



MONKEY BUSINESS

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



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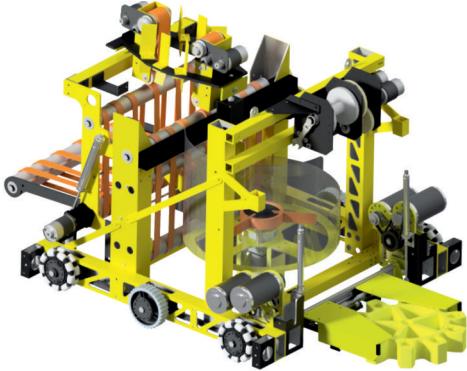
Nikash Walia

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Punk Monkey

Learn about the different parts of our 2017 robot on page 3!

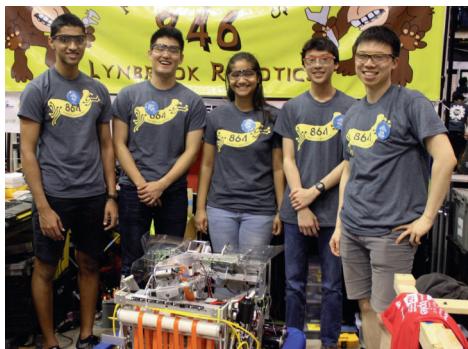


An April Fool's Joke

The day our team became the "Banana Breakers"

Nikash Walia (*sophomore*)

This year, as we analyzed the gameplay strategy and robot features of team 1678, the Citrus Circuits, Shikhar Jagadeesh and James Jiao had a lightbulb moment for April Fool's. We realized maybe it was time



The drive team shows off their Banana Breaker t-shirts.

see AN APRIL FOOL'S JOKE, Page 2

Teamwork – For Real!

A freshman's experience on the team and at the Utah Regional

Rin Ha (*freshman*)

Ever since my first group project in sixth grade, my experiences with them were often one-man projects. I could not perceive that there were benefits of cooperating and being part of a team until I joined Robotics. Thanks to Team 846, I started to learn what teamwork truly is, and at my first regional, the 2017 Utah Regional, I could finally see its importance clearly.

Coming to my first regional, I was exhilarated, knowing it would be a thrilling experience. Our team met up early in the morning to arrive at the Maverik Center, the location of the regional. At 8:30, everyone rushed inside the building to start working in the pits or begin scouting. I was part of the group of people who had to scout. On the first day, my partner and I went to several teams' pits to learn about their robots by studying them and interviewing their team members. Being a shy person at

see TEAMWORK – FOR REAL!, Page 2



Augustin B. (jr), Rin H. (fr), Nikash W. (soph), Anna S. (fr) and Philip A. (jr) dance with other teams at the Utah Regional.

the core, approaching people I had never met and starting a conversation with them wasn't the easiest, but after a couple of rounds, I became more comfortable. Once the first day was over, we had a great deal

The Engineering Process

Using the scientific method to debug a software issue

Philip Axelrod (*junior*)

This year's game, which involved shooting whiffle balls, offered an interesting challenge for both the design and the software team. After creating a double belted shooter, it was time for the software team to step in and create matching software for the meticulously designed hardware. In the process, not only did we create a novel shooter, but the software team practiced the engineering cycle.

On the first iteration of the shooter



Philip Axelrod (jr) and Nikash Walia (soph) use Funky Dashboard to log the shooter roller speeds.

software, we noticed that balls were being shot inconsistently. After logging the speeds of the shooter, we were surprised to find

see THE ENGINEERING PROCESS, Page 2

An April Fool's Joke Continued...



Senior members joke around after their final regional with Team 846.

to start fresh with a new FRC team- the Banana Breakers.

Our main graphic designer, Elton Chang, designed a brand image as a parody of 1678's classic logo by replacing the lemon with a banana. Initially, the idea was in the doldrums, but we soon had many team members buying shirts.

April 1st occurred on Day 3 of the Silicon Valley Regional. The teams had been working from morning to night in the pits and scouting other teams, as well as balancing missed work from school. Then a group of students showed up in grey shirts with strange logos that read, "Banana Breakers, Team 846". Everyone was surprised to see a team that had never been heard of before, much less registered to compete at the regional. The humorous play on one of the world's most competitive teams, at one of the world's most cutthroat events was a comic relief for the load on all the teams at San Jose State University. But the most iconic moment was yet to come—while picking teams for elimination matches, the event announcer, confused by our

"the event announcer, confused by our team's shirts, called us Team 846' instead of 'Team 846'"

team's two different shirts, called us "Team 846" instead of "Team 846", prompting laughter from the entire team and those who were acquainted with our prank.

