AYJ ENGINEERING DEMO 2024

Lead Organizer: Robin Yan

Participants

AYJ Robotics Club……..William Kellen Gr.11, Robin Yan Gr.12
AYJ Physics Club……Simon Shen Gr.12, Alexander Sotnikov Gr.12
AYJ Aeronautics Club…….Steven Yu Gr.11, Jason Liu Gr.9
AYJ Engineering Without Borders……..Leo Nian Gr.9, Jason Liu Gr.9
Team Minekee ……Robin Yan Gr.12, Justin Gao Gr.9

General Information

This one-day demo, also to be thought of as a carnival, is meant to spread awareness and inspire AYJ students to take interest in the STEM fields. Students may freely enter and observe the demo, and are highly encouraged to participate in the STEM activities provided. Activities will vary depending on each participating club (e.g. driving robots, competing in paper airplane contests, etc.), so large public spaces such as the big gym or the cafeteria will be needed. The space where the demo is taking place must not conflict with other school activities (e.g. sports practices in the gym, music students using the cafeteria, etc.), so late May is an ideal time to host the event. Each participating club will have a designated area within the space to host their activities. Each booth will have student representatives from their respective club responsible for managing student engagement and safety, and the entire demo will have a staff supervisor. The event will take place after school to accommodate preparation and clean up time; participating clubs will send down their representatives/volunteers to set up their booth's ahead of time. The demo is not designed as a method of fundraising, but if given permission from admin, clubs may choose to accept donations or sell miscellaneous items (e.g. keychains, stickers) - consumables is not recommended.

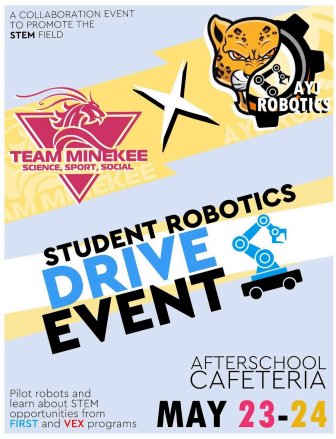
Important Details

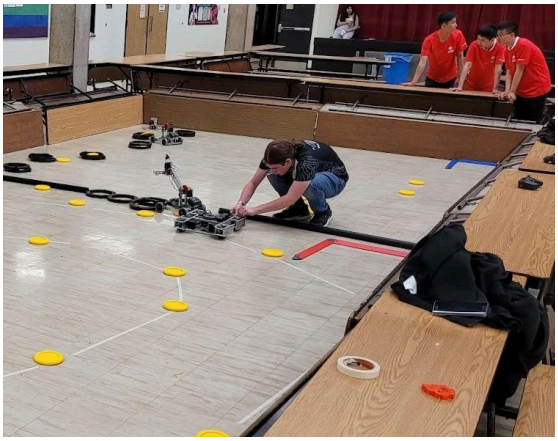
May 27, 2024 11:00am-12:40pm
10:30 preparation,
11:00 event execution,
12:40 clean up,
Big Gym, use caf tables and benches as boundaries (flip them in necessary)
Must not conflict with other events (construction, sports)
Supervisors: Mr. Skuja 9am-1pm

2023 Demo Summary

The 2023 demo last year in May took place in the cafeteria, for 2 days, with only AYJ Robotics and Team Minekee as participants. With the permission of the head janitor, cafeteria tables flipped on their sides and used as walls to protect students from robot activity. Volunteers were dismissed from their classes 30 minutes before the bell to rearrange the tables. Students lined up to test drive robots and ask questions. At around 4:30, the event was concluded and all tables were returned to their original positions. There was a manageable crowd size; a goldilock zone for crowd density and control. It had a smooth preparation, execution, and clean up - there was however an unexpected conflict on the day of the event for Mr. Ricciardi had booked the cafeteria for music students, but that was quickly resolved.

