

GRAVITY FESTIVAL AT BELLEVUE COMMUNITY CENTER

CENTER

DATE & TIME: 6/26/19 | 10:00 AM - 4:00 PM

I. EVENT DESCRIPTION

The Gravity Festival took place at Bellevue Community Center, in the center of Wilmington. We have attended this event for several years, and we always enjoy visiting the other booths as well as helping kids learn about the importance of STEM. There are always many summer camps and children excited to learn and see how our robots work, and MOE is eager to teach the next generation how science impacts their everyday lives.

II. EVENT SUMMARY

After setting up in the gymnasium, groups of kids started coming to see the different stations. Gravity Festival always has a great turnout, and this year was no exception. MOE FTC brought the batter bot and the robot from the 2019 competition. Joe Perrotto also



attended the outreach event, and he brought the FRC robot from the 2019 competition. We stationed at least one of our members near each robot so they could give an overview of robotics and FIRST in general, as well as

teach the kids how the robot worked. The batterbot was the only robot that the children were allowed to drive, and we had the kids line up and learn how to drive the robot. Additionally, there were a few kids from last year's gravity event that came back to see our robot; it was really nice to see that the kids had remembered our team and were clearly enthusiastic to be able to learn about what we had done since last summer. There were not many parents that stopped by, as most of the kids were organized into groups that were led by counselors; however, we made sure to hand out contact information to any parents we met and talked to.



III. EVENT REFLECTION

Overall, the Gravity Festival was a huge success. Not only were the members of MOE able to introduce the young children of our generation to STEM and robotics, this event was also a morale booster for us. It is important for our team to do well in competitions and successfully build robots, but it is just as important to see the impact robotics has on the community as a whole, helping to strengthen the presence of FIRST in our Delaware region. Aidan and Suraj also attended Gravity Festival to gain exposure and experience on working with the outreach participants. This outreach also helps us achieve one of our major goals this season, which is helping out the underserved

community and informing them on the importance of a STEM education. We look forward to meeting new and returning kids next year!

DELAWARE NATURAL HISTORY MUSEUM SUMMER CAMP

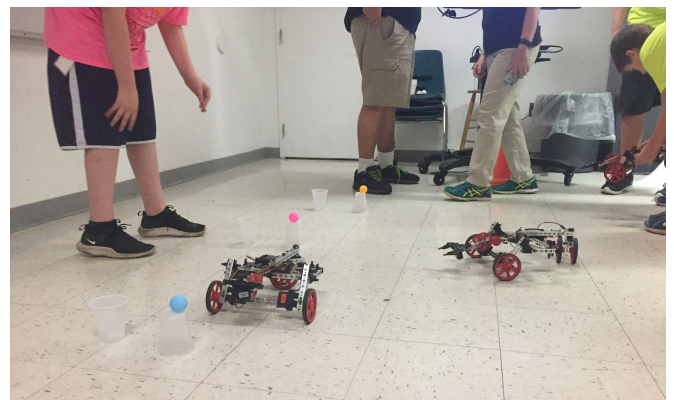
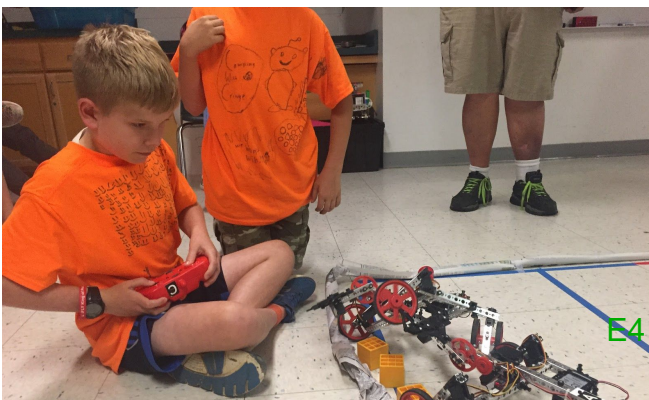
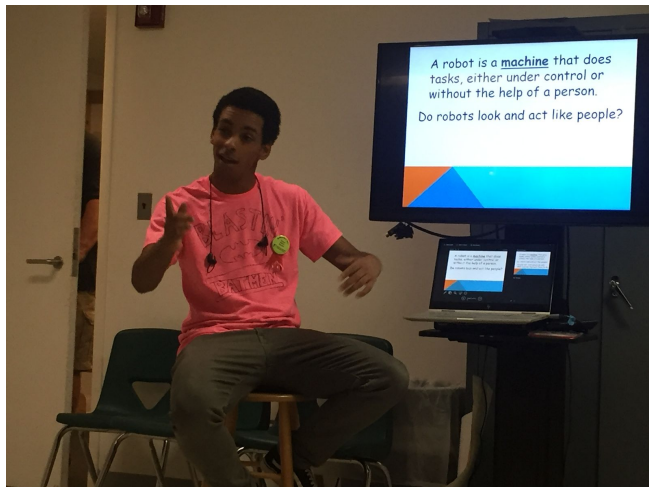
DATE & TIME: 7/17/19 | 8:30 AM - 4:00 PM

I. EVENT DESCRIPTION

This is an annually held summer camp at the Delaware Natural History Museum and we were happy to be able to participate for the **third** time. The camp is STEM-themed and the kids are in grades 1-4. We planned to showcase the Batterbot, introduce the kids to prebuilt VEX robots, organize a simple tournament, and finally give a short presentation on what robots are. Clare, Ian, and Connor were also joined at the event by several MOE FRC students.

II. EVENT SUMMARY

We arrived and set up our demo, but unfortunately, one of the phones was



malfunctioning so the Batterbot would not run. However, we used this as a lesson to teach the students that robotics involves a lot of trial and error and every revision creates a better result. After this, we worked with three teams of students to come up with a team name and decorate shirts and posters. We then introduced them to simple VEX robots and allowed them to discover the qualities of the robot through experimentation and drive practice. After lunch, we held a simple tournament style competition with the help of a MOE FRC mentor and experienced FIRST referee. The kids were very enthusiastic and competitive, so we made sure to place an emphasis on learning and skill building and tried to act as good role models through leadership and sportsmanship. Following the competition, we gave a short presentation on different kinds of robots and showed the kids how they could get involved with FIRST programs.

III. EVENT REFLECTION

This event continues to be one of our team's favorite! The kids definitely looked up to us and we were happy to be able to show them what robotics programs they could join. It was unfortunate that we could not use the Batterbot, so we will make sure to look at it in the lab and check that everything is working before we bring it. However, we think this was still an effective way to teach the kids that setbacks are an unavoidable part of progress. We hope that we will be able to attend this event again next year and will maybe change the game to have a stronger collaborative element so that we can clearly foster an environment of Coopertition among the younger students. In summary,

this was a highly enjoyable event that allowed us to give back to our community's youth and foster more enthusiasm for STEM and robotics based programs.

SUMMER MEETING WITH #14541 DRAGONATORS

DATE & TIME: 7/23/19 | 7:00 PM - 8:30 PM

I. EVENT DESCRIPTION

We invited team #14541 Dragonators to come to one of our summer meetings. We had met with them last year after being in an Alliance with them at Delaware State Championships, so we wanted to meet their new team members and discuss their approach to the upcoming season. They told us that they wanted help with using mecanum wheels, so we made sure that we had plenty of team members ready to help.

II. EVENT SUMMARY

First, we introduced our new members and coaches and showed them what we were working on for our summer project. Patrick talked about our team approach to the design process and showed them the CAD designs we were working on. They had a



few questions about transitioning from using a plywood base to using a typical kit, so we recommended that they use Tetrix to start out with. After meeting in the conference room, we split into several groups. Karthik and Patrick explained the concepts behind

programming mecanum wheels to move diagonally and showed them how to implement these ideas into block code. Clare, Ian, Arnav, and Andrew showed several members around the lab and taught them about motors, servos, and gearboxes so that they would be able to construct a drivetrain. Then, we all met back in the conference room before packing up.

III. EVENT REFLECTION

Over the past year, our team has built a strong partnership with the Dragonators and we were happy to be able to renew it through this meeting. We were able to give them a lot of pointers and tips that they can consider for the coming season, and the relaxed atmosphere made for an enjoyable experience for everyone. As I (Clare), was new to FTC last year, I was happy to be able to talk with their team's new members and talk to them about what to expect in the next few months.

We were very happy with this outreach and learned about the value of having partnerships with other teams, including those that have less experienced members. In sharing our knowledge, we were able to gain a lot in return, and we were happy to be able to give back to the FTC community. We will continue to stay in touch with the Dragonators and will look to meet with them again throughout the season. We also hope to have joint meetings with other FTC teams in the future because it is such a great learning experience for both teams!

DELAWARE KICKOFF 2019

DATE & TIME: 09/07/19 | 10:00 AM 1:00 PM

I. EVENT DESCRIPTION

Our team has attended this annual event multiple times. It is held in Early College High School at Delaware State University in Dover. Typically, 8-10 teams from the local Delaware area get together to review FTC guidelines, watch the kickoff video together, see the new field, and brainstorm some early concepts. It is always exciting to be able to have a community event to start

II. EVENT SUMMARY

In the morning, teams introduced themselves so everyone could be familiar with each other. Next, Mr. Perotto gave a mini presentation of the events and changes for the upcoming season. He showed the differences in the Game Manual, and told us possible dates for meets and the State Championship. He also displayed several programming and building resources that teams could reach out to if they needed assistance throughout the season. Before the game was revealed, we took a small lunch break, and teams got together to discuss their excitement.

At noon, the game was revealed! Delaware teams and nearby out of state teams watched the reveal video together. After we watched, we got a chance to see the field in another room and test out different ideas. Several teams, including us, brought robots to test on the field. Most teams were building structures with the stones to test the balance of varying heights of skyscrapers.



After we all had a chance to see the game, teams were gathered together so we could ask any questions we had about the rules of the game. The event ended on a happy note with a small giveaway. Teams got to keep blocks, and a small lottery was held for random teams to win REV kit parts. We won a mecanum wheel!

III. EVENT REFLECTION

Overall, the kick off was a successful event! Local Delaware teams were brought together, and we could all discuss our thoughts and ideas in the spirit of Gracious Professionalism™.

We learned the value of cooperation, sharing our ideas with other teams. We want the Delaware area to compete with stronger robots and creative engineering!

