



MONKEY BUSINESS

News of the Funky Monkeys, Lynbrook High School Robotics, FIRST® Team 846



Editor-in-Chief
Shriyanshu Kode

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Successful Season of Workshops

New Members Learning the Ropes

Catherine Zheng (jr.)



The animation workshop led by Anna S. (sr.) completing an activity.

Every year, dozens of new members join our team, eager to learn the skills necessary to build a competitive robot. At Lynbrook, we hold workshops to teach and prepare rookie members for Build Season. Our workshops are fully lead by students, who were, just a few years ago, like the freshmen: enthusiastic to learn. We hold workshops for all aspects of our team, from

see Workshops, page 4

Unboxing Monkey Box

The revival of our video series

Joseph Liu (jr.)

Three years ago, a member named James Jiao began an initiative for our team to create educational videos to post online for other teams to learn from. He called this series “Monkey Box,” and he created 2 episodes about ball centering and our team’s Girl’s Subsystem Challenge. While the project has stayed dormant for a while, we recently revived the series with a new episode about Spring Counterbalancing.

see Monkey Box, page 2

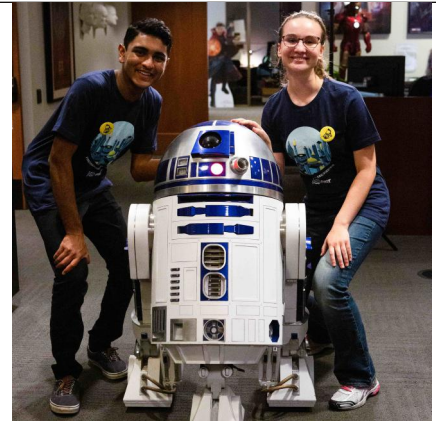
In a Studio Far Far Away...

Anna S. (sr.) and Kunal S. (sr.) explore Lucasfilm

Anna Shaposhnik (sr.)

Stepping into the doors of Industrial Light and Magic (ILM) we were surrounded by characters we know and love: R2-D2, Darth Vader, BB-8. Seeing them on screen, sometimes we forget that behind each, are teams that mastermind every detail. On September 23rd, we traveled to San Francisco to meet one such team, the team behind the animation of Rogue One’s K-2SO droid.

Industrial Light and Magic, a division of film production company Lucasfilm, is a visual effects company legendary for its



Kunal S. (sr.) and Anna S. (sr.) posing with R2-D2.

work on big hits like Star Wars, Jurassic Park, and Back to the Future. While many people pass through their doors for tours, we were invited by FIRST to film a video

see Lucasfilm Visit, page 4

Blasting Off at Offseason Competitions

Cheesing Around at Chezy Champs

Joonha Hwang (jr.)

Bellarmine College Preparatory. It is home to, arguably, the world’s best team: Team 254, The Cheesy Poofs. Since 2014, it has also been home to what may be the most competitive offseason event: Chezy Champs. Team 846, The Funky Monkeys, have attended this invitational offseason competition since its beginning; this past September, the team was back at Bellarmine, facing off against some of the world’s best teams.

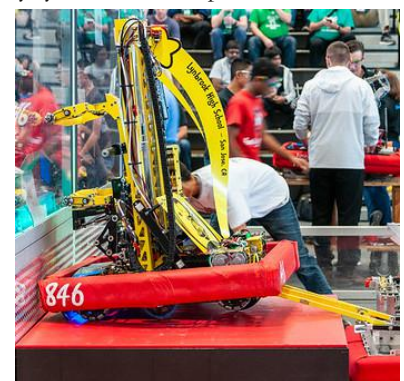
But even before the competition started, the odds were stacked against the team. Caleb Sykes, a renowned FRC analyst, noted in his Chezy Champs match schedule analysis that “846 has a pretty awful schedule.” We would have to compete against some of the world’s best teams, including 254, 1678, 1619, and 971 (twice!).

see Chezy Champs, page 3

Going Bananas at CalGames

Anitez Gautam (soph.)