2023 Gallery:

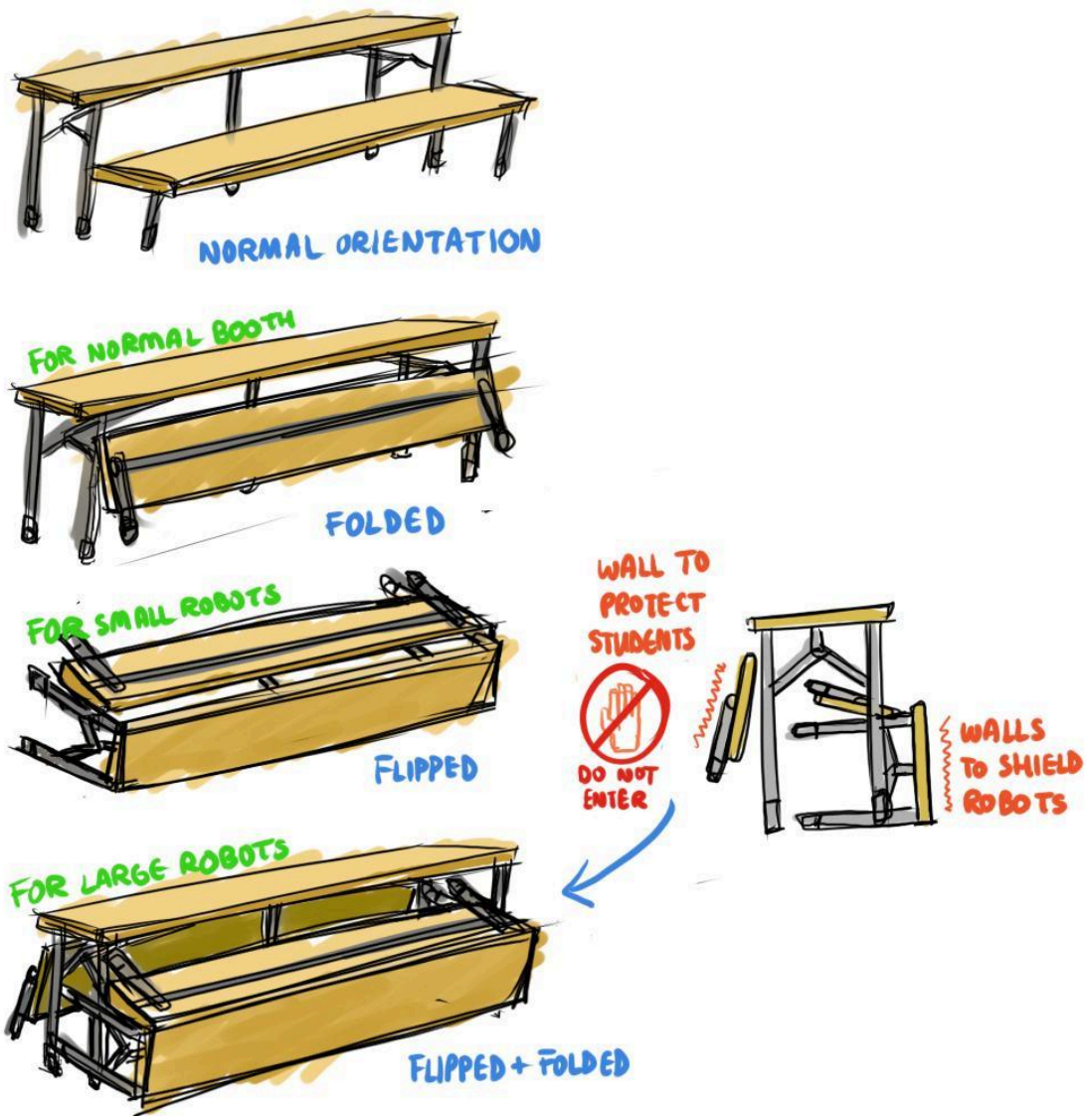




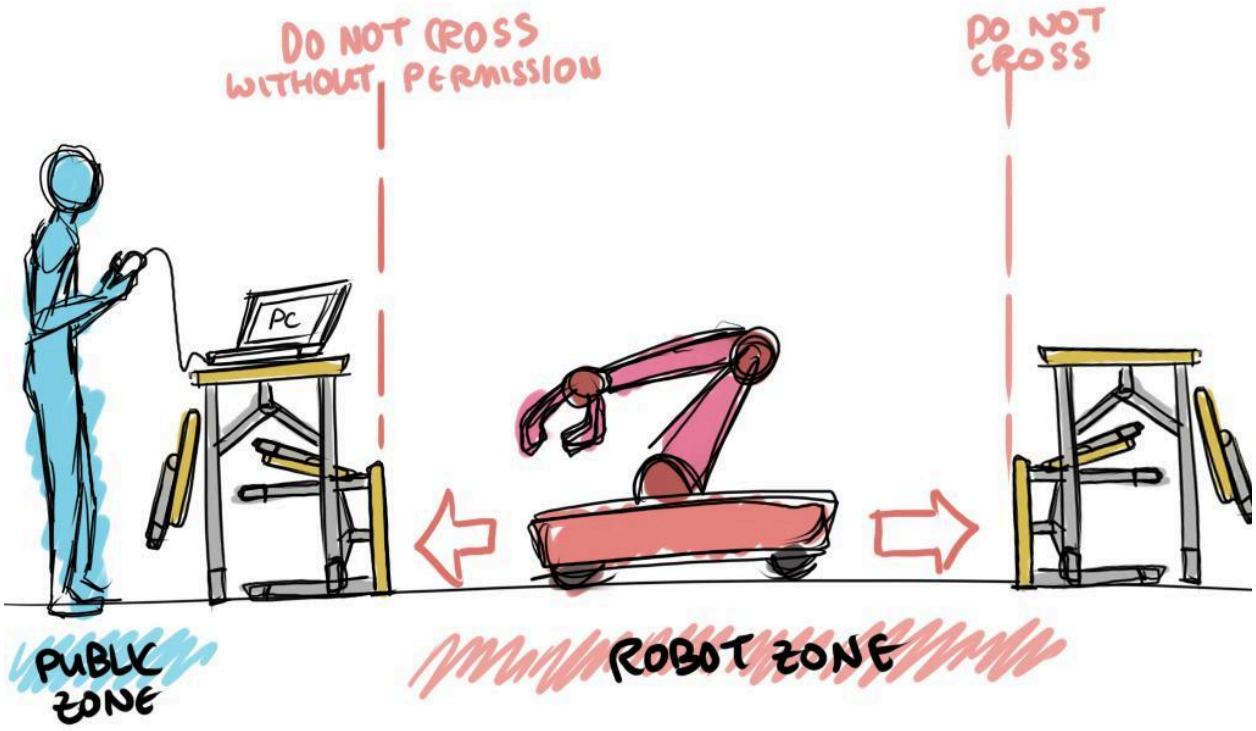
Safety Preparations

Being a public demo, the event must be safely executed. Tables will be used to act as barriers to encircle a club's booth. Only club members or event organizers are allowed to enter into the walled-off areas, as each club's activity may include moving objects and delicate items only to be handled by knowledgeable volunteers. Cafeteria tables may be used as boundaries in the following ways listed below. Certain activities, like robotics, will require more set up and rigid protection. Additionally, students with spares in the cafeteria will be required to move locations so tables can be shifted. No other students except volunteers should be around during preparation because clubs may be transporting delicate items into the cafeteria for showcase.

Table orientations:



A representation of a booth containing a large robot:



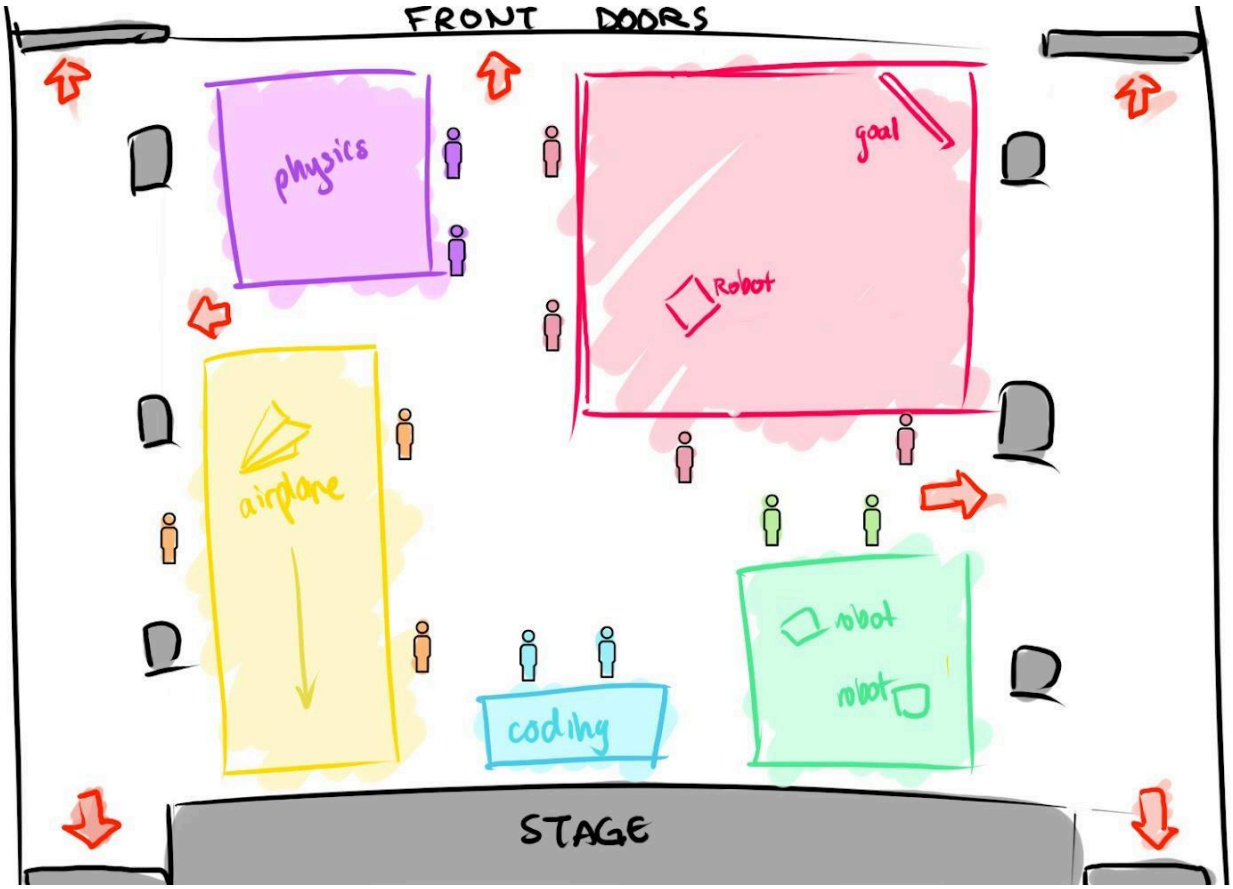
Depending on the size of the activity, a minimum number of student representatives must be present at the booth at all times to make sure nothing goes wrong. For small booths, 2 representatives are suggested: one to direct the activity, another to manage crowd control and surveillance. For larger booths, like robotics, 3 volunteers are suggested.
Crowd control volunteers mainly do the following:

- market the booth to nearby students
- answer questions about the activity or club
- prevent students from moving the boundaries or entering
- manage student line ups
- spot unfriendly activity and reporting issues to staff (i.e. fights, thefts)

All students should be aware of the layout orientation and entrances to the demo. To make space, tables will be moved along to the sides of the cafeteria. In case of an emergency, all moving objects MUST BE DISABLED or put down, and students are to leave the cafeteria via its main doors or sides. Cafeteria main doors are to be open at all times.

Activities containing moving objects will be, to the best of our ability, optimized to face away from the main crowd. For example, robots that launch frisbees into a goal must have the goal set up facing the wall or pillars of the cafeteria. When the robot shoots, it is expected to face AWAY from students. For example, if an activity consisted of flying paper planes, the path of the paper planes must not direct into student zones. Planes are to move parallel to pathways, and given considerable distance.

An example demo layout. Empty spaces are given to let students walk by, and activities are oriented such that moving objects do not interfere with the student paths. Red arrows represent entrances and exits. Model human figures have to been placed to simulate how student volunteers may be positioned.



VOLUNTEERS AND STUDENTS AT ACTIVITES CONTAINING MOVING OBJECTS ARE HIGHLY RECOMMENDED TO WEAR SAFETY GOGGLES IN CASE TINY OBJECTS FLY INTO THE EYE.

Certain activities, like robotics, require long cables to charge laptops and batteries. The layout of the demo will be optimized to the best of our ability to make sure cables travel along boundaries, reducing risks of tripping.

Tables should be properly set up such that table legs do not poke inconveniently poke out into student paths. If required, warning labels or signs can be put around each activity reminding students to keep away from boundaries and follow rules.

At least one teacher or staff supervisor should be present at the event at all times in case of an emergency. This supervisor is recommended to be affiliated with at least one of the participating clubs in the demo.

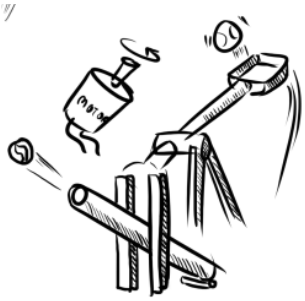
The event is expected to only last until 12:40 pm. When the crowd dwindles, all showcase items or tools (i.e. cables, signs) will be returned and tables brought back to their original positions. Non-volunteer students are free to help clean up after. Belongings should be properly stored and retrieved by the end of the event. The loss of a club item is the clubs irresponsibility for not looking after their items.