For the next Kickoff, we might want to be more prepared with a better working chassis. This would help us think of more ideas that could work with the new season.

BRAINSTORMING WITH #8528 RHYME KNOW REASON AND #13467 LYRICS AND LOGIC

DATE & TIME: 09/10/19 | 6:00 PM - 8:00 PM

I. EVENT DESCRIPTION

At our first meeting after the SkyStone kickoff, teams Rhyme Know Reason (#8528) and Lyrics and Logic (#13467) joined MOE for a fun brainstorming session. Since these teams were unable to attend kickoff the weekend prior, MOE mentors and team members helped provide both teams with an overview of the SkyStone game. This was beneficial for all three of our teams as we were able to brainstorm new ideas and experiment with several other perspectives.

II. EVENT SUMMARY

The two teams arrived and we started by gathering in the conference room. We first watched the game video again with them and did a quick refresher on the rules and point values. From there, we talked about some high level ideas we had before moving into the lab to build the new field. While assembling this year's game pieces, we broke off into groups to experiment with concepts on how to harvest blocks, how to localize the robot's position, and how to stack. We also looked through Game Manual 2 in order to answer the rules questions we had, but for the rules we did not find answers to, we will submit them to the official FTC forum in order to get clarification. After the field was assembled, we gave both Rhyme Know Reason and Lyrics and Logic two stones to take and use as they wait for their Field to arrive. Everyone enjoyed having some group

discussions and rough testing of ideas, such as picking up stones using a rubber claw.

We concluded our meeting around 8:00pm, but we will stay in touch throughout the rest of the season.



III. EVENT REFLECTION

In conclusion, we agreed that this was a fun and beneficial meeting for all three teams. We were excited to be able to share our ideas with each other and build our game field for the first time. It was helpful to have a larger group that allowed for more

ideas to be generated, and we will carry this collaboration on for the rest of the season.

It was especially helpful for the new members of both teams to learn about how the FTC community welcomes each other and to experience an initial brainstorming for the first time. We hope to meet with Rhyme Know Reason, Lyrics and Logic, and other teams throughout the season at and meets.

MEETING WITH LENA DILLARD

DATE & TIME: 10/01/19 | 9:00 AM - 2:30 PM

I. EVENT DESCRIPTION

We arranged to meet with Lena Dillard, an FTC judge who has volunteered in Delaware and Pennsylvania for eight years. We wanted to review award requirements and ask Lena about what she had learned from being a judge and what we should keep in mind for the upcoming season. We knew that this was a good opportunity to discuss aspects of the competition with someone who has been involved with FTC for a while.

II. EVENT SUMMARY

This was a very useful event for our team. We always value being able to meet with other members of the FIRST and engineering community, and Lena's experience with judging in Delaware and Pennsylvania gave us a lot of insight into how FIRST competitions are run



and how we can better improve our team organization and processes. She was very helpful and helped all of our team members and coaches better understand the judging and competition process.

She began by giving a general overview of what a competition schedule may look like and continued by telling us about her general experiences with judging and qualification.

Two sides to every event: Competition and Judge Interviews

- A. Awards for each side (CRUCIAL FOR ADVANCEMENT, especially in Delaware since only 1st place Inspire advances to World Championships)
Judging is your opportunity to show off robot, outreach, and team and to WIN AWARDS. Team is interviewed by 2-3 Judges and each panel interviews between 4-7 teams. Judges are volunteers with all sorts of professional backgrounds.
- B. Ten to fifteen minute interview
 - 1. Up to 5 Minutes uninterrupted presentation and 5-10 minutes Q&A
 - 2. It is very difficult to fit all of the season in a 5 minute presentation – it is skillful to reference the notebook and just give highlights — “Elevator Speech”
 - 3. Best teams practice their presentations and give a general overview of their highlights, while leaving time for judge input and questions
- C. Bring Robot, Notebook, visuals, and handouts
 - 1. Not having a Notebook makes you ineligible for most awards
- D. Judges nominate teams for awards based on eligibility (Criteria laid out in GM1 Section 9)
- E. Pit interviews and match observation during qualification matches as extra factors for awards
 - 1. Critique - Last year, 16/18 teams were either in queuing or in match play so pit interviews were easily interrupted by match schedules - Our mentors suggested that there could be 30 minutes after lunch dedicated for pit interviews
- F. Award winners and scripts written
- G. Advancement finalized after Match Finals

III. EVENT REFLECTION

In conclusion, this was a fantastic opportunity that we took advantage of. Lena was very gracious with her time and knowledge, and all team members were able to learn a little bit more about the judging process. Specifically, many of the more experienced team members had not

known about how the competition functioned from a judge team's point of view. This definitely gave us a greater appreciation for all of the volunteers involved in running a competition! Newer team members learned about each of the specific awards and what constituted a Technical award (Think, Innovate, Design, Control) and a Community Award (Motivate, Connect). While we frequently get to interact with FTC mentors and other teams, it is less common for us to be able to talk with those who are involved with FTC behind the scenes in competitions. We will definitely have a greater awareness of the logistical functions of a competition and, more importantly, the hardworking volunteers who make every event possible.

ROBOKINGS #12993 OUTREACH

DATE: 10/15/19 through 10/19/19

I. OUTREACH DESCRIPTION

We first got into contact with the RoboRoyals/RoboKings team through a Reddit post. We learned that they were a team located in Australia and connected to Chancellor State College. They were looking to move from FLL to FTC and wanted to be in contact with a few different teams so that they could have an avenue of advice and collaboration. Seeing this, we reached out to them via email and introduced our team and our strengths. The team “RoboRoyals” unfortunately had to disband due to other commitments, but many team members decided to join their sister team RoboKings! They have requested to be identified as RoboKings throughout our writing.

(RoboKings’ Reddit post)

FTC collaboration

Other

Hi fellow FTC teams,

My name is Ellie and I am the team manager of team #12993 or RoboRoyals from Australia. We have begun FTC this year, transitioning from FLL, and are looking for other FTC teams to keep in contact with us through YouTube videos and emails. We used this technique throughout our FLL journey and found it an effective way to bounce ideas, collaborate and get to know teams from around the world.

If you are interested in collaborating, please email us at roboroyalscsc@gmail.com

Thank you!

Ellie and the RoboRoyals

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II. EVENT SUMMARY

After sending them an introductory email, they asked us a few questions about programming, which we redirected to our programming team. They were wondering about the benefits of using Java rather than other kinds of programming, and we advised that they start with blocks and play to their strengths. They also invited us to join their Discord server which put us in contact with many other teams from a variety of locations. Our email communication is attached below.

moe365ftc . <moe365.ftc@gmail.com> Tue, Oct 15, 2019 at 6:35 PM
To: roboroyalscsc@gmail.com

Hello Team #12993 RoboRoyals!

We are Team 365 MOE (Miracles of Engineering), a 12-year veteran team from Wilmington, Delaware. We are highly experienced in all aspects of FIRST Tech Challenge, and we would love to help your team navigate the through your FTC journey!

Our main speciality is programming, achieving a nomination for the Control award at the Detroit World Championships. We have a very experienced team of programmers that can help any where from the basics of block programming up to complex control algorithms, camera detection, and motion planning in autonomous!

We also have great experience in documentation. We use an online notebook, and we are happy to answer any questions you have about technical documentation.

Overall, we'd be happy to help with any questions or issues you may have. Let us know if there's anything we can do to help and the best form of communication for you (email, discord, etc.)

Sincerely,
Patrick and Clare
MOE 365

RoboRoyals Australia <roboroyalscsc@gmail.com> Sat, Oct 19, 2019 at 8:13 AM
To: "moe365ftc ." <moe365.ftc@gmail.com>

Hey Patrick, Clare and MOE 365!

Thanks so much for reaching out! I apologise for our tardy reply, life get's in the way sometimes...

It's been amazing to connect with teams like you who are so willing to offer help in your areas of expertise - thank you so much.

Before I continue, I'd just like to let you know that we are now known as RoboRoyals #15145! There have been a few issues with registering team names and the numbers, so our junior team is known as #12993 and we are now #15145. Sorry for the confusion.

I think we might just have to take you up on your offer to help us with coding, our coders have little to no experience. We are aiming to go big this year and hope to make it all the way to world champs. We've been told by other teams that from the start, we should aim to learn to code in java, as it is better and more flexible. Do you agree with this?

If you could help us in any way with coding that would be great, especially auton and camera detection for the skystones this year.

Any tips and tricks you have are always welcome.

In terms of communication, we operate through almost anything under the sun - let us know what suits you, and we can work it out. But recently we have built what we hope will turn into a community of people like you and I, but also people beyond FIRST. Currently, we have close to 80 members who all compete in FTC and are currently looking at ways to grow this beyond FIRST. If you're interested, you can use this invite link, but it's obviously not the most private way to collaborate. Just let us know.

Again, thank you for taking the time to reach out to us. I (and all of #15145) look forward to hearing back from you.

Thanks!
Mitch

moe365ftc . <moe365.ftc@gmail.com> Sat, Oct 19, 2019 at 11:40 AM
To: RoboRoyals Australia <roboroyalscsc@gmail.com>
Hi Mitch and RoboRoyals #15145!

Clare and Patrick have directed your emails towards me and the rest of MOE 365's programming team and we are happy to provide any programming assistance to your team!

To answer your question, Java is very useful for FTC programming and has several benefits but can be a timely investment for your programming team if they are inexperienced with the language. Learning a new programming language always takes a lot of time and effort, and this effort can be used elsewhere. MOE 365 currently does use Java for our code, but our programming team had a good amount of background knowledge and experience with Java beforehand. We would only recommend coding in Java if your programmers are familiar with the language. For inexperienced programmers, we recommend using block-based programming as it is sufficient for FTC and is easier/faster for beginners to learn. There have been teams who participate in the worlds competition with block-based programs; the best coding language is different for each individual team. Here is the link to the FIRST blocks programming manual: https://www.firstinspires.org/sites/default/files/uploads/resource_library/ftc/blocksprogramming-trainingmanual.pdf

I hope this information helps. Feel free to email us or chat on discord about any other questions you may have! Thank you for inviting MOE to your discord server; we appreciate any opportunity to reach out to other teams! If you haven't already, you should join the FTC discord for more resources: <https://discordapp.com/invite/vJ9js72>.