CalGames is an off-season competition hosted by the Western Region Robotics Forum (WRRF) that our team takes part in every year. The competition includes nu-



SpaceRex on the level 3 platform in a match at CalGames.

see CalGames, page 3

Exploring the Pits

Behind the Workings of FRC Teams

Tishya Chhabra (soph.)

Robot! Robot coming through! Ah, the pits. It's a cramped area, each with a team and their entire shop condensed into a few racks. Members are constantly moving, some rushed to make last-minute fixes, while others are more relaxed, discussing and conversing with other teams. I had the opportunity to go to the Silicon Valley Regional at San Jose State University; being a rookie, it was my first ever competition, so I decided to visit the pits and learn more about all the teams in FRC.

It was quite a task, going around, finding teams that weren't too preoccupied, hastily stepping aside as another robot makes its way into the pits after a match on the field, going up to teams with a smile, and asking questions. I wanted to gain a broader sense of the big picture, of how other teams work as well. So, when we weren't on the field, I was on a field of my own, learning and absorbing as much as I could.

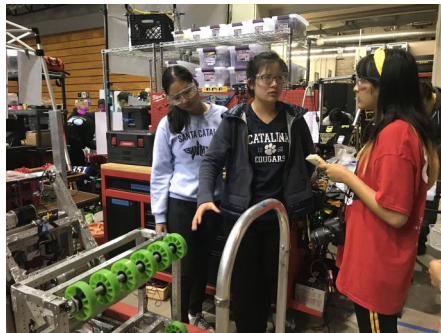
A key difference I found between our team and a number of others was the variety of ways different teams train rookies. For one, there are many teams, like The Cheesy Poofs, Deep Blue Robotics, and Barn2Robotics, who require all their members to have basic training in machining. Team 1868, The Space Cookies, even requires all their girls to do some form of business, whether it be working on an animation video or writing to sponsors. There were also some teams, like Cardinal Robotics, who had their rookies go through a mock build season in the offseason with the previous year's game so they could have an idea of how build season will go. The Iron Panthers even require all of their incoming freshmen to join their FTC (FIRST Tech Challenge) first before coming to their FRC team. A majority of teams, like teams 649 and 6043, have fall workshops, with separate workshops for each



A member from team 4171, the Baybots, and Tishya Chhabra (soph.) after a pit interview.

subsystem, just like us.

Interviewing around at the Silicon Valley Regional also introduced me to a new type of FRC teams: community teams. Most teams are school-affiliated, like us. However, there are some teams that are community teams, where the members are from multiple schools in the area. Team Deep Blue Vision explained that they were operating out of two



Tishya Chhabra (soph.) interviews team 6665, Nuns and Bolts, at the Silicon Valley Regional.

garages, both of which were a bit of a drive from their schools. Additionally, resources and sponsors were hard to find, their only source of funding being the members' parents. However, all the members they have are quite dedicated; one of the main reasons they pulled through was because of the passion that the team has.

At the regional, there were a couple of teams that had some very unique aspects. For one, team 6421, CowTech Robotics, is a team that builds their robot almost entirely out of wood. They have a laser

"It made me realize how, not only me, an individual, but the entire team is part of something so much bigger."

cutter and oven specifically for their wood-working purposes. One of the leads said that CowTech Robotics started with the whole wood concept to spread more awareness about biodegradable robots. Team 4171, the BayBots, started off as well-sized team, but by the middle of build season, they only had two people building the entire robot! It was difficult for them, but with the help of mentors, they were able to pull through and attend the Silicon Valley Regional with a functioning robot.

Going through the pits, meeting so many teams and conversing with them

see [FRC Teams](#), page 4

Monkey Box, *Continued...*

When one of the team's former members told me about Monkey Box, I thought it was awesome right out of the gate. I loved the silly but informative presenting style and I was intrigued by the professional feel of the videos. I wanted to get involved with the project, but I didn't know who to ask or where to start. But when someone on the team came to me and wanted to kick-start Monkey Box, I immediately hopped on board with the project. After choosing the topic that we wanted to present, getting equipment ready, and writing the script, we finally got to the part that originally drew me into the project, which was the filming. Although it took long hours and many takes to get the footage, in the end the episode looked great, and I was really happy with the results.