Demo Activities

Specifics of each activity are to be determined by each club. Minor details that do not regard the general demo safety are expected to be handled by clubs individually (i.e. placement of crowd manager, presentation of activity, etc.). Bear in mind, activities may see a change shortly before execution from unseen emergencies - these are general ideas.

PHYSICS CLUB:

Several physics experiments (similar to the ones shown at open house), with the main subject being several marble launchers and trebuchets (we will probably need a long empty section for this). Additional qualities such as targets to shoot may be added. Projectiles may be controlled by club executives to prevent rouge firing into crowded areas by anyone.

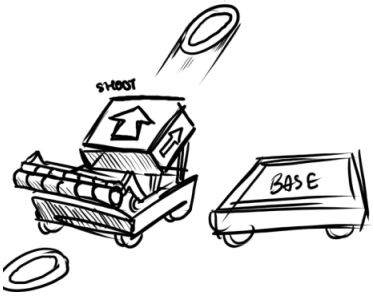


AERONAUTICS CLUB:

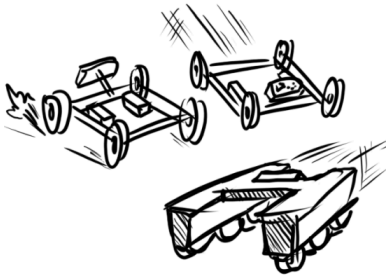
Aircraft demonstration. Most likely a glider (no motor to avoid cutting people), therefore some height is required to launch the aircraft, and a long strip of space is required to glide it down. To make it more interesting we will likely have some hoops as targets. A few aircraft will be carried down for static demo (no flight, no visitor touching) and they will be parked on the ground or a table, depending on what is available.

TEAM MINEKEE:

One swerve-drive base running simple obstacle courses and one on-season robot running simplified 2024 Crescendo game. Robots are wider but as tall as normal solo-school tables. These are big robots. Visitors are allowed to observe and try out from outside barriers, one visitor for base and one visitor for on-season robot as DRIVER ONLY (operator position is static as team member). Visitors are not to touch anything without permission. Area size: classroom size enclosure for on-season robot (must be one of the corners of the gym), smaller than classroom size for drive base.

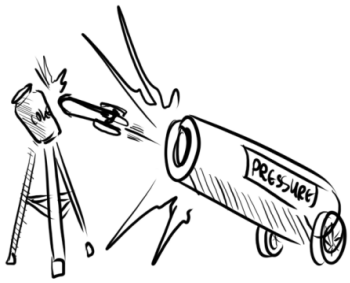


AYJ ROBOTICS CLUB:



Two VEX EXP robots racing and running an obstacle course, one VEX V5 robot doing obstacle course. Robots are roughly a textbook wide, short bots. Visitors are allowed to observe and try out from outside barriers, only one person per robot per time - each visitor should not spend more than 5 minutes at the controller. Visitors are not to touch robots or controllers or parts without permission of representatives. Area size: long rectangle length of classroom for EXP, another for V5.

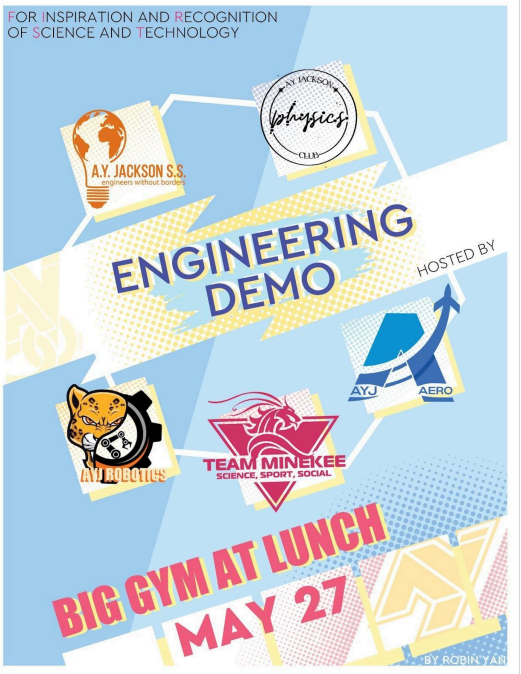
ENGINEERING WITHOUT BORDERS:



An Over-Engineered Game of Darts: an air cannon of our own creation that students will fire at a target around 15 meters away. The projectile will be a foam dart made out of a pool noodle. The air cannon will only be pressurized to 20 psi at most so that even in the event of a complete tank rupture (which isn't possible at such a low pressure) it will only be loud but not hurt anyone. We need some cones or pylons from the school to mark out the area students may not enter, and electrical power. Two executive members of our club will supervise students operating the cannon to ensure safe conduct. Additionally, to emphasize safety, a locking mechanism is added to the trigger of the cannon to ensure no mishaps happen before proper aiming. Furthermore, the horizontal axis will be unable to turn away from the intended target to make certain that the cannon cannot be targeted at others.