Sincerely,
Helen and programming team
MOE 365

III. EVENT REFLECTION

Communicating with the RoboKings Australia team was a unique and beneficial experience for many members of our team. As we've been expanding the scope and

impact of our outreach this season, collaborating with teams from other countries was a great opportunity for us. Through our experience helping rookie teams in Delaware and New Jersey, we understand that it can be difficult for new teams to get the resources and information to surpass the steep learning curve of FTC, and we hope that the guidance we provided has helped the RoboKings in their first season. We have continued to stay in touch with them and many other teams through their Discord server, and look forward to maintaining these relationships for seasons to come!

NATIONAL CHEMISTRY WEEK AT INDEPENDENCE

DATE & TIME: 11/2/19 | 12:00 PM - 3:00 PM

I. EVENT DESCRIPTION

To celebrate National Chemistry Week, the Independence School hosted an event to teach children the importance of chemistry and science. For our team, the goal of the outreach was to interest children in the field of robotics and possibly get them into the FIRST program.

II. EVENT SUMMARY



The event went really well, with many children driving the robot and parents coming up to ask with some interested in knowing more. Also, many younger Girl Scouts were in attendance and learned more about robotics and FIRST.

Because of our previous experiences with this event, we knew it would be good to bring two robots to the outreach; there are many people who want to line up to drive robots. Unfortunately, only



one of them worked, but many children were still interested.



While at the outreach, we had many kids come up to our table and drive the robot around. The robot they used featured a mecanum drive train, but no other mechanisms, so a lot of them were interested in chasing around one of the team members.

Many parents asked about robotics and how they could join or get involved. We had them write their information down or asked them to go to the FIRST website for answers to their questions. We also brought a tri-fold featuring other outreaches we had done and our engineering notebooks from last year for children and parents who are interested in getting their children in the FIRST program.



At one point, the gearbox of our drivetrain motor lost its screws and fell apart. It required us to put the small gears back together in the gearbox, but children joined in and helped us find screws! Moving forward, we wanted to make sure those screws were tight, so we even had children help us with maintenance! These hands-on activities created a deeper interest.

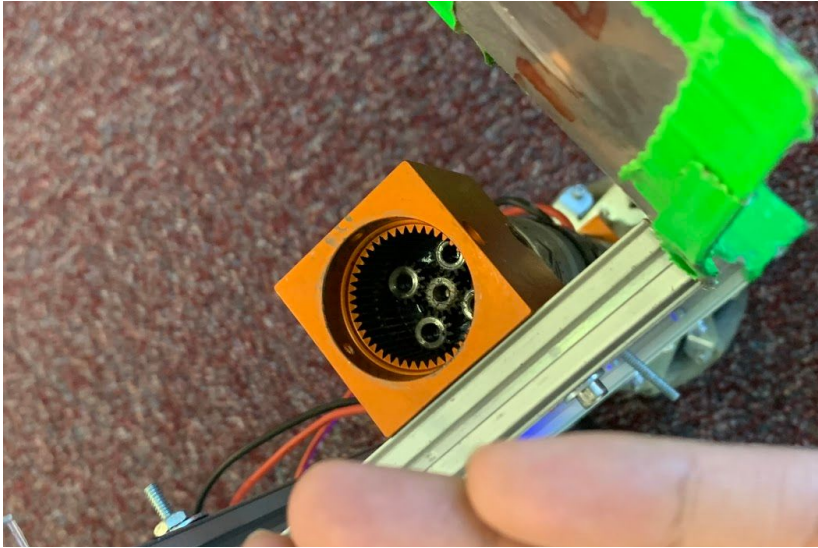
III. EVENT REFLECTION

This outreach was very effective because of the younger audience. Sometimes, experiences like this in childhood can create interests that will last forever. Furthermore, there were many Girl Scouts at the event, and increasing female interest in the STEM field would expand the diversity seen in engineering and robotics in the future.

As stated previously, one of our outreach robot did not work. This one would probably be more interesting for the children because it could also swing a bat. Because we were using older electronics, this robot is often inconsistent and disconnects very easily. We hope to switch to REV electronics in the future to make it more reliable.

Also, we forgot to pack controllers! Luckily, the outreach was not far away, and one of the mentors was already at the lab. This experience shows the importance of a packing list. Although we already have one, it is mainly for competitions. It may be worth making multiple types of packing lists to cater to different types of events.

Furthermore, although children had a fun, hands-on experience fixing the robot, we should not have let the gearbox fall apart: quick maintenance can save long



problems. We need to make sure we're frequently tightening our screws, especially for longer outreaches.

The event was an overall success because we interested many children and

parents in robotics and the FIRST program.

MASTERMINDS OUTREACH

DATE & TIME: 11/09/19

I. EVENT DESCRIPTION

Team MasterMinds reached out to us through our social media page. We discovered that they were a team based in Brazil who had followed our social media for a while. They were looking for help in documentation and the Engineering notebook, so we directed them toward Patrick, our documentation lead.

II. EVENT SUMMARY

After receiving their request, Patrick compiled an email summarizing the importance of the Engineering Notebook, its purpose, how our team writes it, and a few tips and tricks we've discovered over the last few seasons. We shared our design process and described how it should be connected to every notebook entry. Finally, we advised that they join the FTC Discord server, as it provides quick and detailed answers from people who are very experienced in various areas of FTC.

The full email is included below:

Hello Jhon,

I am Patrick from MOE. I am the documentation leader on the team, and I would be glad to help. First, the engineering notebook is a very important aspect in the competition, so I am happy to hear your enthusiasm to learn more! If the notebook clearly conveys your hardwork and dedication in the season, then judges are able to give you the awards that you deserve!

First, make sure you look at the checklist on the FIRST website for FTC notebooks! I directly used this when making the template for our notebook! Make sure you write your outreaches, meetings, competitions, and whatever you do as a team!

Next, you should have a clear design process. First, this will increase your efficiency and work-flow as a team, but it will also make writing the notebook a lot easier and more organized! I wrote a small document on the importance of the design process:

“We wanted our notebook to be easy to write and also easily understood by readers without sacrificing the quality of our notebook entries. Our goal with the notebook is to document all of our experiences, decisions, and reasonings behind those decisions. All in all, it may seem complicated and lengthy to write every experience and decision, but we made it easier to write and read by following one universal design process.

The design process not only helps us make smart mechanical decisions, but also serves as a guide for our notebook entries: our thought was that if we follow the design process throughout our decisions, we can easily write about each step that we follow and our reasonings behind our decisions.

This makes entries easier to write because all of our decisions can be supported by a universal design process. With an overall understanding of the design process, it is easier to understand why we made the decisions that we did. Also, each step of the design process has a description of the information that it should contain, so crucial steps do not get glanced over. “

Additionally, it is very important to write what you learn! Whether you succeed or fail, reflect on what you did. FTC is a learning process, and judges want to see this process through the notebook!

To create a quality notebook, make sure you add pictures, math, and reasoning! They will convey your process better than just words and will create a more competitive notebook!

To organize the notebook, we use Google Drive. All students on the team have a google account for writing in the notebook, but we also have a team email we can use. We do not have the notebook as one document—each entry is on its own, and we save it as a PDF in order to number the pages. Google Docs has trouble with very large documents. Because we have so many documents, we create organized folders in the Drive, so files do not get lost after the long season. We have outreach writing and meeting writing in two different folders, as long as many other folders for documents, our Team Plan, programming, and CAD. The outreach and meeting folders also have a folder for unfinished meetings, completed meetings, and printed meetings. This way we can keep track of meetings that still need information, so we do not have to go through each document to make sure it is complete. Also, we need to keep track of which meetings are in the PDF and printed, and which ones are not.

Finally, my job as the documentation leader is to make sure that the notebook is getting written. I use a spreadsheet to log which notebook entries are completed and the things required to complete the entry. This way, I can know who to contact to write their notebook entry.

The notebook is very important, but many teams do not spend this much work on it. I believe that it is the most important aspect in order to quality to the next step of competition. It is up to your team to decide how much effort you want in making your notebook the best as possible!

If you have more questions, you can contact me directly on discord.

If you do not already have a discord, this is crucial if you want to learn quickly in FTC. Experienced engineers and programmers can easily be found on the FTC server, and the community answers very quickly!

One quick question: What is your team name and team number?

Thanks!

Good luck on your 2019-2020 FTC season!

Patrick Tiamson and MOE 365!

Here is his response:

Hello, first we want to thank you for all the support you provided us. Surely we will quote this conversation in the notebook. We look forward to the presentation knowing in advance what will happen because you, thanks again for helping us, and we look forward to seeing you at the international stage!

III. EVENT REFLECTION

This outreach aligned perfectly with our aim to expand our team's impact and role in the FTC community. We not only got to meet a new team for the first time, but also learned more about how FIRST works in other countries and how difficult it can be for teams outside of the US to get the resources and contacts necessary to participate in FTC to the fullest. For this reason, we were extremely glad to be able to provide any experience and advice we could for the MasterMinds. We also learned that our team's social media is helping us discover new teams and that the work we've done this year has certainly helped us find other teams from a large variety of places.

OXFORD SCRIMMAGE

DATE & TIME: 11/16/19 | 8:00 AM - 4:00 PM

I. EVENT DESCRIPTION

This event is a meet held at Oxford Area High School hosted by teams #61 Ozone and #6045 Twobar, who also host qualifiers later in the season. This is an early checkpoint for us to see where our progress is, both with our robot and our documentation. We are not too concerned about how we perform competitively, as this is still an early meet and is very low-stakes. We will be able to talk with many teams, get practice will communication in our alliance, and give experience to new members.

II. EVENT SUMMARY

After arriving in the morning, we went through all the normal Inspection phases. We needed to tape off some sharp edges and add some stickers, and we worked with the judges and volunteers to make sure that our robot was competition-legal.

Though there was no formal Judging Presentation, some of the judges were available to evaluate our notebooks. Lena Dillard, who we met with earlier in the season,



looked at our Engineering Notebook and gave us some advice. She recommended that we add more calculations, a summary page, more information on our finances, and a design summary section. It was very valuable to have a judge's perspective on our notebook so far, and we will definitely add these things to make our notebook as thorough as possible. We also got to talk to team #10098 Two-eyed Illuminati about their notebook and Team Plan.