"I'll definitely be looking forward to making new episodes of Monkey Box!"

Helping to create this new episode of Monkey Box was a super awesome experience. Not only did I have a blast with the other people on the team when we were filming and prepping, I also got experience in being one of the leads for a major team project. I even learned a little bit about spring counterbalancing. Going into the future, we're planning to create even more Monkey Box videos including ones on how we counterbalance the lifts on our robots and how we calculate our acceleration curves using an oscilloscope. If you're interested, all of our Monkey Box videos are on the Lynbrook Robotics YouTube channel!



Joonha H. (jr.), Sam P. (jr.), and Joseph L. (jr.) after filming a Monkey Box episode about counterbalancing.

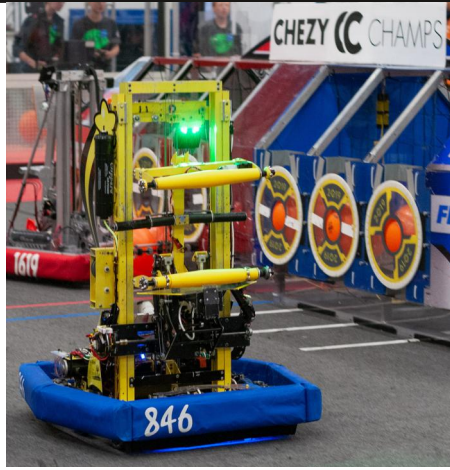
Overall, helping to lead the revival of the monkey box video series wasn't just fun, it also helped me get more experience leading projects. I'll definitely be looking forward to making new episodes of Monkey Box!

Chezy Champs, Continued...

and the reigning world-champion, team 973, the Greybots. Caleb Sykes predicted that the Funky Monkeys would finish 29th among the 40 teams attending due to our tough schedule.

Undeterred, the team headed into the qualification matches on Saturday. Our drive team, comprised of a seasoned driver and four new members, tried its best to compete with the full capabilities of the robot. As demonstrated by the robot tracking data that was available, Space Rex was one of the most heavily defended robots on the field, being defended more than 35% of the time. The team battled through the tough competition and by the end of the qualification matches, the Funky Monkeys were ranked 31st out of 40 teams.

Throughout the qualification matches, the scouting team worked tirelessly to gather accurate data in order to gauge each team's strengths and weaknesses. The entire team scouted for hours at a time to gather accurate data, which helped greatly during alliance selection after the qualification



Our 2019 robot, SpaceRex, driving back to the loading station.

matches. After careful deliberation and much cooperation with other teams, we formed an alliance with three other phenomenal teams: Team 4414, High Tide; Team 5818, Rivera Robotics; and Team 5199, Robot Dolphins from Outer Space.

The quarterfinal matches seemed even

more daunting than the tough qualification matches. We were up against two of the world's best teams: Team 1678, Citrus Circuits, and Team 1619, Up-a-Creek Robotics. In a stroke of brilliance, our alliance devised a plan to victory: switching fields to alternate the hatch and cargo placements in order to avoid the defense. It worked, and in a "certified banger" match where our alliance squeezed out a win with a score of 88 to 87, The Funky Monkeys moved onto the semifinals.

The opportunity to compete with and against some of the best teams in the world was a great experience for the whole team. Members could visit the pits of some of the most innovative teams in the world and learn about exciting mechanisms. In addition, the high level of competition pushed our team to think about new strategies with our alliance partners in order to combat all the high-powered teams. Even though our journey stopped at the semifinals we learned invaluable lessons throughout the event.

CalGames, Continued...

merous local teams and it is a great opportunity to explore the local FRC community. As we arrived at the venue to set up our pits and get ready for our competition, I was excited to be there and to see how our team would perform.

