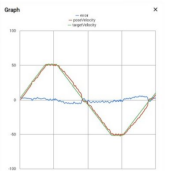
Learning odometry on https://learnroadrunner.com/
Learning OpenCV from our mentor Leo 😀

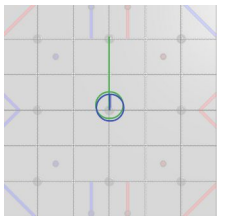


Odometry:

Had to localize robot through intensive open-loop and closed-loop PID tuning.

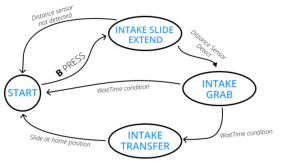


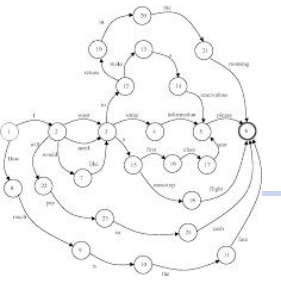




Finite State Machine:

The power of gm0! https://gm0.org/en/
Created over 327+ states in total across 12 programs

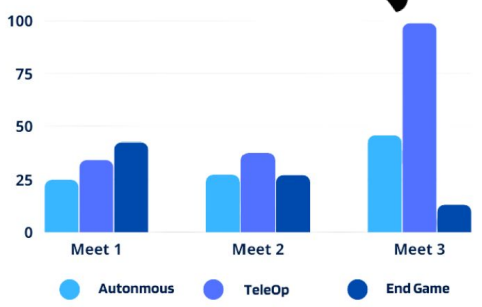




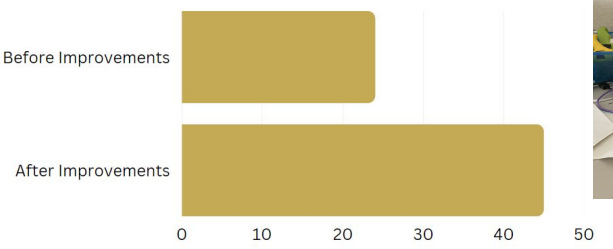
CenTex FTC Conference, August 19, 2023

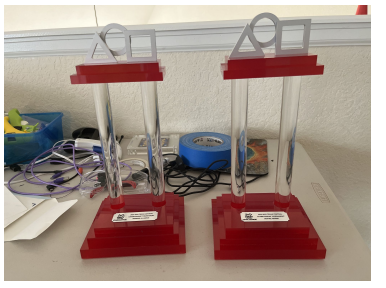
AGENDA | WHAT | WHY | HOW | **RESULTS & DISCUSSIONS** | Q & A

After Improvements



Improvement of Autonomous Score





- 100% accuracy in camera detection in different environments
- Only ½ inch margin of error in the robot's trajectory.
- Enhanced efficiency by 60% compared to non-FSM program
- Bruno ranked 3rd in Autonomous mode in the Ochoa division.

Rank	Team	Team name	Non Penalty OPR	OPR	Non Penalty OPRc	Auto OPRc	TeleOp OPRc	End Game OPRc	Avg Score	Max Norm Score	Worlds
1	16458	TechnoWizards	158.9	163.5	157.5	45.6	98.8	13.1	177.2	180	yes
2	7172	Technical Difficulties	158.7	171.6	158.3	45.0	81.9	31.5	227.0	229	yes
3	19746	The Disruptingly Robocephalic BrainSTEM Robotics Team	154.0	158.5	153.0	47.9	81.2	23.9	223.4	242	yes
	19746	The Disruptingly Robocephalic BrainSTEM Robotics Team	140.4	142.7	135.7	39.9	75.9	19.9	210.6	226	yes

Title: Improvements of Autonomous and Teleop on "Bruno"
Presenter: Justin | 16458

Q & A

16458

CenTex FTC Conference

Parker Olkowski

Session Chair and Presenter

Topic

Initial Brainstorming: the importance and process to creating a successful design

Interests

- Running
- Clash Royale
- CAD
- Robotics

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Initial Brainstorming: The Importance and Process to Creating a Successful Design

Parker Olkowski

Team: 16458 Technowizards, San Antonio, Texas, USA
Email: parkerolkowski@gmail.com

Background: The FIRST Tech Challenge (FTC) is a global robotics competition spanning 53 countries and regions, with over 80,000 participants in 2023. FTC presents mechanical design challenges that test teams' ability to create efficient and reliable robotic assemblies. This abstract focuses on the process and primary benefits associated with in-depth preliminary brainstorming during the design of complex components and/or robots.