Our little joke may not have been as iconic and well-known as Google's "Easter eggs", but it remained immortalized and memorable as our own April Fool's joke forever in our hearts and minds.

Teamwork - For Real! Continued...

of data about all the robots in the regional.

The second day marked the start of qualification matches, and we learned a lot about other teams' strengths and weaknesses. To obtain all that data, we studied the individual robots competing and how well the alliances worked. For several hours straight, I was sitting among the audience, jotting down notes on an index card every match. After several of hours of hard work, I would even wonder, "Do we really need to scout every single match? Will all this data even be useful?" I could not see the answers by the end of the second day or even the beginning of the third day. However, during alliance selections, the answer shone clearly.

The alliance captain that chose us had

"I now know that teamwork is a key factor in any team's success"

less scouting data compared to us. After we were chosen, our alliance captain relied on our data heavily when choosing our final partner. After much discussion, we choose a good defensive robot. We claimed victory both times during our quarterfinal matches and headed to the semifinals. Although we could not advance to the finals, our alliance tried its best in its semifinal matches, and I was proud that all our scouts' data helped us strategize well for our quarterfinals.

Later during the award ceremony, we won the Innovation in Control award, which made me particularly elated because I knew my contributions to our software, had helped us receive that award. Shadaj, our Vice President of Software Engineering became a Dean's List Finalist and Mr. Giandomenico, our head coach, who has taught our team for fourteen years and been a central figure in unifying us, earned the Woodie Flowers Finalist Award, which was thrilling.

Later, as our team celebrated together for our great success, I could feel the spirit of teamwork. Cooperation allowed us to reach this high a level of performance. By going to the 2017 Utah Regional, I now know that teamwork is a key factor in any team's success rather than members only focusing on their own work. From what I have learned, I am even more enthusiastic to contribute to Team 846 and work together with the people on the team!

The Engineering Process Continued...

that the roller speeds wildly oscillated around the target speed, which would explain the inconsistent shooting. After reducing the gain of the roller's velocity control loops, we found that shooting did become more consistent.

A second issue soon arose. Although balls were being shot consistently, we found that balls were still falling short of their target. We discovered that the shooter velocity was dropping because other robot components were drawing electrical energy away from shooter, causing the shooter roller speeds to drop. After coming up with a scheme to compensate for this dropping battery voltage, we tested this on the robot. Success! Not only did the data indicate the elimination of the speed drop, but the results were visible in that balls were being shot consistent distances! But we accomplished more than creating a consistent shooter.

In fact, our entire robotics club is about



With less aggressive roller speed control and compensating the battery voltage, we now have a consistent shooter!

more than shooters, control software, or robots. Rather, the shooter was medium for students to participate in the cyclic engineering design process: We made educated, evidence-based observations to diagnose problems regarding shooter speeds; designed, implemented, and tested solutions based off these observations; and repeated the engineering cycle to address increasingly more difficult problems. The students walked away from this experience not only with a competitive shooter, but with the engineering process as a problem-solving tool.

1 Ball Collector

Our collector uses belts to pick up balls on the ground and move them to the ball storage then to the shooter. Two pneumatics deploy the front of the collector outside the robot's bumpers to collect balls before the robot runs into them.