From a technical viewpoint, our competitive experience was very valuable. While we had some constant problems with disconnecting, we were happy to experience this issue now and not at a later competition. Some of the problems we encountered included electrostatic discharge

(ESD), our phone coming disconnected, and software crashes. We sadly disconnected in every single match, so we finished in last place. In the moments that we weren't disconnect, we noticed that our robot intake performed very well. We will look into solving these issues in the next few meetings.

III. EVENT REFLECTION

In conclusion, this was an invaluable experience for our team. We got useful advice on our Engineering Notebook and got to talk to other teams about mechanical plans and documentation strategies. While it was frustrating to have disconnection issues, we kept our team spirit high, practiced the MOE cheer, and got a clear idea of what we need to do in the next few weeks. We were very happy to see that our small robot's drive train allowed for high maneuverability and shared many fun moments with our teammates and with other FTC teams. We enjoyed the competition and are looking forward to the next few weeks of the season!

#14851 JULIETTE'S REVENGE MEETING

DATE & TIME: 11/19/19 | 7:00 PM - 8:00 PM

I. EVENT DESCRIPTION

FTC team Juliette's Revenge (#14851) visited MOE during one of our Tuesday meetings. Juliette's Revenge is a rookie FTC team that is currently facing wire and phone connection issues that MOE faced early in the SkyStone season. We invited Juliette's Revenge to tour MOE facilities and hold discussions about different issues encountered and solutions created about challenges both of our teams have faced in the SkyStone game this season.

II. EVENT SUMMARY

During the meeting, the team of Juliette's Revenge arrived and met MOE in our conference room.

Members of Juliette's Revenge talked to members and mentors of MOE about the types of connection errors they were facing. After talking through and brainstorming ideas about this problem, MOE looked tried



troubleshooting their problems. We saw that their driver station was incorrectly trying to find a REV Control Hub instead of a Robot Controller phone, so we quickly fixed their

settings. From there, a few MOE members introduced Juliette's Revenge to the organization and facilities used by MOE. Furthermore, they asked for mechanical tips on their stacking mechanism. They had wanted to know how to achieve linear movement using a motor/servo, but there was very little space. We recommended using a rack and pinion because of its small form factor.

III. EVENT REFLECTION

Ultimately, the meeting with Juliette's Revenge proved to be insightful for both teams. Juliette's Revenge was able to overcome difficulties in running their robot and were introduced to efficient and effective organizational methods that MOE has experimented with in the past couple of years. At the same time, collaborating with Juliette's Revenge helped MOE sort out some of our own connection issues between wires, phones, and hubs. In addition to competing well, MOE aims to inspire other people and teams in our community to further the development of robotics in the Delaware region as a whole. We hope to see Juliette's Revenge at future meets and look forward to collaborating with them again!

TOWLE INSTITUTE MEET

DATE & TIME: 12/05/19 | 5:00 PM - 8:30 PM

I. EVENT DESCRIPTION

This event is a local Delaware meet held at the Towle Institute. Around 15 teams from the surrounding Delaware area attended. MOE members were able to discuss robot developments and difficulties with a variety of different perspectives. The Towle Institute meet offered MOE and other Delaware teams an opportunity to talk to and get advice from a plethora of mentors and other team members.

II. EVENT SUMMARY

Overall, the Towle Institute meet was successful and full of improvements for the team. Out of the six matches, five of them went smoothly. Several aspects of our team improved after our first meet at the Oxford Scrimmage. As we dive further into the SkyStone season, elements of the team, such as driving and mechanical developments, are enhanced. Since MOE is becoming more familiar with the game, we were more prepared for this meet. One minor difficulty we encountered during this meet was a lasting effect of our previous connection errors. We disconnected one



time out of six matches, which was due to a collision with another robot where electrostatic discharge impacted both our robot and our alliance's robot. In addition, one of our plastic drive pulleys broke in the final match. We performed fairly well despite not having as many mechanical capabilities, and we were very happy with how well our harvester functioned. Our smaller robot was very maneuverable and faster when compared to the robots at the meet with larger wheels.



III. EVENT REFLECTION

The one time we crashed, our robot and the other robot involved both disconnected. As we were both using REV wheels, we are wondering if the REV wheels are a liability. We will have to do a few fixes before our P-Town Throwdown meet on Saturday and order some new parts.

One strategic mistake we made was that we tried to reposition the opposing team's foundation in an attempt to increase our competitive odds. We had utilized this strategy at the Oxford Scrimmage, but we did not realize the potential of obtaining

penalties for this. Since the opposing foundation was moved to be on our side of the game field, the harvester on our robot broke the plane of the foundation every time the robot travelled near the opposing foundation. This cost us several major penalties.

Despite this, MOE appreciates the opportunity for us to learn proper game strategy such as with the foundation repositioning. In its entirety, the Towle Institute meet was a fun and relaxed experience where MOE was able to connect with familiar Delaware teams and learn about several important game and mechanical strategies.

P-TOWN THROWDOWN MEET

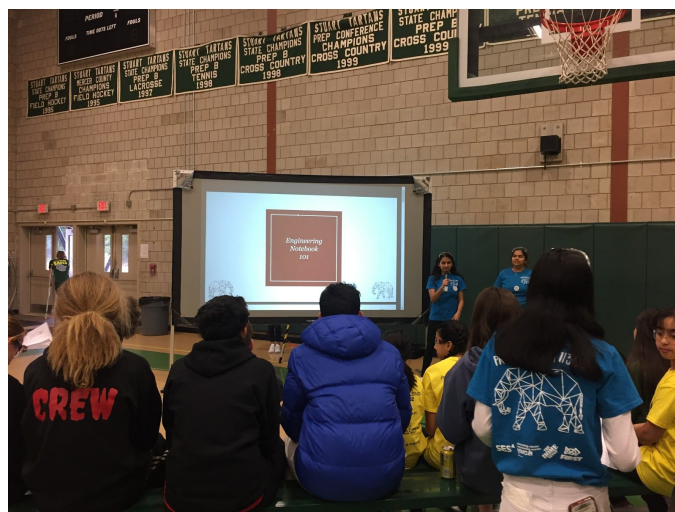
DATE & TIME: 12/07/19 | 8:30 AM - 4:00 PM

I. EVENT DESCRIPTION

This was a New Jersey meet that would allow us to compete against a lot of teams we don't normally encounter over the course of a season. This meet, though still early in the competition season, is important for us because we will be able to expand into a wider region and have the opportunity to potentially qualify for NJ State Championships. This is the first of two New Jersey meets that we have to attend, and our performance will dictate how well we have to perform in our second meet. It will let us see more ideas that other teams have and talk with others about game strategy and the engineering notebook. This should be a very competitive meet with many teams, so we are happy to have the opportunity to travel and participate.

II. EVENT SUMMARY

This event was beneficial for us for several reasons. There was an Engineering Notebook seminar given by team #11306 Prototype G that Clare, Jonas, and Helen attended. From this, we learned about how to structure our Team Plan and got some ideas for our Team Bios. We looked through some



of their old notebooks and will take some of this information with us when documenting for the rest of the season.

Robot-wise, we were very happy with our performance at this meet. We went 4-1 for the qualifying rounds and were 4th place Alliance Captain. We only disconnected once over seven matches, and our intake/harvesting system worked quickly and reliably. We had a few problems with our wheels slipping and pulling the Foundation



was slightly inconsistent. One mistake we made was in our Drive Team communication. Patrick and Rohan both pressed the Initialization button in the time before TeleOp started, which led to us accidentally starting moving before TeleOp. This mistake could be very costly (Major

Penalty!) in the future, so we are happy to have learned this lesson in this meet. A team with a great stacking lift, #7149 Enforcers, wanted us to choose them for finals, calling us the “best intake bot in the meet.”

Between matches, we were able to talk to a great number of teams about game strategy and other topics. Specifically, we were able to reconnect with #14541 Dragonators, a team that we’ve known since last year. We gave them some guidance with programming a servo and even got to partner with them for a match!

Our performance puts us in a fairly good position to get into a southern NJ League tournament. To qualify, we need to be the top 2 Non-NJ team in the region (including RPs and TBPs across all southern-region meets), and we were the #1 Non-NJ team in that meet. Since we finished with a low number of TBPs, we have may to go 5-0 in the next meet.



III. EVENT REFLECTION

Overall, this meet was a positive experience for us. Newer members got to experience a larger out of state meet, and the Engineering Notebook Seminar gave us some new ideas for the content we need more of. We will have to fix the wheels and build a permanent Capstone over the next few meetings. We definitely have a clearer idea of what we need to accomplish mechanically to have a competitive robot and got confirmation that our redesigned harvester works very well. This meet gave us a valuable perspective to where our team is at this point in the season and what we need to work on in the coming weeks.

KAIZEN ROBOTICS #16378 VISIT

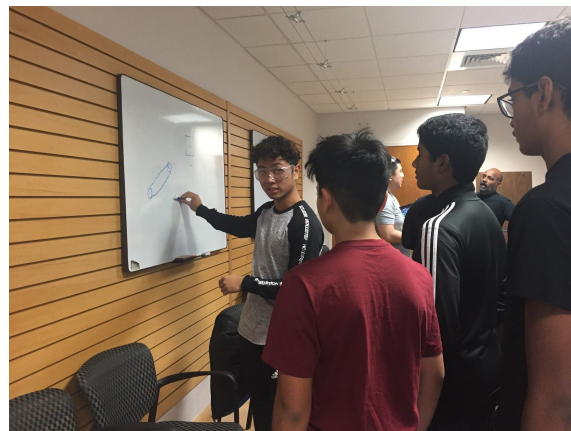
DATE & TIME: 12/14/19 | 10:30 AM - 1:00 PM

I. EVENT DESCRIPTION

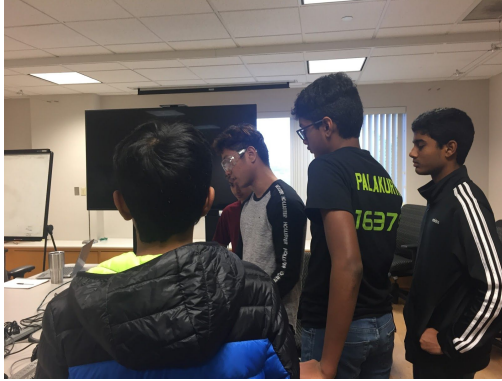
Kaizen Robotics is a first year, community-based Delaware team. Mr. Prettyman had been in contact with their mentors for a few months leading up to the season, but we were hoping to help them more directly now that they have started building and programming. We arranged for them to meet with us in our lab for part of our meeting today. We planned to answer any questions they had, help them with programming, and let them work in our lab space.