Significance: In FTC, brainstorming lays the foundation for a team's robot design. Inadequate and inefficient brainstorming often leads to suboptimal designs that require iteration later in the season. Furthermore, due to time constraints, the initial robot design frequently remains unchanged throughout the FTC season. If a team's initial design is poor, as previously mentioned, these design flaws may persist throughout the season. Proper initial design brainstorming is essential to rectify these issues and create a robot capable of competing at a global level.

Methods: Our FTC team, TechnoWizards (#16458), developed a four-step initial design brainstorming process comprising the following stages: Game Rule Analysis, Value Assignment, Team Brainstorming, and Design Confirmation. Game Rule Analysis involves a comprehensive analysis of the specific game rules for the current season. Value Assignment entails assigning values to various aspects of the FTC game challenge. Teams should base their robot design and brainstorming on the aspects of the FTC game challenge with the highest assessed value. Team brainstorming entails the convergence of ideas among members of the FTC team. We recommend utilizing resources like gm0.org, past FTC game challenges, other teams, and forums for design inspiration. Lastly, Design Confirmation involves rapid prototyping and simulation software, such as Meep Meep Simulator, to finalize a robot's design.

Results and Conclusion: Implementing the aforementioned four-stage initial brainstorming process led to a significant enhancement in the efficiency, reliability, and components of our FTC team's robot—TechnoWizards (#16458). Allocating values to specific aspects of the FTC game challenge enabled us to design a robot that excelled in those areas. Specifically, our team focused on autonomous performance, resulting in improved competitiveness against other FTC teams. This was demonstrated by our team's qualification for the FTC World Championship and achieving the 13th highest-ranked autonomous performance globally.

Initial Brainstorming: The Importance and Process to Creating a Successful Design

Parker Olkowski
Team: TechnoWizards 16458
Brandeis

Acknowledgement: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

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- What we did
- Why we did it
- Results & Discussions
- Q & A

Initial robot design is often design of your robot the entire season

- Rebuilds of your robot design mid - season often lead to an unpolished robot

Helps to eliminate unoptimized designs

- Good initial brainstorming can reduce design changes later in the season that were unoptimized