On the first day of the qualification rounds, our team won every single match we had and were placed as the 1st seeded alliance. Even though we had success on the



Isha V. (jr.) and Sam P. (jr.) working on the robot before a match.

first day we knew the matches would get tougher the second day. To stay at the top our team needed to score 3 ranking points consistently in the rest of our matches, a tough task considering our schedule. Our team started the day by winning our first match but ultimately, we lost our second match of the day. By the end of the second day of the qualification matches our team had dropped to 4th place.

After the qualification matches it was time for alliance selections. Throughout the competition we talked with and scouted several teams and ultimately, we formed an alliance with two other great teams: Team

199, Deep Blue; and Team 2643, Dark Matter.

Our alliance worked seamlessly in the quarterfinals and advanced to semifinals. Heading into the semifinals the other two robots on our alliance were facing technical difficulties, but as an alliance we banded together and we got all our robots working just in time for the semifinals. The mechanical difficulties our alliance faced earlier finally caught up to us and our journey ended in the semifinals. Our team came out of the competition knowing that we did all that we could and learned significant lessons we would take into the upcoming 2020 season.

Off the field, we collected two awards! Anna Shaposhnik, our co-President, received the "Volunteer of the Year Award" for her work in graphics and media for WR-RF. For the past couple of years Anna has worked to make amazing graphics to promote the competition. She has also been a videographer at CalGames producing stunning recap and hype videos. This is the first time the award has recognized a high school student in the event's 17-year history. The Funky Monkeys were proud to receive the System Design Award, one of the top technical awards, for our "exceptional robot system design."

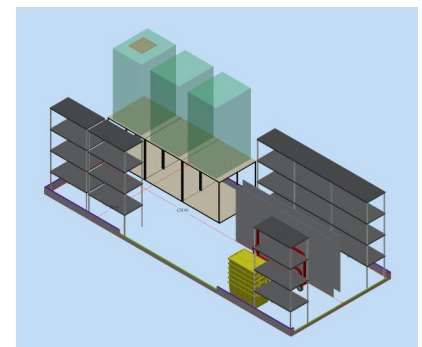
Monkeys on the Move

Downsizing our Storage Space

Swasti Jain (soph.)

This past summer was spent hauling heavy shelves of metal beams, as we were forced to move out of our storage room, room 607. In order to plan ahead, I created a model using CAD so that I could figure out the optimal way to arrange the room. I was personally shocked by the difference in size of the alternative space, roughly three-fourths of the original storage room space. Due to the limited space, we had to dismantle robots from past years, which are fundamental when teaching new members about how a robot works, and inspiring designs during build season. Everything that couldn't fit into

the small storage unit was crammed into the already packed machining room. Physical obstacles and overall less space introduce an unnecessary safety hazard. This move has been difficult but thanks to the efforts of our team the transition was seamless.



A CAD Model we made of our new shipping container to fit the most into the 8x20 ft. space.

Lucasfilms, Continued...



Kunal and Anna talking to ILM's Animation Supervisor Hal Hickel.

for their Galactic Builders YouTube series. Each video would feature one or two FIRST teams and one Star Wars related project: Hasbro's droid toys, Disney Imagineering's animatronics, and now ILM's K-2SO motion capture technology.

Motion capture? That's right! To explore the concept, I donned a fuzzy suit and stuck on some colorful Velcro tabs with small reflective balls, slipping my hair through the "pony tail hole" (good design!) in the hat. Naturally, I picked the red colored tabs, which turned out to be the exact ones used by an actor to practice playing Darth Vader! Motion Capture Technician Brendan Byrd led me and Kunal into a black-walled room

lined with cameras. He explained that K-2SO is only partially visual effects. In fact, it's played by an actor wearing a motion capture suit like I wore. When the actor moved, a digital puppet of the character would be overlaid in real time to the movements of the actor. A large screen called a "magic mirror" is used to try-on the character. As soon as I stepped in front of it, I could see myself as K-2SO. When I raised my arms, he raised his. When I danced, he danced. I was ecstatic and instantly tried to "break" the model. It wasn't that hard. His arms, longer than normal human arms, could pass through the body. Byrd explained that the actors had to practice familiarizing themselves with this difference of scale.