Methods of Advertisement

- A poster:



- Morning announcement:

  "Is it a bird? Is it a plane? Is it superman? Well, yes, but actually no, it's a super plane! Aeronautics club in collaboration with 4 other clubs is providing you with an engineering demo on Monday May 27 during lunch in the big gym. Everybody is welcome to take a look and try out some cool machines, airplanes, and physics experiments. That's the big gym, Monday May 27th at lunch. It's only happening for one day, so don't miss out!"

"Do you like donuts? I sure do. Don't worry AYJ, Team Minekee's got you covered, because on May 27 you'll get to see giant robots set afloat giant donuts. In collaboration with 4 other clubs, AYJ is having its own engineering demo on Monday May 27 during lunch in the big gym. Everybody is welcome to take a look and try out some cool machines, airplanes, and physics experiments. That's the big gym, Monday May 27th at lunch. It's only happening for one day, so don't miss out!"

"Hey AY, scared that you might get a negative reaction from a date? Well don't worry, because Physics club assures you that you're bound to get a positive reaction of equal magnitude when you check out the engineering demo on Monday May 27 during lunch in the big gym. Everybody is welcome to take a look and try out some cool machines, airplanes, and physics experiments. That's the big gym, Monday May 27th at lunch. It's only happening for one day, so don't miss out!"

"Hey AY, what are pool noodles made for? Making a Pool-Noodle Accelerator of course! If you don't believe that, you need to come check out Engineering Without Borders' collaborative engineering demo on Monday May 27 during lunch in the big gym. Everybody is welcome to take a look and try out some cool machines, airplanes, and physics experiments. That's the big gym, Monday May 27th at lunch. It's only happening for one day, so don't miss out!"

"Hey AYJ, tired of having your joy-cons drift and mess you up in Mario Kart? Don't worry, now is the time to redeem yourself, because next Monday, you can practice your karts driving skills but in real life. Robotics club, in collaboration with 4 other clubs, presents to you an engineering demo on Monday May 27 during lunch in the big gym. Everybody is welcome to take a look and try out some cool machines, airplanes, and physics experiments. That's the big gym, Monday May 27th at lunch. It's only happening for one day, so don't miss out!"

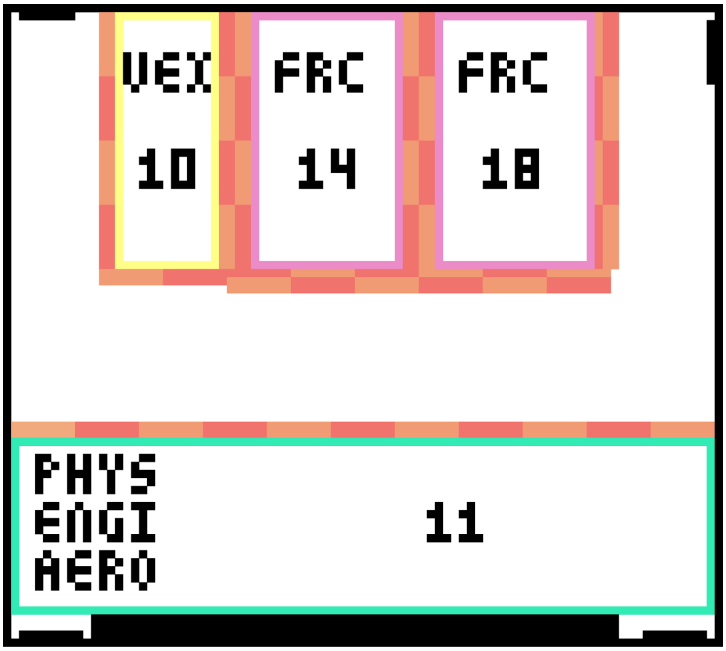
- Brightspace announcement

  "Hey AYJ, wanna see robots score frisbees, or drive F1 racing? Wanna see flying homemade airplanes? Wanna see a pressured pool noodle push targets around wirelessly? Wanna see trebuchets and cool physics projects? You won't need to wait long. We've got five engineering and STEM related clubs collaborating on an engineering demo on Monday May 27 during lunch in the big gym. Everybody is welcome to take a look and try out some cool machines, airplanes, and physics experiments. That's the big gym, Monday May 27th at lunch. It's only happening for one day, so don't miss out!"