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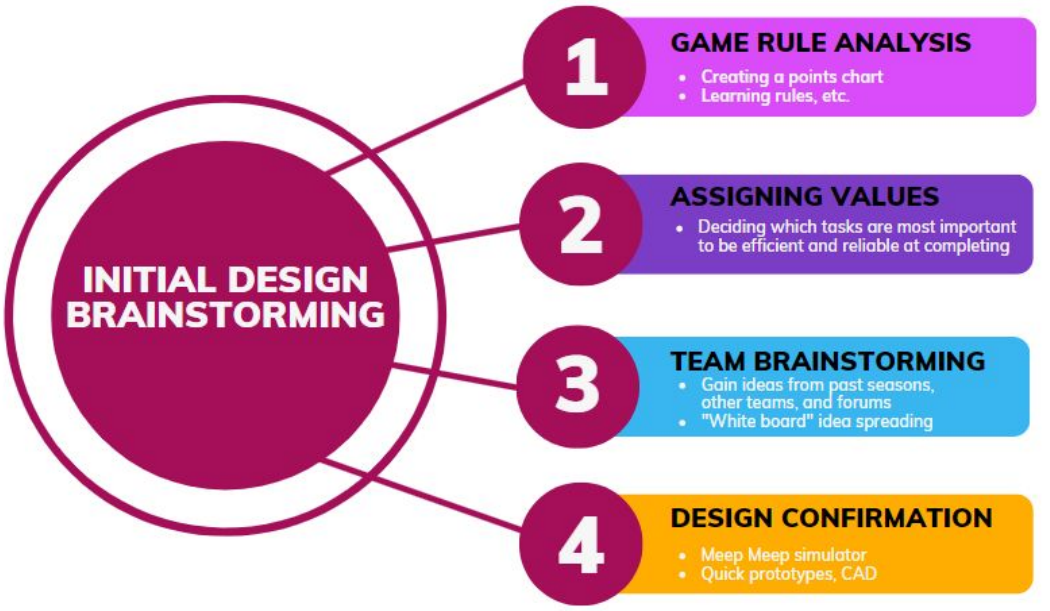
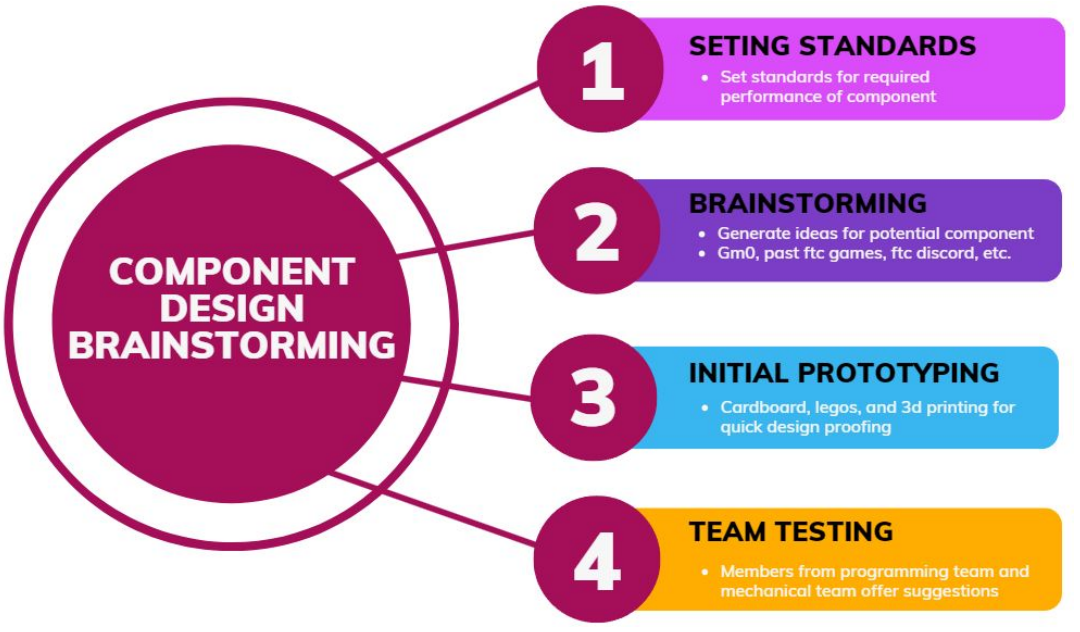
AGENDA | WHY | WHAT | RESULTS & DISCUSSIONS | Q&A



Title: Initial Brainstorming: The Importance and Process to Creating a Successful Design
Presenter: Parker Olkowski | 16458 TechnoWizards



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AGENDA | WHY | WHAT | RESULTS & DISCUSSION | Q&A

Debriefing Previous Season Brainstorming

1. Design Priorities
2. Our Brainstormed Ideas
3. Final Designs

Title: Initial Brainstorming: The Importance and Process to Creating a Successful Design
Presenter: Parker Olkowski | 16458 TechnoWizards

DESIGN PRIORITIES

01

RELIABLE AUTONOMOUS

- Reduce movement during autonomous as much as possible
- Reduce interference with opposing alliances

02

REDUCE DRIVER WORKLOAD

- Eliminate driver movement (turning, driving, aligning) as much as possible
- Integrate pre-programmed multi-task functionality into controllers

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AGENDA | WHY | WHAT | RESULTS & DISCUSSION | Q&A

POTENTIAL DESIGNS

RELIABLE AUTONOMOUS

OUR BRAINSTORMED IDEAS

- Single extension 360 degree turret crane
- Pass through v4b
- Double turret two extension design

REDUCE DRIVER WORKLOAD

OUR BRAINSTORMED IDEAS

- Dual cameras for auto tracking to poles and cones
- Distance sensors
- Pole alignment feature
- Delivery turret

Title: Initial Brainstorming: The Importance and Process to Creating a Successful Design
Presenter: Parker Olkowski | 16458 TechnoWizards