II. EVENT SUMMARY

As soon as they arrived, Andrew and Patrick gave them a tour around the lab and introduced them to different subteams and team members. We briefly went to the conference room, where Patrick and Clare gave the team mechanical advice. They had



motors directly driving their wheels, and Patrick recommended that they add belts or chain to reduce the stress on the motor's axle. We also introduced them to four bars, which would help them position and aim their claw better. After this, we took a look at their programming code and talked through options for vision detection. They were currently using TensorFlow Lite. While we did not have much experience with this



software, we noted that this option should be able to work, but Vuforia would be much easier for detection and navigation because of the built-in features. We also suggested that they use encoder values rather than time

Then, we returned to the lab and let them use the space and tools we had. We gave them the mecanum wheels and motors that we had used for last year's programming chassis, as these parts were no longer useful for us but were exactly what Kaizen needed.



As Clare and Patrick worked with the team, Arnav and Mrs. Ho talked to their parents and coaches about funding. We are hoping to help them become a part of First State Robotics and gave them some advice about sponsorships.

III. EVENT REFLECTION

After communicating with and meeting this team on a few occasions, we were happy to finally meet with them in the lab. We were impressed by how well they had performed in meets and tried to give as much guidance as possible so that they would continue to learn and improve. While our team is fortunate to have the support of many experienced mentors and financial backers, we understand that many teams and

especially new teams struggle to find these. Therefore, we are hoping that we can help Kaizen Robotics join FSR, develop new skills, attract mentors. We had a fun time meeting and learning about this team, and we're excited to see how they progress throughout the rest of the season!

DOVER HIGH SCHOOL MEET

DATE & TIME: 01/10/20 | 5:00 PM - 8:00 PM

I. EVENT DESCRIPTION

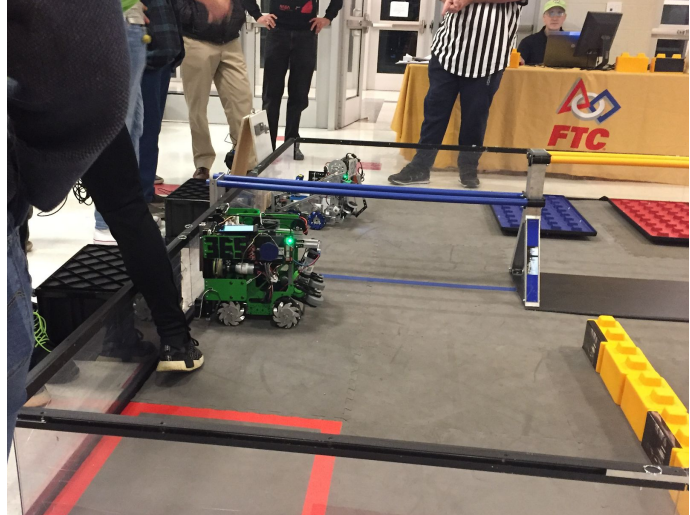
This was the second Delaware meet our team would attend this season. We attended this event last season, so we were already familiar with the venue (and excellent concessions stand!). We knew beforehand that it would likely be a smaller meet since it was on a weeknight. However, this meant that we would have more time to talk with these teams, learn the rules of the game, practice driving, and work with an Alliance Partner. We were also hoping to begin filming footage for our Promote Video.

II. EVENT SUMMARY

As we expected, there were only five teams there including us. This gave us lots of time to interact with each team, including our Pit neighbors EngiNerds. The match schedule was fairly casual because of the low number of teams, and we were able to get a lot of drive practice and test our mechanisms. While the drivetrain was working well, the lift string came undone a few times. We were happy to discover this issue sooner rather than later and will print a new spool as soon as possible.



Despite this issue, we had plenty of time to participate in matches and talk with the referees, several of which we had seen before and who had also refed at World Championships in past years. They were able to answer the more specific rule questions we had, and the lower number of teams meant that we had extra time to understand the smaller parts of the game ahead of the more pressure-filled competitions.



We also got the opportunity to start filming for parts of our Promote Video, which we will be adding to over the next few months.

III. EVENT REFLECTION

In our team's experience, we often find that the smallest meets are the most memorable ones - this Dover Meet was no exception! Having less pressure and rush meant that the teams, volunteers, and refs were all able to spend more time enjoying the event and making sure that every team was able to perform at their best.

After the competition, we received a message from team Enginerds:

"EngiNerds update-It was crazy last night, we had a lot of things wrong, Core module was burnt out we put wires in wrong...we are here at our

workshop 8am -11 today, Moe was great, they tried to help us, we will be ready next time, learning a lot!!!!!!”

We were glad to be able to aid the Enginerds in any way we could, and will continue to check in with them throughout the competition season. Events like these help bring the FTC community closer together, and we are grateful to have been part of it!

WILLIAMSTOWN ROBO-SCUFFLE NJ MEET

DATE & TIME: 01/12/20 | 8:30 AM - 4:00 PM

I. EVENT DESCRIPTION

The Robo-Scuffle, at Williamstown Middle School, was the second NJ meet of the year for our team. It was a popular event and a great opportunity for many team members to get used to the environment of an exciting and large competition. We came into the meet as the number one qualifier from out of state, and we needed to remain in the top two in order to qualify for the NJ League competition. However, we also knew that this meet would have many good teams from around the region, including many who we haven't met before. While having the chance to qualify for NJ states would be a unique and new experience for our team, we were looking forward to the opportunity to meet many new teams and reconnect with older ones.

II. EVENT SUMMARY

We arrived at the competition early in the morning and were happy to be met by a very large venue with many teams. We went through Inspection while talking to many of the other teams, including Out of the Box, who kindly lent us plenty of tools throughout the competition and our neighbors, the Dragonators.



Unfortunately, we ran into a few issues during our matches. Our lift string came undone a few times, and our drive belts shredded after the third match. This meant that we had to spend more time than expected with repairs rather than with drive practice.



However, we also got to play with and against some new and inspiring teams! With the help of our partners, we were able to get our first experience of stacking high in a competition. We also experimented with a new scouting strategy and will continue to work

on this for future competitions.

Luckily, we were able to get a chance to participate in the playoffs. This was a great experience with many close matches and exciting finishes. While our robot's mechanical issues meant that we did not perform as well as we had hoped, we did take full advantage of the opportunity to learn from and work with many teams for the first time.



II. EVENT REFLECTION

Overall, MOE's experience competing in NJ was overwhelmingly positive. We enjoyed the high quality of competition and the vast amount of teams, all of whom were willing to discuss their thoughts and strategies with us. As we work to expand our

team's role into a larger community, we hope to return to NJ FTC again next year and keep in touch with the teams we met at this meet. We have a clear idea of what work we still have to perform on our robot and will have positive momentum moving into our upcoming outreaches and competitions. This meet was a fun event, and we are so grateful to the teams and volunteers who made it possible!

PRESENTATION AT THE COLLEGE SCHOOL

DATE & TIME: 01/17/20 | 9:00 AM - 12:00 PM

I. EVENT DESCRIPTION

At the College School, a 25th annual talent show was hosted for students at the school to showcase their unique abilities and interests. One member of MOE FTC, Aidan, was able to bring the Batterbot and give a slideshow presentation during the talent show to introduce students to FIRST Robotics and our team. With this event, we aim to inspire other students, teachers, and parents to engage more in STEM and use the skills that they have learned in school in other places.

II. EVENT SUMMARY

During the talent show, Aidan was able to give a formal presentation filled with many pictures of the MOE team and our robot CAD pictures. In addition, he was able to give a brief introduction of FIRST Robotics and the types of FIRST Tech Challenge competitions that we have attended as a team. Afterwards, Aidan demonstrated the abilities of our batterbot outreach robot to the audience. This was beneficial as it showed younger students and parents how robotics can be engaging and connect to other fields of study to interest children. Aidan was also able to talk to many other audience members about their thoughts on our team and robots.

III. EVENT REFLECTION

Overall, this event was a success and contributed much to the talent show as a whole. A couple of minor issues arose, and we were able to learn a lot about outreach

organization in general. Since this event was a talent show, Aidan was unable to describe in detail the batterbot and have the audience members test drive the robot. Minor aesthetic details of the slideshow presentation, such as using music to make the presentation more engaging, will be evaluated and implemented for future outreach slideshows. At the conclusion of the event, several students, parents, and teachers were exposed to robotics and STEM. Beyond the technical aspects of MOE and FIRST, many audience members were impressed with the accessibility and abilities of the batterbot. MOE is happy to have the opportunity to connect with another diverse group of individuals and MOEtivate our community to engage with STEM. We look forward to collaborating with the College School and possibly seeing these students in FIRST teams in the future!

PENNSYLVANIA BLUE & WHITE QUALIFIER

DATE & TIME: 01/19/20 | 8:00 AM - 4:00 PM

I. EVENT DESCRIPTION

This event was a very competitive qualifier hosted by Penn State York at the Joe and Rosie Ruhl Student Community Center. This venue had held the event for many consecutive years and had a long history within the PA FTC community. We knew that there would be many quality teams from Pennsylvania, New York, New Jersey, and Maryland. We were the only Delaware team in attendance, so we hoped to build connections with those in neighboring states as well as be strong ambassadors of DE FTC.

II. EVENT SUMMARY

We arrived at this event early in the morning and immediately signed up for Judging, which was the first time we presented to judges this season. We realized that we were scheduled for the first slot and that not all of our team members who were presenting were at the competition site yet, but everyone arrived in time. The presentation was not quite as smooth as we would like it to be but was a good start for the first presentation of the season. We felt that we did an overall successful job representing our team's goals,



accomplishments, and plans, and were glad to have this experience going into the second half of the season.

After the judging presentation, we did some drive practice on the practice fields and were able to meet and practice alongside many other teams from PA, MD, NJ, and NY, many of whom we had never met before. We also got to reconnect with RoboDoges and Flaming Phoenix. At the same time, we handed out custom MOE buttons and talked to other teams through scouting.