- Individual club internal announcements

Demo Floor Plan and Layout

To measure, we have recorded the gym area in terms of 1ft × 1ft tiles. The gym is a 90 × 81 ft² rectangle. Each cafeteria table has a minimum size of a 2 × 8 ft² rectangle, sometimes 3 × 8 depending on orientation. Using the map to scale, the number of tables required to enclose each booth is listed:



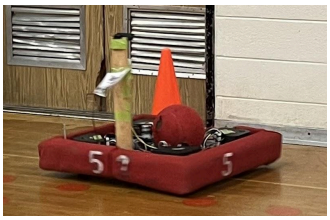
- 10 - AYJ Robotics
- 14 - Minekee Swerve
- 18 - Minekee Donut
- 11 - Runway enclosure

**Note from after demo: I overestimated the size of the robots booth. You really only need a 2x2 cafeteria table square for each one.*

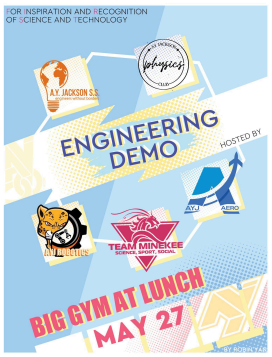
2024 Demo Summary

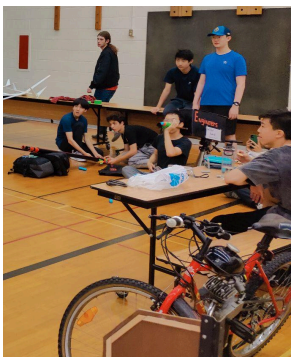
The 2024 Engineering Demo took place in the big gym from 11:00am - 12:30pm. From 11:00 to 11:30, grade eights were invited, and from 11:30 to 12:30, the demo was open to highschoolers. Given only 30 minutes to prepare (from 10:30 to 11), the clubs efficiently moved tables from the cafeteria into the gym while showcase items were being brought down. Preparation went smoothly, though for some reason the robots had minor issues which ended up missing the first wave of grade eights. The air cannon was actually incredibly powerful, it could blast a dart from one end to the other of the gym at high velocities. Marble launchers were displayed but not used, and air planes were in display too and some were flown. A motor powered bike was also brought and showcased. The execution could have seen more visitors, but still the demo ended smoothly too, and tables were returned back to the cafeteria. There was a slight issue during set-up which should have been foreseen; grade 8 orientation was in the cafeteria and they required tables to sit at, but this was resolved because there were vacant tables that the demo could use. Thank you to the caretakers for setting up the ramp to let us move tables back and forth. Thank you to Mr. Barker for letting us reserve the gym and use the storage room. Thank you to Ms. Hadziahmetovic and her administration team for handling regulatory details. Thank you to Mr. Skuja for supervising the entire demo. Finally, thank you to all participating clubs and students for letting this fun event happen.

Gallery:







Words From Robin

Thank you everybody for contributing to this year's engineering demo. It was an incredible step-up from last year, especially with more participating clubs and a larger audience age range. Ever since grade 10, my introduction to robotics and STEM changed my life in so many positive ways, and it was always part of my wish to let other young students learn about these opportunities that inspired me into engineering. As a way of paying tribute back to the community, this demo follows the vision of FIRST: For Inspiration and Recognition of Science and Technology. Thanks to the direction of admin, we lined the event up with grade 8 orientation day, which is a perfect age-range for an audience discovering their paths into highschool and later university.

In general, this demo was a success. Because I had "senioritis," I spent more time on this event, managing a larger group, directing meetings, doing administrative stuff with staff, and writing this document, and as a result, preparation and clean up was shockingly efficient, and seemed to have more appeal to the people who came

We definitely received a larger audience this year, but I underestimated both audiences. First, I did not expect so many grade 8's to visit the gym all so fast. They came very early - while some clubs were still preparing - and each class only stayed for 5 minutes. It wasn't enough time to get enough students to be engaged. Unfortunately, robotics missed one wave of students. This is partially my fault for not giving enough time to prepare and not reserving enough time for grade 8's (because I only planned 30 minutes!) to explore.

