FINAL

Nintendo,

Resilience,

We are engineers, we are artists, we are innovators…

Because of innovation is what drive 99484 a team committed to interdisciplinary education

One of the ways we see this is in our distribution of jobs. We as captains consider ourselves industrial engineers, but we have mechanical engineers, software engineers, and everything in between.

Shun

Design process. //tell me more about 3d and CAD

Futaba

Build //Show the robot. You have a 3d print and the CAD.

// lift, chassis, ((passive shooter))

Ayumi

Strats //she’s fine, just needs self-confidence

Joshua

Programming //

**What is 99484?**  
  
Before CAJ was a part of the VEX robotics competition, the impact of technology among the student body was not very prominent at the school. There were a few ‘electricity’ or ‘machines’ units as part of learning general physics, and rare robotics units where students could compete in a class game of “robot-sumo”. But overall, the presence of technology had little effect on the students.   
  
Then in 2015, Mr. Fujiwara assembled and coached CAJ’s VEX Robotics Club, a team of students who would soon pave the way for a greater integration of technology in CAJ’s education. These students were Rei Arbuckle (‘17), Chad Driscoll (‘17), Kenji Johnson (‘17), Willem VanDam (‘17), Seth Mutenda (‘18), and Josiah Balona (‘19), led by Noah Okada (‘19).  
-when were we created?  
  
**What is our goal?**  
  
The Christian Academy in Japan (CAJ)’s robotics program was founded after seeing the lack of diversity in STEM educational programs in East Asian regions, as well as the significant need for Vex Robotics Competition teams in Japan. It was founded with two main goals, first to merge the fields of STREAM (science, technology, research, engineering, arts, and mathematics) into a robust program robotics program that could serve the entire CAJ community through project based learning. Secondly, it was created with the goal of increasing the reputation of Japanese robotics in the VRC community. For years Japan had been represented by only one team at the Vex Robotics World Championships, and this significant lack of diversity within the robotics community was not properly representing the innovation achievable by the Japanese people. With these goals in mind 99484 robotics was established under the leadership of Yujiro Fujiwara with the support of the REC foundation and the Christian Academy in Japan. It was an attempt to merge multiple departments in an interdisciplinary effort to train creative problem solvers, leaders, and change makers that could serve Japan and the world.   
  
 **How did we accomplish this goal?**  
  
Over past four years of its existence the members of 99484 robotics have proven to be a successful team of problem solvers who have carefully executed the goals by which the team was formed. In their first season 99484 achieved the highest programming skills score in Japan thus qualifying for the Vex Robotics World Championships where they placed xx out of their division of 100. In the following years 99484 defended their title as Japan’s highest scoring robot in the Robot Skills Challenge, and attended the Vex Robotics World Championships for Vex Starstruck(2016-17) and Vex In the Zone(2017-18) where they received the first place award for the Future Foundation Online Challenge and won the Service Award in their division. Outside of the competition members of 99484 robotics have founded many other programs to serve both the CAJ and global community. These activities included the Vex IQ program, the e-NABLE chapter for 3D printed prosthetics, and the Vex Japan Server. Driven by a desire for excellence instilled by their collaborative community, members of the 99484 community have achieved an overwhelming amount of success in the goals set out for them.  
  
**How has this been achieved?  
  
Middle School & Elementary Robotics Program**  
The Middle School and Elementary robotics programs were started in 2018 by members of the 99484 robotics team. These members served as both instructors and mentors for elementary and middle school students as they led them through lessons about the design process. Using the Vex EDR and Vex IQ curriculum these students were able to train the next generation of engineers at the Christian Academy in Japan.  
  
**e-NABLE**  
The e-NABLE prosthetics club was established in 2018 by two members of the 99484 robotics team: Megumi Shinagawa, and Noah Okada. The club was founded with the mission to fabricate 3D printed prosthetics for children in need while educating the community about how to use 3D technologies to combat global issues. Under the guidance of both Shinagawa and Okada the club was able to expand into three departments that worked to educate elementary schoolers, organize community events, and raise awareness for the issues surrounding disabilities. The club now continues to operate under the guidance of members within the 99484 community continually seeking new opportunities to serve the world.  
  
vex japan server  
  
**How do we structure our team?**  
  
-caps  
  
Captains in 99484 are not the dictators, but more of managers of the whole team. We as experienced team members have a duty of leading the rest of the team throughout the season for them to grow in their skills and mentality. Our leading philosophy is to lead by the example. Through our dedication and commitment to the team, we try to encourage our underclass teammates to also work hard and dedicate their time to achieve something as a team. We are hoping that their motivation will be brought up as they spend more time with us in the after school meetings everyday. Therefore our responsibility is very huge. Anything we do, it can cause positive or negative influence among the whole team. If one of us keeps coming late to the meeting, then others will see and understand that as the standard. Of course we cannot be the best examples everyday, but we all share the mindset of having to be the most dedicated, hardest working people in the team.  
We have in total four leadership members in this team 99484. Everyone having different specialties and perspectives, we collaborate each other tightly to make the best decisions and to help with each other’s jobs. One fundamental factor in team building is making a connection with each individuals in the team. However, it is tough even in a small team to get to know everyone at personal level. We are all high schooler, who also have friends and assignments in our everyday lives. Having multiple leaders help us to understand more people in most efficient approach. As we share things happening in the team and members, we can figure out stuff which we would be able to find out by ourselves. This can also be said about understanding the roles within the team, which help us to include every individual members in almost everything we do. Not only during the meetings after school, we openly discuss over the team members, dynamics and problems; basically anything about the team. Because every leadership members are in different work fields during meetings, we each know our capabilities. If one thinks that one field is not utilized to its full potential for the team, that leader shares the thoughts and we can discuss. Hoping everyone to feel that they are being part of team 99484, we constantly seek for the way to pull out everyone’s opinion and create place for them to shine. This has been our goal, and we are proud of what we have achieved through this 2018-2019 season of VEX robotics competition.  
  
how this job can be incorporated to the real engineering field?  
industrial engineering  
  
  
**builders**  
The builders have a critical role in preparing the robot, which is, well, building it.  
  
Every member of our robotics team is required to have some level of experience with building the robot, in order to understand robot fundamentals and basic techniques that lead to a successful design. The veterans train the novices by challenging them with questions and presenting new problems, which allows the newcomers to learn through discovery and provide their own creative solutions.  
  