FINAL DESIGNS

RELIABLE AUTONOMOUS

FINALIZED DESIGNS

- Double turret two extension design
  - Allows for robot to remain stationary during autonomous to prevent localization errors
- Odometry & Roadrunner integration
  - More accurate movement in autonomous

REDUCE DRIVER WORKLOAD

FINALIZED DESIGNS

- Distance sensors
  - Automatic intaking of cones
- Pole alignment feature
  - Allows driver to deliver easier
- Delivery turret
  - Reducers drivers need to turn
- Intake Turret
  - Allows for micro-adjustments of intake

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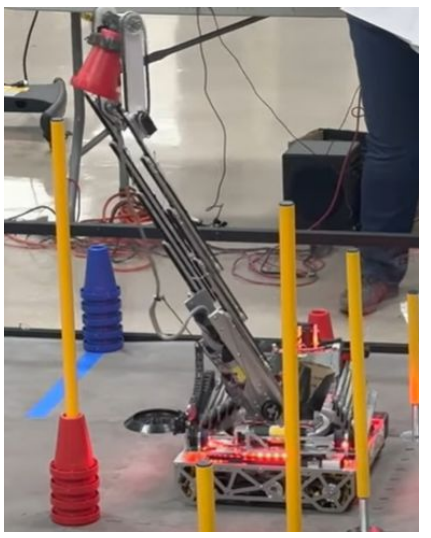
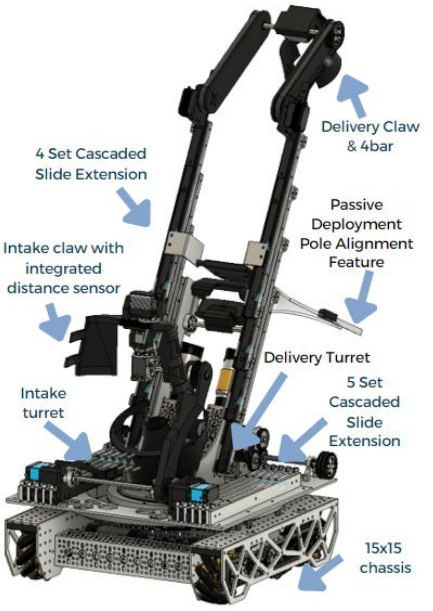
AGENDA | WHY | WHAT | RESULTS & DISCUSSION | Q&A





Title: Initial Brainstorming: The Importance and Process to Creating a Successful Design
Presenter: Parker Olkowski | 16458 TechnoWizards

Q & A

16458

CenTex FTC Conference

Isabel Xu

Publication Coordinator and Presenter

Topic

Mechanics Behind the Robot

Interests

- Music
- Orchestra
- Building

CenTex FTC Conference

San Antonio, Texas, USA
August 19, 2023

Applying Mathematics and Physics Concepts to Examine Mechanics Behind the Robot

Isabel Xu

Team: 16458 Technowizards, San Antonio, Texas, USA
Email: isabel.xu47@gmail.com

Significance: Our team applied several concepts using both math and physics to determine the exact calculations and physical components needed for the robot to perform its designated tasks to ensure that our robot could accomplish the required tasks while running at its maximum efficiency. For instance, it is important for us to find the minimum torque required to extend both the intake and delivery slides because it allows us to optimize gear ratios.

Methods: To calculate the minimum amount of torque needed to extend the delivery slides, we must create a free body diagram (FBD) and combine all the forces doing work. This is somewhat complicated, so we proceed in the following steps.

1. Calculate the vector component of gravity pulling down on the slides by using the formula M * g * sin(Θ), where M is the mass of the slides, g is the acceleration due to gravity (which is a constant), and Θ is the angle of the tilt of the slides. Corresponding to the parameter values shown, we have 2.15 kg * 9.81 * sin(60°) = **10.55 N** of force.
2. Convert this force into a torque, which we can do by multiplying the force (which we have just solved for) and the radius of the pulley (in meters) to get 0.55 N * 0.02 m = **0.211 N x m** of torque. Finally, we can plug in this value, along with the amount of torque created by friction (0.1588 N x m), into Newton's Second Law equation $\Sigma\tau = I\alpha$, and expand it to get the equation Tm = Tf + Tg which then simplifies to Tm = 0.1588 N x m + 0.211 N x m = 0.3698 N x m of torque.