Additionally, not a large enough highschool student body showed up at the demo. I originally thought that if we had the demo happen after school like last year, the summer weather would tend people to leave school and miss out on something happening indoors, so lunch time would be good because everyone is already in school. However, even as I walked around personally advertising the demo during lunch, people didn't seem to care so much. Even with multiple P.A. announcements and posters around the school, if people weren't interested they didn't show up. That makes sense; people just want to eat lunch and hang out with their own friends, do their own things - there is no incentive to get up and go to the demo, for what benefit is there to them? I personally think a demo is not something people need to *choose to go see*, but rather that they see the demo and they *choose to engage*. Last year the demo was hosted in the cafeteria, so even without improved advertisement people visited and stayed at the demo because it was publicly visible, available, accessible, and you'd pass by it very easily. Even if the gym gave us easy accessibility to load robots in and provided us with a larger space to work with, its isolated location countered our advertising efforts. Keep in mind though that the reason why we had to use the gym is because grade 8 orientation needed to happen in the cafeteria.

I'm being critical here as in giving criticism to bring light to issues, not criticizing by saying we did something wrong. This demo was a success, but our advertisement can definitely see an improvement! I'm sure this is not an issue unique to us - all companies and politicians trying to advertise things run into the same issue. There will always be a high percentage of people that simply will not buy your advertisement no matter what you do, especially if there is no incentive or higher power at work here. Perhaps we need to narrow down a target audience instead of just general high schoolers, like grade 8's or 9's or 10's. Perhaps we need to collaborate with larger teams, maybe with SAC, or even with guidance so it shows up on guidance google classroom, or appear on Mr. Paputsis' (principle's) weekly email as an official event. What if we turned this event into an official school event so that 9's and 10's were excused from class for this - maybe like an assembly? Or similar to how peer-mentorship works? That would help create incentive. Additionally, leaving only one week to advertise simply wasn't enough marketing, so I hope the next organizer(s) can find a better approach to that.

I hope to pass on my learning to those after me so that this event can evolve into something even more extraordinary. It could be that my idea of a perfect demo simply does not exist, and that there will never be a solution to this lack of audience, and that's okay. Just like how science has come so far because people build upon the discoveries of those before them, hoping one day someone can use the accumulated knowledge and find a solution, a theory, a product, or just something, the most important thing here is that we are improving from year to year, and that is all something needs to be great.

Again, I thank everyone who contributed to this event for making it possible. It was undoubtedly a product of team work (and some dedicated leadership). For those wanting to expand and direct awareness events and demos for future years or to other schools, here's a recommended schedule:

- Start planning two/three months ahead of event

- Confirm participants and idea approval by admin by week 2
- Idealize a supervisor and location by week 3
- Write a document of important details (must have safety precautions) and officially approved by admin by week 4
- Solidify and confirm availability of supervisor, design a poster, set a date, reserve the location, and announce to participants the procedure for week 5
- Host meetings and work closely with participants, write announcements and have them approved by admin in week 6
- Have a meeting about safety and preparation, put up posters, post announcements, send a list of students to be excused (if required) to admin by week 7
- Leave the remaining weeks reminding clubs, having them prepare their activities

PLEASE PLEASE START ADVERTISEMENT AS SOON AS POSSIBLE, THAT COULD MEAN PLANNING AHEAD 3 OR 4 MONTHS AHEAD OF TIME

Reminders:

- Certain people like caretakers or gym teachers will need to be contacted depending on the scenario. As organizers, you must be the one going around and arranging things. Staff and admin have no time and no responsibility for doing that because they aren't the ones organizing! Their job is just to say yes or no.
- Everything that happens MUST line up with safety protocols of the school. Even if something, outside of school, seems not-so-dangerous, if there is ANY CHANCE it can harm someone it must not happen.
- I highly recommend you use a discord server to communicate and manage everybody - it is a great way to announce information and host meetings.
- Understand that the participants are not the only people who need to know what is going on. Others involved, like parents and teachers, will need to know important details if they are delivering items or are storing them, etc.

Lastly, I would like organizers to bear in mind and exhibit "gracious professionalism." *"It's a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community"* - FIRST. Know that this demo is for everybody, so both participants and audience should have fun! I wish for your success.

Sincerely,
Robin Yan