After the drivers' meeting, the matches began.

Our first match was unusual because though our autonomous ran fine, our TeleOp program did not run and the robot controller couldn't connect to the driver station. Thankfully, after the match ended, the problem fixed itself and did not

happen again. We will keep this in mind for future matches and will see if we can find a cause of this technical issue.

The rest of our matches were highly competitive and exciting. Our partners ran into a few issues with disconnecting, but we worked together well and ended up being able to put together decent stacking performances. We also saw some very impressive robots that we will take inspiration from as we continue to iterate our robot, particularly on the intake side. Our harvester's ramp was having some problems with consistency, so we viewed these other robots as good examples and made sure to talk to these

teams to see how we could improve.

Furthermore, several teams commented on our chain-driven, horizontal slide, and the wire management for our vertical lift.

Though we did not get to participate in the playoffs, we chose to stay and definitely enjoyed the experience! We watched some of



the closest and highest scoring matches of the season and were definitely inspired to keep improving and tweaking our own design. At the end of the day, we left with many good ideas, several connections to new teams, and a plan of what to do over the next few weeks.

III. EVENT REFLECTION

This event was one of our biggest learning experiences of the season. We were against very high-scoring robots with innovative mechanisms and programming algorithms. These teams were all extremely willing to talk about strategy, design, and autonomous, so we were able to make multiple new connections with these teams and hope to keep in contact with them when we compete with them in out of state events. Notably, we saw various ways to improve our judging presentation because this was our first event of the year with judging and awards. Although we can no longer compete in Pennsylvania competitions, this qualifier let us rethink our priorities for the upcoming

Maryland Qualifier. The event was overall very enjoyable and exciting through the hard work of the Pennsylvania volunteers and the Pennsylvania FTC Community.

HAGLEY STEM TASTIC OUTREACH

DATE & TIME: 01/20/20 | 11:00 AM - 3:00 PM

I. EVENT DESCRIPTION

Over several weekends in January and February, the Hagley Museum hosted outreach opportunities for their STEMtastic weekend events. MOE FTC was able to host one of these dates, which invited children and people from all around the surrounding region promoted by radio station ads in the area. Hagley's STEMtastic weekends attracted many young students and families, giving us the opportunity to work with children and introduce them to the world of robotics and to the world of FIRST Robotics in general. We invited other FTC teams X² Factor and Juliette's Revenge to join us in this event. Unfortunately, Juliette's Revenge could not attend, but several members of X² Factor brought their robot to the event.

II. EVENT SUMMARY

After setting up the Skystone field and our robots, we were able to use the batterbot as the demonstration robot for the children to practice driving with. The children and other attendees had fun driving the batterbot



around the space and attempting to hit a wiffle ball off of a tee.



Throughout the course of the day, we met many younger elementary and preschool-aged children who have had little experience with robotics. We did meet a few students who had blossoming interest in Lego building and the basic Lego Mindstorm robots. By handing out flyers and buttons to promote both MOE and FIRST Robotics, we were able to introduce families with young children to FLL and encourage them to join their local team. We hope that these

students will be interested in pursuing STEM and engaging in robotics in their future!

When we arrived at the Hagley Museum, we were joined by the Padua Academy X² Factor FTC team. After the X² Factor FTC team finished tweaking their robot, we were able to run a couple of practice matches with our competition robot on the SkyStone field during the break times.

III. EVENT REFLECTION

Overall, the Hagley STEMtastic weekends event was very educational for the visitors and our team as well. We had the opportunity to promote FIRST values and FTC, in addition to MOE and robotics. At the same time, half of the team was also able to complete hours of competition robot tweaks and drive practice while the other half of our team talked to interested parents and children. This gave us the chance to connect

with the Delaware region community and the FTC community, as we were able to brainstorm robot tweak ideas with X² Factor and hold practice matches with them. Some of the children were very engaged with our batterbot, and the mechanical team had the opportunity to talk with a young boy about the specifics of our competition robot. We love meeting students in the area and inspiring them to participate in STEM and FIRST programs; we hope to return to Hagley for more STEMtastic weekends in the future!

PG COUNTY MARYLAND QUALIFIER

DATE & TIME: 01/25/2020 | 7:30 AM - 4:30 PM

I. EVENT DESCRIPTION

The Maryland PG County Qualifier is one of many Maryland FTC qualifier events held at Parkdale High School. Many experienced, competitive teams attend this event, so we expect to see some innovative robot designs and strategy ideas. We have also been doing a lot of practice for our judging presentation, and we hope to try out this newer version of the presentation at this qualifier. This will be a great opportunity to talk to teams that we don't normally run into over the course of the season and we expect to see many high-scoring matches!

II. EVENT SUMMARY

We arrived at the competition and found out that we were scheduled for one of the earliest Judging times, which meant that we did not have time to run through our presentation beforehand. Despite this, all of our team members arrived on time and our presentation went very well. Although she didn't present a slide, Helen joined in to learn about the judging process and helped us answer questions about outreach and team organization. Due to this experience, she will be better prepared for helping us present in future competitions.



Our early judging slot meant that we had a large amount of time before the Drivers' Meeting and the matches starting, which meant that we were able to complete Inspection, drive with other teams on the practice field, and talk to some of the teams we met, including Volt-e-mort, Flamangos, Fairy Tale, and Falcons FIRST. We had many conversations about the mechanical details of lifting and harvesting, and got several good ideas.



We also got to try out a version of a capstone that Jonas had 3D printed for the competition. As we competed in matches and on the practice field, we discovered that we could not place the capstone until we had stacked at least three stones high. Although this would not normally cause an issue, we

will look into having a backup that can drop the capstone onto the foundation regardless of how high our skyscraper is.

Similarly to the Pennsylvania Blue and White Qualifier, these matches were very competitive. We saw some good teamwork between alliances where one team would stack while the other would deliver, and this proved to be a powerful strategy that



we hope to implement in the future with our alliance partner.

We stayed to watch the playoffs, and again saw some very close and high scoring matches. At the awards ceremony, we were surprised but very happy to learn that we had won the Think award and second place Inspire award, meaning that we had qualified for Maryland State Championships. The whole team felt very honored to be picked to advance among so many innovative and experienced teams, and we hope to make the most of this opportunity!

III. EVENT REFLECTION

While our robot's autonomous capabilities were unfinished for this competition, we still performed well, had the opportunity to talk with many teams in the Pits before and between matches, and learned several important lessons. We were happy to hear that the judges thought our notebook combined the design process, algorithms, math, and lessons learned in an effective format, and will continue to expand on these areas to make our notebook a better representation of our team's journey throughout the season. We also got into contact with several teams, which we plan to reach out to over email and social media. We have a new focus in the State Championship on March 1, and will plan our priorities and timeline around this new date. Overall, the PG County Qualifier was a great experience and has inspired us to improve all factors of our robot and team!

BLACK HISTORY MONTH KICKOFF

DATE & TIME: 02/01/20 | 10:00 AM - 1:00 PM

I. EVENT DESCRIPTION

The Walnut Street YMCA hosted an event celebrating African inventors and innovations throughout history. This event acted as the kickoff for February's Black History Month celebration. It featured many performers in the Wilmington region, from school bands to local comedians. Several vendors and community groups were invited as well (such as the Delaware Children's Museum), giving us the opportunity to showcase FIRST Robotics and our MOEbots as well. This event is unique as it targeted the underrepresented minority community of Wilmington, allowing us to introduce many young children without a lot of access to engineering to robotics and STEM in general.

II. EVENT SUMMARY

Throughout the morning, children from the YMCA and the surrounding area walked around the activity tables, where we gave demonstrations of our batterbot. The other vendors and groups also talked to the students and gave activities for them to complete. While the space was crowded, the



kids had fun driving the batterbot around in our corner of the room and making the batterbot hit the wiffle ball. Many of the children at the event have not had previous exposure to FIRST and robotics in general. We were able to talk to several interested parents about how to get their children involved in FIRST Robotics, whether it was FLL or FTC.

The Walnut Street YMCA handed out an inventor's notebook to each child that participated in the Black History Month Kickoff event, reflecting the event's purpose to teach children about important African and African American inventors throughout history. The children were able to collect stickers from each table after talking to the group about their specific exhibit. We handed out stickers and MOE buttons/pins to the children, who were very excited to drive a robot themselves.



In the middle of the event, the Walnut Street YMCA invited many local groups and individuals to perform. We had the opportunity to listen to songs by school bands from the area and watch traditional African dances by local dance organizations.

III. EVENT REFLECTION

Overall, the Black History Month Kickoff event was very educational to MOE, as it taught our members a little about traditional African culture as well as about African

American inventors and the Wilmington community. Demonstrations of the batterbot went smoothly, and the newly designed batterbot performed well. The students and families at the event had a fun time exploring robotics for themselves. One improvement for outreaches that can be worked on for future events is contact information. While the trifold does include information about FIRST Robotics and the social media information of MOE, there is no efficient way for us to hand out contact information. Something that could help with this is the creation of MOE business cards in addition to MOE buttons/pins. This will help both organizations that want MOE to demonstrate robots to their group and interested parents contact our team for more information about robotics.

MOE had an amazing morning interacting with the children and teaching them about the batterbot and the robotics in STEM. This event was meaningful to us because it gave us the opportunity to meet people from our team city and the surrounding underserved Wilmington community. It was heart-warming to see the enthusiasm of the students, and we hope to demonstrate our robots at the YMCA again soon!

#14851 JULIETTE'S REVENGE MEETING #2

DATE & TIME: 02/01/20 | 9:00 AM - 11:00 AM

I. EVENT DESCRIPTION

FTC team Juliette's Revenge (#14851) is a rookie FTC team that was facing issues with constructing their robot. Earlier this season, Juliette's Revenge was having wire connection issues that MOE also experienced. Through a Tuesday meeting in November, we were able to help them overcome these issues while also learning how to overcome our own connection issues. We invited their team back to the MOE labs to help with the finishing touches on their competition robot as both of our teams prepare for the Delaware state tournament.

II. EVENT SUMMARY

Juliette's Revenge came early in the morning to our scheduled Saturday meeting. They asked for mechanical tips for their grabbing mechanism as well as help with block programming.