To calculate the minimum amount of torque needed to extend the intake slides, we once again create a FBD and combine all the forces doing work:

1. Starting again with a FBD, we can combine all the forces (that create torques on the slides) to get the equation FT = Ff + Fb and substitute in the physical values such as 0.8415 N for Ff and 2.4525 N for Fb. We then simplify to get about 3.294 N of force pulling against the slides during their extension.
2. To find the amount of torque that these resisting forces create, we must then multiply them by the radius of the pulley to get 3.924 * 0.02 m = 0.07848 N x m.
3. Multiply this value by the gear ratio from the gearbox to determine the amount of torque needed from the motor by itself: 0.07848 N x m * 4:3 Gear Ratio = 0.1046 N x m.

Results: After calculating both the minimum torque required to extend the delivery and intake slides along with the exact amount of stall torque needed to maximize efficiency on the robot, we were able to adjust the gear ratios on the motors accordingly. This helped us be able to extend our slides even faster, allowing us to spend less time delivering cones and score more points.

Conclusion: It is important for teams to make these calculations to not only increase efficiency during robot performance, but it can also help towards having less error during building.

Applying Mathematic and Physics Concepts to Examine Mechanics Behind the Robot

Isabel Xu
Team: 16458
Louis D. Brandeis High School

Acknowledge: Tower Semiconductor, Toyota, USAA, TI, NS-REU@UTSA

CenTex FTC Conference, August 19, 2023

- What we did
- Why we did it
- How we did it
- Results & Discussions
- Q & A

Since every part of our robot has several different underlying concepts behind it, our team decided to analyze some of them. We applied many concepts using both math and physics to determine the exact calculations and physical components needed for the robot to perform its designated tasks. Some examples of this include finding the horizontal distance between the base of our delivery system and our robot, calculating the minimum amount of torque required to extend both our complex delivery and intake systems, and calculating the minimum amount of torque required to hold up the 4bar connected to our intake as shown in Figure 1.1.

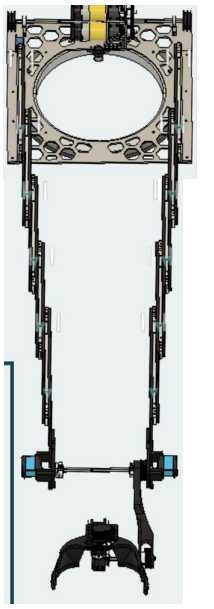


Figure 1.1

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AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

We did this to ensure that our robot could accomplish the required tasks while running at its maximum efficiency. For instance, it is important for us to find the minimum torque required to extend both the intake and delivery slides because it allows us to optimize gear ratios. Since the amount of power for the slides peaks at exactly half of the stall torque from the gearboxes on the motors as shown in Figure 2.1, we can try to modify and adapt the robot to fit that quota.

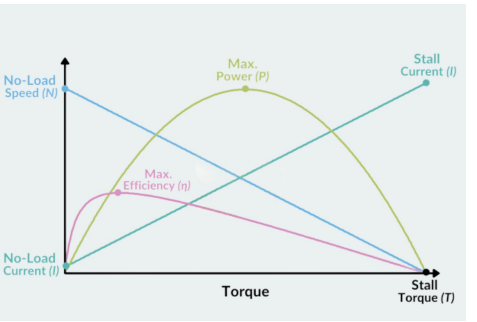


Figure 2.1

Title: Applying Mathematic and Physics Concepts to Examine Mechanics Behind the Robot
Presenter: Isabel Xu | 16458 - TechnoWizards

To calculate the minimum amount of torque needed to extend the delivery slides, we must create a free body diagram (FBD) as shown in Figure 3.1 and combine all the forces doing work. This is somewhat complicated, so we proceed in the following steps.

1. Calculate the vector component of gravity pulling down on the slides by using the formula M * g * sin(Θ), and corresponding to the parameter values shown, we have 2.15 kg * 9.81 * sin(60°) = **10.55 N**.
2. Convert this force into a torque, which we can do by multiplying the force (which we have just solved for) and the radius of the pulley (in meters) to get 0.55 N * 0.02 m = **0.211 N x m** of torque. Finally, we can plug in this value, along with the amount of torque created by friction (0.1588 N x m), into Newton's Second Law equation $\Sigma\tau = I\alpha$, and expand it to get the equation Tm = Tf + Tg which then simplifies to Tm = 0.1588 N x m + 0.211 N x m = 0.3698 N x m.