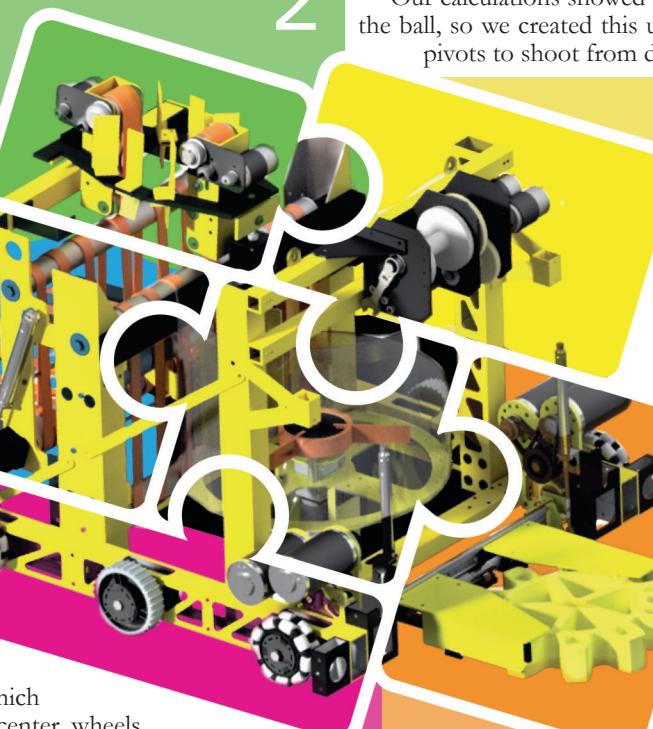
Ball Shooter

2

Our calculations showed belt-shooters transfer more energy to the ball, so we created this unique double-sided belt shooter that pivots to shoot from different angles.

Drivetrain 4

This six-wheel drive has a slight center drop on the middle wheel, making it a west coast drive. The front wheels are Omni wheels, which reduces turning resistance, and the center wheels are traction wheels, which allows for control. The single speed gearbox can drive the robot up to 15.5 ft./s. This year's drivetrain was fully designed, machined, and assembled by the girls on our team who took part in the "Girl's Subsystem Challenge."



Climber 3

Velcro on the climber captures the nylon rope. The rope's slip knot allows the climber to gather enough slack before climbing. The gearbox's torque limiter slips when the robot reaches the top of its climb. A ratchet on the output prevents falling.

5 Gear Collector

Our gear collector uses a pair of clamping surfaces to pick up gears from the ground. Pneumatic cylinders allow it to raise and lower itself, and open and close the clamp.

Introducing Punk Monkey!

Height: 24 in. | Length: 28 in. | Width: 28 in. | Weight: 88 lb.

The Brains Behind the Bot

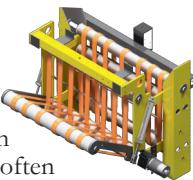
Many team members contributed to the robot, but here are the perspectives of our lead designers

Anna Shaposhnik (*freshman*)

1 Jing-Chen Peng

Collector Lead (*junior*)

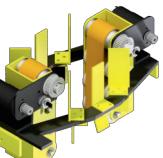
As a junior hardware lead and future president, Jing Chen is always working on ways to improve his subsystem. You will often find him testing the robot outside or in the gym along with James. "[We're] still working on finding problems" he says.



2 James Jiao

Shooter Lead (*sophomore*)

To James, "robotics is awesome". Looking back on the choice to make a belt shooter this year, he tells me. "We were inspired after seeing the benefits of a double-sided shooter. Then we decided to take it further and increase the contact distance with the ball by using belts which allows more energy to be transferred. Although it may not have performed as well as we would have liked, it was a very good learning experience, and the knowledge will prove to be useful in future years."



3 Andrew Ng

Climber Lead (*sophomore*)

For Andrew it's simple, "the best part of working on the climber was seeing it pull our wooden robot prototype up the climb."



4 Ria Pradeep

Drivetrain Lead (*senior*)

Ria's passion for robotics infects the people she works with. As lead for this year's girl's subsystem, the drivetrain, Ria says "I got to work closely with many underclassmen and rookie members. I enjoyed sharing my knowledge and experiences, and hope to see the subsystem continue in the future."



5 Arthur Zhang

Gear Collector Lead (*junior*)

To craft the gear collector, Arthur was very resourceful: from using silicone placemats to obtaining free rails from IGUS. He commented: "I used a variety of sources for ideas, ranging from the Robot-In-3-Days teams, existing machinery that also picked up objects, and examples from our team's past robots. I narrowed these examples down by selecting the simplest yet effective design and modifying it to fit our needs."



SENIOR GOODBYES

Dear Funky Monkeys,
As my incredible journey through high school comes to an end, I would like to thank the member and mentors of the Funky Monkeys for an unforgettable four years. The countless long nights, the

"These past four years have helped me become the confident leader I am today."

exhilarating competitions, the skills I've learnt, and the relationships I have built are just some of the things that will stay with me for years to come.

When I first joined the club, I was incredibly shy and sat in the corner not



Shikhar Jagadeesh enjoys his passion of fabricating parts on the CNC machine.

actively trying to participate in anything. It was thanks to a sophomore at that time, Srinjoy, who went out of his way to get me involved, that I could make sizeable contributions to the team. Through the years, I gained technical skills in electronics and machining, speaking skills through presentations, writing skills through grants, and interpersonal skills through demos.