Patrick helped them get started with blocks programming. Their main programmer was not there, so the whole team got involved in the programming process. First, they got a second Expansion Hub so their config needed to change. We showed them how to name their config to match



their wiring. Afterwards, Patrick helped them get their new Tele-Op code by showing them the math for differential tank drive using one joystick for forward and backwards movement and the other for turning. Next, he showed them how to set the powers to the



motors. After running the program, it was able to move! They followed this power setting process for their arm and their claw. After it was programmed, we got a stone from the field to test it out. It was a success, except the arm seemed to fall down with the weight of the stone.

Simply by changing the Zero Power Behavior to brake, the arm was able to keep its position.

Patrick also noticed that their rack-and-pinion grabbing mechanism did not seem to grab without the teeth skipping gears. Because they were using spur (eccentric) motors, it was very easy to get the teeth to mesh. We saw that by loosening the motor, you can just spin it in its mount and the teeth of the gear will mesh. Also, their set screws on the gears of their arm mechanism needed to be tightened.



They were very happy about the progress that they made when coming over! They could finally drive around with their new expansion hub, and can use this knowledge to start programming autonomous. We told them to keep in touch to ensure they are prepared for the Delaware State Tournament.

III. EVENT REFLECTION

This meeting was a good learning experience for both MOE and Juliette's Revenge. Working together kept the FIRST ideas of Coopertition and Gracious Professionalism in mind. Although MOE and Juliette's Revenge may be competitors at the Delaware state tournament, helping and working with each other is beneficial to both of our teams and the FTC community. We hope to maintain contact and also help other teams to strengthen the performance at the Delaware State Tournament.



ROBAUKTICS #395 MEETING

DATE & TIME: 02/04/20 | 6:00 PM - 8:30 PM

I. EVENT DESCRIPTION

RobAUKtics (#395) is another veteran FTC team in the Delaware region. The team is based in Archmere Academy and are working on their competition robot for the SkyStone season. We got into contact with them because Clare goes to school at Archmere and has met with team members a few times. We invited RobAUKtics to the MOE lab to brainstorm ideas for mechanical aspects of our robots, as they are facing minor issues with the wiring and mechanical design of their robot.

II. EVENT SUMMARY

Our team members briefly introduced ourselves, and Jess from RobAUKtics gave a short introduction as well. She joined us in our meeting room and listened to how we plan our meetings. Afterwards, she showed us a video her robot to show the mechanical issues she faced. She talked with Bryan, our mechanical lead, on how to fix the problems.

Bryan gave tips on the overall mechanical design. Their drivebase was very slow and the gearing was not mounted



of

sturdily. He gave out tiny mechanical tips for each mechanism and drew sketches for Jess to keep.

Clare and Patrick also briefly discussed the notebook. Jess says that RobAUKtics has not been writing a notebook, so Clare and Patrick emphasized the importance. We showed her ours to give her an idea of what the notebook should look like.

III. EVENT REFLECTION

This was a very successful outreach, hitting one of our outreach goals: Connect. We want to connect with FIRST in our community to strengthen the FTC Delaware teams. We find this very important because it will inspire everyone to work harder and harder and not be deterred by problems. By helping local FTC teams, we aim to have a more fun and competitive event at Delaware States!

The event did not completely go as planned, for only one RobAUKtics member could show up, and she could not bring the robot. Despite this, we were able to work with what we had and provide as much help as we could. She was able to learn a lot from Bryan's mechanical tips and will update the team to improve their robot!

LAB VISIT: MR. STEVE RHODES AND NCS

DATE & TIME: 02/11/20 | 6:00 PM - 8:00 PM

I. EVENT DESCRIPTION

During this Tuesday meeting, MOE invited Mr. Steve Rhodes and a local student to visit the MOE lab. Mr. Steve Rhodes is a potential mentor for local FIRST teams and wanted to learn more about FIRST Tech Challenge. In the past, Mr. Steve Rhodes worked with Vex Robotics and helped coach and mentor Vex Robotics teams. However, Mr. Steve Rhodes became interested in FIRST Robotics and FIRST's message after becoming exposed to the organization prior to this visit.

At this meeting, other members of our team also talked with a student from Newark Charter School, which is a local school in Delaware. Kevin, a student from NCS, was interested in the FIRST Robotics program after participating in FLL in second grade.

II. EVENT SUMMARY

At the beginning of the meeting, Mr. Steve Rhodes and Kevin attended the goal setting and priority setting session in the conference room. They were able to learn more about the design process and the organization of a FTC team. Afterwards, members of the team gave both visitors a tour of the MOE lab and equipment.

Bryan and Patrick talked with Mr. Steve Rhodes regarding the programming and electronics aspects of a FTC robot. Mr. Steve Rhodes was already knowledgeable about FTC after watching several robot tutorials and competition videos. Patrick was

able to walk Mr. Steve Rhodes through how to connect the robot's phones and access block programming. He also explained the basic electronic system of the robot. At the end of the meeting, MOE gave Mr. Steve Rhodes an expansion hub and a touch sensor for his personal experimentation. Mr. Steve Rhodes also watched members of our team practice for the judging presentation to learn more about the competition process.

Meanwhile, Arnav, Rohan, and Karthik met with Kevin to discuss the programming portion of FTC, as Kevin had programming experience and wanted to learn more about how to program for robotics. Karthik gave Kevin an overview of the existing code and demonstrated the iterative design process through testing the autonomous Skystone detection program.

III. EVENT REFLECTION

Ultimately, this outreach event encompassed two out of our three outreach goals this season: connect and expand. We were glad to help Mr. Steve Rhodes become more knowledgeable about FTC and introduce Kevin to FTC and FIRST Robotics. This was a valuable experience as we received the opportunity to help a local STEM figure learn more about organizing and mentoring a FTC team. At the same time, we were also able to bring FIRST Robotics to a student and our local community. We are thankful for Mr. Steve Rhode's input for our judging presentation and hope to see him on the FTC field in the next season!

ASPIRA ACADEMY FLL QUALIFIER

DATE & TIME: 02/15/20 | 9:30 AM - 2:00 PM

I. EVENT DESCRIPTION

Aspira Academy is a local K-9 school in Wilmington that was the host of one of many FLL qualifiers this season. Throughout the day, local FLL teams from schools and the community in the region competed in the FLL game and in core values. Besides the FLL students, there were also many parents and FTC students at the event as volunteers. Aspira Academy offered MOE an area at the competition to showcase our competition robot and promote FIRST in general.

II. EVENT SUMMARY

At the FLL qualifier, MOE was able to set up the Skystone game field in one of the rooms for demonstrations of our competition robot. Throughout the day, kids and



parents walked around the rooms and stopped by our display to look at our FTC level robots. We had the opportunity to talk to many interested parents about the next level of FIRST robotics that their kids can participate in after competing in FLL. This was a good learning experience for both the parents who wanted more information and MOE, as we learned more about the STEM needs of our community.

While parents talked to team members about participation in FIRST, kids and students watched MOE prepare and demonstrate the Skystone MOEbot. We also brought the batterbot to this event so the children were able to test drive a larger scale robot themselves.



Many of the FLL participants were interested in this, and their enthusiasm for robotics at such a young age was very inspiring to members of MOE.

Members of the mechanical and programming teams were able to make tweaks on the robot during this event. Since we brought the game field to this event, the drive

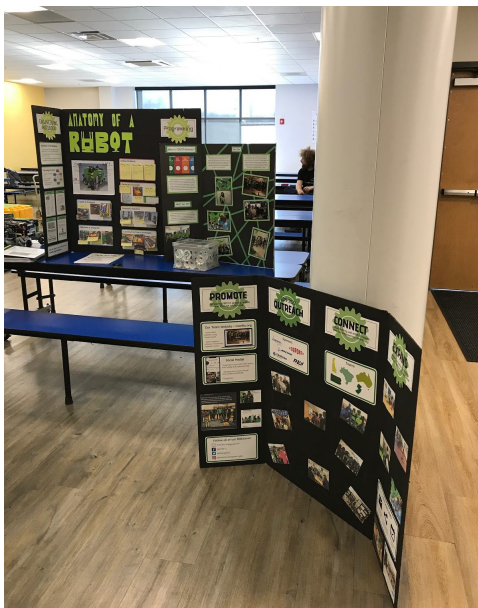


team practiced driving the robot and stacking stones. Some of the children at the event were especially interested in the robot, and we let them assist with some of the fixes done on the robot. At the same time, the programming team had the opportunity to work on the autonomous

program of the robot that they started during prior meetings. This event proved to be productive for both of these subteams.

One important aspect of this event was promotion of FTC and MOE in a FIRST robotics setting. The mentors, students, and parents at this event have had experience

with FIRST and were extremely engaged with our displays and robot demonstrations. Clare and Helen were able to interview many of the FLL participants for the MOE/FIRST promote video to gather answers to the prompt question “How has FIRST changed you?” MOE thought that it would be unique to gather answers from a variety of people involved with FIRST, so we gathered audio clips from younger FLL students. The visual portion of the promote video will be collected in the upcoming week.



III. EVENT REFLECTION

MOE had fun meeting inspirational kids and FLL teams at the Aspira Academy FLL Qualifier event. We demonstrated our competition robot and taught interested students how to drive the batterbot themselves, in addition to making tweaks on the robot. Overall, this was a productive and important event, as we were able to expose many parents and children to the next level of robotics after FLL. We hope to interact with these talented children again in the future!

PADUA ACADEMY MEET

DATE & TIME: 02/18/20 | 5:00 PM - 8:30 PM

I. EVENT DESCRIPTION

Padua Academy, a local school in Wilmington, hosted the sixth and final Delaware FTC meet of the season before the Delaware state competition in March. Most of Delaware's FTC teams, as well as many strong out of state teams, attended this event.

II. EVENT SUMMARY

Although the actual meet started at 5 p.m., some of MOE's team members arrived at Padua Academy early to help set up the fields. Bryan and Patrick met with members of the Padua X² Factor team (#4200) to assist in setting up the rest of the event as well. MOE met with other familiar teams to discuss and brainstorm solutions to problems. Prior to the beginning of the matches, Patrick talked with Juliette's Revenge (#14851) and helped them code an autonomous program that could part underneath the alliance bridge. In addition, other members of the team including Bryan and Ian walked around the pit area to give struggling teams mechanical advice.