Figure 3.1

CenTex FTC Conference, August 19, 2023

AGENDA | WHAT | WHY | HOW | RESULTS & DISCUSSIONS | Q & A

To calculate the minimum amount of torque needed to extend the intake slides, we once again create a FBD as shown in Figure 4.1 and combine all the forces doing work:

1. Starting again with a FBD, we can combine all the forces (that create torques on the pulley) using Newton's Second Law to get the equation FT = Ff + Fb. We then substitute in the measured physical values, such as 0.8415 N for Ff and 2.4525 N for Fb, and simplify to get about 3.294 N of force pulling against the slides during their extension.
2. We must then convert this force into a torque to find the amount of resistance, so we then multiply them by the radius of the pulley to get 3.924 * 0.02 m = 0.07848 N x m.
3. To find the true amount of torque acting on the pulley to extend slides, multiply this value by the gear ratio from the gearbox to of torque needed from the motor by itself:
   0.07848 N x m * 4:3 Gear Ratio = 0.1046 N x m.

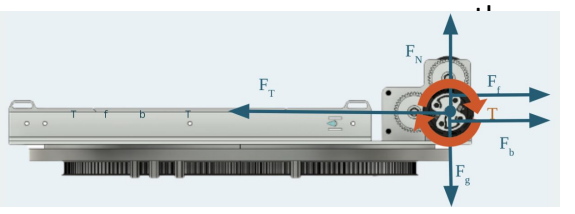


Figure 4.1

Title: Applying Mathematic and Physics Concepts to Examine Mechanics Behind the Robot
Presenter: Isabel Xu | 16458 - TechnoWizards

After calculating both the minimum torque required to extend the delivery and intake slides along with the exact amount of stall torque needed to maximize efficiency on the robot, we were able to adjust the gear ratios on the motors accordingly. This helped us be able to extend our slides even faster, allowing us to spend less time delivering cones and score more points.

Q & A

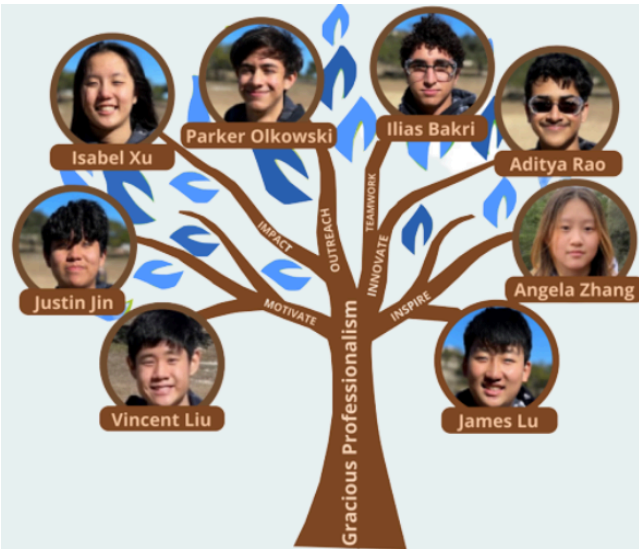
Presentations

Group Pictures

Networking

Guest Speakers

For Inspiration and Recognition of Science and Technology (FIRST) is a global robotics organization to inspire P-12 students to pursue STEM-related careers. Each year, over 660,000 students worldwide participate in FIRST across 3 programs: FIRST Lego League (FLL), FIRST Tech Challenge (FTC), and FIRST Robotics Competition (FRC). FIRST competitions challenge students by integrating both technical and soft skills into robot competitions, promoting gracious professionalism, and motivating more students to join STEM fields. In essence, FIRST fosters the self-esteem and self-development of kids, illustrating the concept of how robots build kids.



Hello! We're team 16458, TechnoWizards, from San Antonio, Texas. We are a student-led community team made up of family and friends. We have 8 members from diverse backgrounds between 7th to 10th grade. The team has been part of the FIRST program for over 8 years. We are striving to learn as much as we can in the FIRST community.