These past four years have helped me become the confident leader I am today and I will forever be grateful to the mentors and members that have helped me along the way. This team helps inspire greatness and I am excited to see what is in store team! Best of luck to all of you!

— Shikhar Jagadeesh
2016-2017 Co-President

Dear Team,
As my time on the team comes to an end, I look back on the past three years with a sense of accomplishment and awe. I remember on Kickoff day of my rookie season, I still thought it was impossible to make a robot in six weeks. Now, I've helped

build three. That first week, I stood by the CNC both intrigued and confused. Now, I can use that same machine to fabricate complicated parts. When I joined the team, I immediately started participating in the Girls Subsystem, which was only in its second year. It enabled me to develop skills strong enough to become one of the team's first technical leads. Today, the team consistently has six or seven girls working on the drivetrain, a significant rise from the two during my rookie year.

This project enabled me to become an active member on the team, and I'm sure it will continue to do the same for many other girls in the future.

A word of advice to new members. Our team prides itself for its diverse member-

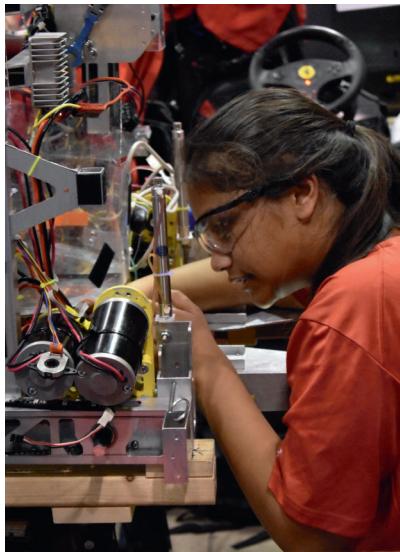
ship. Our skill sets range from writing and public speaking to animation and music. Regardless of what you may be interested in, you will find a way to express that passion through some activity on the team. If you remain active and open-minded, nobody

will stop you. And, if there's something you want to do but nobody else is doing it, start it yourself! Want to build a skateboard? Or apply for a new grant from a sponsor? Or even share your knowledge with the world? You can do any of those things (in fact, those are all activities that students have led and accomplished).

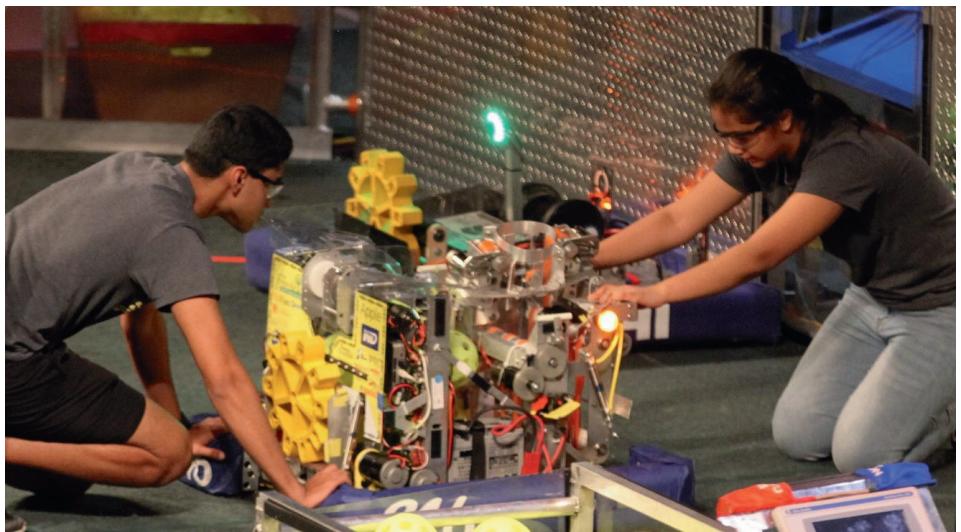
Thank you to all the mentors and members who patiently guided me through my time in Robotics. This team has transformed me from that shy sophomore to a confident leader. I will never forget the lessons I learned, the friendships I

have formed, and memories that will last a lifetime. I know Lynbrook Robotics can only go up from here, and I can't wait to see what the team accomplishes in the future.

— Ria Pradeep
2016-2017 Co-President



Ria Pradeep pushes an encoder back into place after a match.



The co-presidents, Shikhar Jagadeesh and Ria Pradeep, position the robot for the autonomous routine.