Designated builders are expected to know the robot’s goal and the capabilities the robot will need to achieve that goal, along with maintaining proper build quality and sufficient durability. Builders approach this in their own way: some write out blueprints for robots, going down to the exact angles necessary for their design. Others resort to computer-aided design, creating and planning digital prototypes to use in the real world. Additionally, builders spend a notable amount of time going through trial and error; changing, maintaining, and tuning builds to make sure their design perfectly executes its planned functions.   
  
These students who were trained in our robotics team to be a designated builder (how this prepares for career.)  
  
In this way, builders are an essential backbone of the robotics team.   
  
  
  
**-cad**  
The prototyping and design process is vital to the execution of any engineering project, and the best way to do this is by modeling the robots to better understand and document their design. In our robotics program we use a computer aided design software produced by Autodesk called Fusion 360. This software allows our design team to carefully document every aspect of the robot in CAD files thus increasing our efficiency at analyzing and presenting the robot. This software also allows us to 3D print replicas of the robot in order to physically visualize and analyze what the flaws of our design may be. The members who participate in this role are vital to the team for they serve as the mechanical engineers for the team, possessing the tools to build and analyze a graphical model of our robots thus increasing our understanding of the different aspects of the design. Furthermore the CAD files allow us to expand our communication by allowing members of our team to have constant access to the robot through a virtual platform. By emphasizing the role of a CADer on our team, 99484 is able to be efficiently fulfill the various aspects of the design process.   
  
  
**-pr**  
Although the PR team is not directly related to the process of competing in a VEX competition, it plays a vital part in the \_\_\_\_\_ of the program. Everyone on the team is expected to help out whether that be through leading, helping man an event, or managing social  
  
  
A big part of the PR team worked on the financial aspect of the team since we needed funds to fly ourselves over to Kentucky and compete at worlds. They were in charge of organizing fundraising events to raise money to compete at VEX worlds. Whether that be through selling Christmas wreaths, holding bake sales, or distributing stickers, we worked on raising money.   
  
 The PR team manages everything related to funding, events, and production of promotional material. They were in charge of organizing the fundraising events to raise money to compete at VEX worlds. Whether that be through selling Christmas wreaths, holding bake sales, or distributing stickers, we worked on raising money. Another group of us All of our team members contribute to the PR team in their own way, but the PR managers are the ones to organize, In any career, you need to be able to pitch yourself   
  
Being noticed is hard but crucial if we want to do well at worlds. So, the PR team also worked on   
We realized that in order to do well, it wasn’t enough to just survive through the season, we had to thrive.   
  
  
**-programmers**  
How do we attempt to ensure that no one feels left out //why is this important  
  
**Why do we structure the team the way we do?**-leadership philosophies  
-99484 as one team rather than 3  
-emphasis on collaborative family environment with open communication and regular meetings rather than competitive environment  
-What do we hope to grow in?  
  
When I first started robotics, the impression was that the different teams didn’t really mix. Our process was separate,   
  
When I first started as a captain of a team, all three of our teams were very divided. We worked in separate rooms, and we would pop in to help each other once in a while, but for the majority of the time we would mind our own business. This was problematic because none of the teams could grow to the extent of their potential. We would help each other, but there was a sense of competition within the team itself which made it hard for us to learn from each other.   
  
Instead of having three captains for each of the different teams, we started to become one team with three captains.   
  
But this all changed when we started preparing for worlds. All of a sudden, we were three captains running one team. We were a bit confused at first since it never occurred to us to have multiple leaders But as we worked together, we   
  
 Delegation. We realized that we were more effective as teammates and as leaders when we worked together. By focusing on each of our area of expertise, we could work more efficiently and lead the team better. This way, we could learn and grow in areas where we were less comfortable as a member of the team, but also lead and teach in areas we excelled. Josiah, as the head builder of the robot, was the head captain when it came to our daily meetings. However, when it came to competitions, Yoshiki and I were the head captains. Yoshiki would manage the schedule of the day throughout the competition while I managed the flow of people both within and outside the team.   
 That translated into the way we ran the different teams in the school. Instead of being three separate teams with three different robots, we became one team with three robots. All of us worked together, learned from each other, and supported each other. All of us would put our heads together to come up with the best design and strategy for the team regardless of how experienced we were. It became less about what you knew to start, and more about what you could learn and apply. With this shift in the work flow came shift in the team mentality. We were no competing to out do the others, we were each other’s number one fans. There was a sense of family that came with that attitude, the idea that we could count on each other to have our backs.   
 This sense of family carries on to how we conduct our meetings. We hold two different types of meetings: casual and formal. The casual meetings are possible because all of us feel that we are more than just teammates and they are used to have discussions that can happen outside of our workshop. Whether this be about how to make strategies, what we hope to accomplish at the competition, or just sharing what’s on our minds, these meeting helps us stay on the same page as a team. On the other hand, our formal meetings are usually decision oriented as we discuss topics more directly related to the overall direction of the team.