Meanwhile, Kunal got to check out the virtual camera. A screen equipped with a few reflective-ball-covered appendages. To test this out I was tasked to play out a few scenes. First walking with fear, then with confidence, and then with confusion. Following me with his virtual camera, Kunal could see how the scene looked on the screen in real-time. It was fun!

We also got to meet Rachel Rose (Co-Supervisor for R&D) and Hal Hickel (Animation Supervisor). Both revealed to us the amount of math that goes into bringing K-2SO to life. From the dynamic joint connections, to the software that puts all

the camera data together, it's not easy, but from their enthusiasm, it sure looked fun! In the interview about our impressions and how it ties back into our team, I pointed out the joy it brought me knowing that jobs that combine art and technology are thriving. What we do on our team, from the software, CAD modeling, to the 3D animations we create are all vastly applicable skills. As a final treat at the end, when we filmed our "entrance," R2-D2 rolled out! Beep-boop.

I'm so grateful for this experience. From

"I pointed out the joy it brought me knowing that jobs that combine art and technology are thriving."

the patient director who's catch phrase for "action" is "in your own time," to the quirky actor who convincingly portrayed a dinosaur's movements, everyone we met that day was memorable. Being able to embody K-2SO is a testament to how technology, art, and storytelling feed-off one another. As someone aiming for a design/technology related degree, what I saw makes me excited to bring together these two fields myself.

Workshops, Continued...

machining to media. Whether you are more hands-on or more theoretical, there is definitely a workshop for you.

Workshops are about 7 weeks long and span from early October to late November, and are held after school on weekdays with different workshops each day. We have so many workshops that we have to overlap them on some days!

Just because the workshops are student lead does not mean they are less in content or quality. Workshop leads spend numerous hours outside school preparing for their

class. Before workshops begin, they have to plan the course of their workshop, and for some workshops, such as Design and Software, leads have to send out detailed instructions on how to set up specific software for their workshop. The first

"Like the students, I learned a lot, and in the end, I came out a better designer and teacher."

workshop is usually planned to help everyone get started and on equal grounds. For other workshops, such as Electrical and Animation, the students are introduced to the tools and skills they will need through presentations and group work.

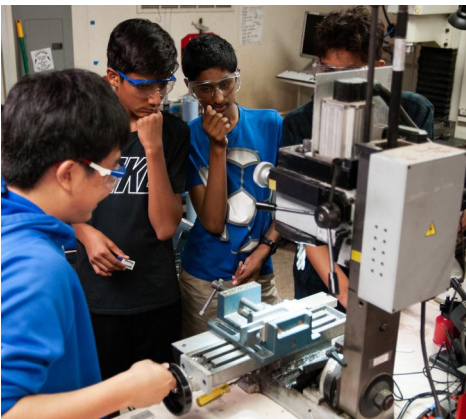
Once workshops start, preparations would range from class materials, such as demos or crimped wires, to homework instructions, which could be as easy as thinking of ideas for the next Animation Video or completing tutorials about Kotlin. Because of the limited time we have to prepare the freshmen, curiosity and motivation for learning become essential if they wish to thrive on the team. While not mandatory, homework allows students to practice the skills they learned

in the previous workshop and encourages them to branch off and explore. Despite the limited time we have, many of the students are prepared going into build season, and they come out ready to teach the next generation of new members.

This year, I was the lead for the design workshops. Even though I helped with the same workshop last year, leading it was a whole different story. I was scared of being underqualified, but many people helped me along the way. Like the students, I learned a lot, and in the end, I came out a better designer and teacher. I cannot wait to use my newfound skills this coming Build Season.

FRC Teams, Continued...

made me gain a whole new level of respect for FRC in general. It made me realize how, not only me, an individual, but the entire team is part of something so much bigger. Every single person I talked to welcomed my questions with big smiles and were excited to share about their team. I even took pictures with them! The whole experience made me realize what an intelligent and respectable community I was finding my place in. Every single team was self-driven and passionate, not only in building a robot, but in building and maintaining a successful team.



Joonha H. (jr.) teaching rookie members how to use a minimill.