At the beginning of the meet during the opening speeches, Padua Academy welcomed a group of characters from Star Wars to show some spirit for FIRST and



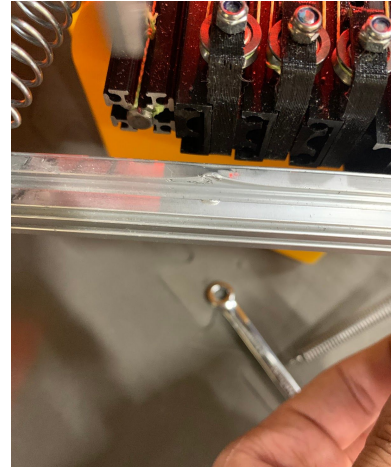
FTC. This was a fun addition to the competition, and everyone was given the opportunity to take pictures with the characters throughout the night. MOE appreciated the support and spirit that these characters brought to the event!

Throughout the meet, Helen and Clare had the opportunity to work on the MOE/FIRST promote video. After conducting a brainstorming session a couple of weeks prior, we decided to film a time-lapse video of different people placing sticky notes on a wall with answers to the prompt, “How has FIRST changed you?” Following the audio clips from the Aspira Academy FLL qualifier event, we worked on the visual aspect of the video at Padua Academy. MOE talked to members from all of the other teams, as well as parents, judges, and mentors. By the end of the competition, we were able to finish the wall of sticky notes for our promote video. Two images are included below to show the progression of the wall of sticky notes.



During the matches, the Skystone MOEbot faced some difficulties regarding the mechanical aspects of the robot. Before the first match, the mechanical team had to tweak the outtake arm in order for the mechanism to be able to reach out far enough and stack stones in a higher tower. Although these tweaks were effective, issues soon

arose regarding the pulley strings. The bottom pulley's retraction string had too much load and ripped open the REV extrusion. The mechanical team plans on fixing this problem by drilling through the REV extrusion so that the screw will not rip out in the future. Another problem that we ran into was detachment of the phone on the robot. While there was space for velcro on the robot, the phone did not have velcro and became loose as the robot drove. Since this was a minor problem, we were able to find a temporary solution and attach the phone onto the robot with tape.



III. EVENT REFLECTION

Despite the mechanical issues that we faced, this event was very beneficial for MOE. We were able to reach out to many local teams and many out of state teams as well, allowing us to interact with a variety of teams. One thing that would have been useful to pack for future events is our MOE spirit and promotion supplies, such as the MOE buttons/pins and business cards. Another game element that should be packed in the future is our MOE capstone for the Skystone skyscraper. Overall, we accomplished many things during this meet, from creating visuals for the promote video to drive practice. We look forward to seeing these teams again at the Delaware state tournament in March!

BOEING E-WEEK

DATE & TIME: 02/19/20 | 10:30 AM - 3:00 PM

I. EVENT DESCRIPTION

Every year, the Boeing company hosts an Engineering Week event, or E-Week, that showcases STEM and reaches out to the surrounding community. This year, Boeing invited MOE to one of their sites to demonstrate the MOE FTC robot to the various employees and managers. By doing so, MOE is able to collaborate with professional Boeing engineers and answer any questions that the employees may have. At the same time, MOE had the opportunity to demonstrate our robots and discuss our design process.

II. EVENT SUMMARY

Unfortunately, we could not get pictures for this event because of the confidential information in the area. Our mentor took some pictures and videos, but he is currently scrolling through them to ensure they are okay to post.

The event started by unloading our stuff by the cafeteria with the other participants of E-week. Foot traffic and participation was lower than events with many children because many of these people were working, but the Boeing employees were fascinated by what high schoolers were able to do. Many of our mentors' co-workers stopped by and were impressed at the FTC program. We displayed our competition robot and its mechanism. Flaming Phoenix #7423 was there with their competition bot

and their outreach bot. Together we were able to show Boeing workers what the robots in FTC can do!

When we finished showing our robot, Boeing gave us a tour of their facilities. They showed us how the Chinook is currently being built and many fun facts about the production of the Chinook. After the tour, our mentors privately showed us around where they worked. They let us use their Osprey flight simulator which was very cool! They also showed us some of the control systems of the Osprey.

III. EVENT REFLECTION

This event was unique as it allowed members of the MOE team to meet and communicate with professional engineers. By participating in this event, we were able to show our appreciation for Boeing as a sponsor and collaborate with some of their employees to help spread STEM. They were able to see how our robot worked, but we also got to see how Boeing operates! We are very happy to strengthen our bond with Boeing and spread our knowledge of STEM with each other. Altogether, seeing the professional field of STEM is very inspiring and eye-opening to what a future in STEM can look like.

STEM EXPO AT THE DELAWARE CHILDREN'S MUSEUM

DATE & TIME: 02/22/20 | 12:00 PM - 3:00 PM

I. EVENT DESCRIPTION

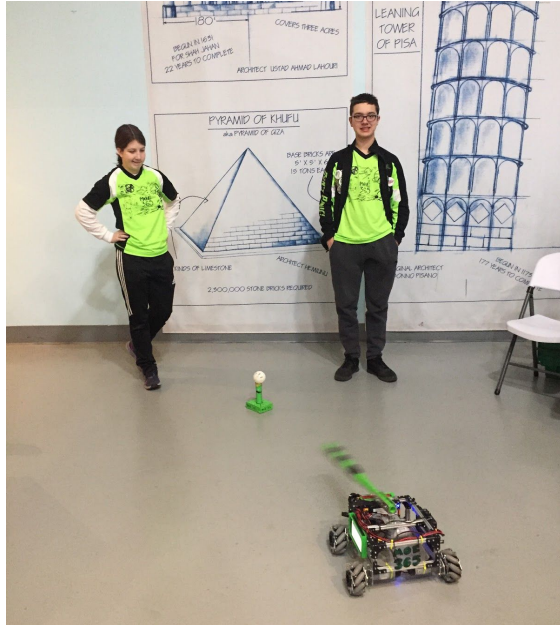
Students from the STEM club organization at the Charter School of Wilmington partnered with the Delaware Children's Museum to host a STEM Expo for the public. The Delaware Children's Museum is a popular museum in Wilmington that teaches children about science, STEM, and nature in a fun and interactive way. This STEM Expo is one of many events that they host every year. MOE has attended some of the Delaware Children's Museum's events in the past and was happy to be invited back to demonstrate our robots to the families there.

II. EVENT SUMMARY

MOE 365 FTC arrived at the STEM Expo event and met with Ms. Rebecca Virden, one of the event organizers from the Delaware Children's Museum. Afterwards, we were able to set up our three trifolds: our outreach trifold, our robot/programming trifold, and our general information trifold. We also brought some of the MOE buttons and pins to hand out to the event attendees.

After setting up, we started running the batterbot and demonstrated it for some of the children and families passing by. Many of the children were enthusiastic about the bat on the robot and wanted to try





hitting the wiffleball themselves. Although a lot of the children who visited the Delaware Children's Museum were young, they learned quickly and were soon able to drive the batterbot around the room themselves. One thing that we noticed while the kids were driving was a confusion of robot direction. Some of the children pressed the joystick down in an attempt to move the robot back,

but this did not work when the robot was not facing forward. Due to this confusion, we decided to add field centric drive to the batterbot for one of our team's summer projects.

One problem that we encountered at this event was disorganization, as the phones used for outreaches were not charged. Luckily, there was an outlet available at the event for charging, and we were able to charge the phones throughout the afternoon to keep the batterbot running for the majority of the event.

At the STEM Expo, we had the opportunity to meet and talk to dozens of parents about the FIRST Robotics program and how they can get their children involved in robotics. Since the children at this outreach were younger, many of them would be able to join a FLL team. We introduced the parents to FLL and gave them our contact information if they wanted



help in finding a local team for their kids to join. Something that we can improve upon in future events is organization and communication, as we were unable to bring the new MOE 365 FTC business cards to this event due to some miscommunication in transportation. Despite this, many parents seemed interested in FIRST, and we were able to hand out the MOE buttons/pins that we brought.

III. EVENT REFLECTION

Overall, the STEM Expo event hosted by the Charter School of Wilmington and the Delaware Children's Museum was a fun and interactive event for both MOE and the families who were visiting the museum. At this event, we worked with many younger children and were able to introduce FIRST Robotics to many parents as well. At the same time, we also learned some lessons about team communication and outreach organization in general. In the end, we had a wonderful experience meeting the enthusiastic kids and parents at the Delaware Children's Museum and hope to return for future events!



PADUA LAB VISIT/DRIVE PRACTICE

DATE & TIME: 02/25/20 | 6:00 PM - 8:00 PM

I. EVENT DESCRIPTION

Padua Academy's team (X² Factor #4200) is another FTC team in the Wilmington, Delaware area. X² Factor is an experienced team that has competed in several FTC seasons in the past. MOE introduced new members of X² Factor to our lab during one of our Tuesday meetings. With the Delaware state competition coming up, MOE decided to host a drive practice section X² Factor to further develop our relationships with local teams.

II. EVENT SUMMARY

At the beginning of our meeting, X² Factor was able to listen to and participate in our weekly reflection and conference room meeting. We



discussed the agenda for this meeting and showed the Padua team the MOE lab. Since the Delaware state competition is in a few weeks, X² Factor brought their Skystone robot and practiced driving with the MOE drive team. Both of our teams were able to learn a lot of new game strategies and brainstorm ideas that would help make our driving more efficient.

After brainstorming and practicing driving, X² Factor gave MOE their judging presentation. We had the opportunity to hear another team's judging presentation for

inspiration and advice for our own presentation. Another opportunity that we had was to give feedback to the X² Factor team and help guide them through the judging process. Afterwards, MOE gave our judging presentation to the X² Factor team to help them gather more ideas about their own judging presentation. We were also able to receive feedback from members of their team and mentors to improve our judging presentation before the Maryland state competition this upcoming weekend.



III. EVENT REFLECTION

MOE had a lot of fun meeting with X² Factor and learned a lot during this connect outreach. Both of our teams gained more experience with driving and developed stronger game strategies for our upcoming competitions. This meeting was very valuable for increasing the strength of Delaware teams! We hope to communicate with them more leading up to Delaware States to ensure that everyone is ready to bring their best at the competition!