



# MONKEY BUSINESS



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

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## Upcoming Events

Fall 2015

- Worksessions (in Room 612)
- Chezy Champs (at Bellarmine HS)
- CalGames – Hosted at Lynbrook HS!

## Junky Monkey

Learn about the different parts of our 2015 robot on page 3!



## The Line Between School and Robotics

Trying to balance the workloads from school and robotics is a difficult task.

Wendy Zhang (*freshman*)

Ding!!! The bell rings precisely at 3 pm. Students rush out of class. Some people race to the PE lockers for sports while others make their way the front of the school. However, a group of Funky Monkeys dash into a room next to the basketball court at the back of the school. This is Room 612 -- the Lynbrook Robotics team's workshop.

From January to February, these dedicated students toil late into the night to design, machine, and assemble the robot. Many of these students are busy

see **SCHOOL AND ROBOTICS**, Page 2



Dear Funky Monkeys, Welcome to Lynbrook Robotics! As we approach the 2016 FIRST Robotics season, there are many exciting ways for you to get involved on the team! In the remaining months before second semester, there are plenty of opportunities for you to jump right on as a Funky Monkey, including our two offseason competitions, Fleet Week fundraiser, and member training workshops in Computer-Aided Design,

see **PRESIDENT'S WELCOME**, Page 2

To Our New, Aspiring Members, The next chapter of your life begins now and you have the choice to make them as memorable as you want. Within my last four years as a student I have spent countless hours learning from our mentors in the workshop, competing at away regionals, and most importantly building great friendships with many members on the team. Because of our dedication and teamwork, in just the last three years, we've qualified for the

see **PRESIDENT'S WELCOME**, Page 2

## Build Season

Behind the scenes: What really happened.

Brent Yi (*senior*)

It was Saturday morning, January 3rd. The sun barely peeked over the horizon, as hundreds of students from the Bay Area poured into San Jose State University's Concert Hall. The group was incredibly diverse, but everyone came for one common purpose: the 2015 FIRST Robotics Competition (FRC) kickoff, where the season's game is revealed and kits of parts are distributed.

The 2015 FRC game, "Recycle Rush", is different from recent years' games. This year, each alliance of three robots remain



Shikhar Jagadeesh(*sophomore*) works with Rahul Iyer(*junior*) to assemble the drivetrain.

on their own side of the field while attempting to stack rectangular totes and cylindrical recycling bins. Each team, including Team 846 and 2900+ teams

see **BUILD SEASON**, Page 2

*Presidents' Welcome Continued...*

programming, and machining. We also have a group of awesome officers and mentors who are always willing to help you out. Our team is not just about building robots either! Writing, photography, graphic design, and animation are all activities you can be a part of as well!

Above all, Lynbrook Robotics is a community of doers, people who actively pursue new ideas because they love what they do. Robotics is the platform for bringing out your creativity, and you provide the ideas and the innovation that drives the team forward. I look forward to seeing and working with every one of you and would love to help you become an avid Funky Monkey this year! Here's to a great season ahead.

*-Rahul Iyer, Co-President 2015-2016*

Robotics World Championships twice, won our first regional in 15 years, won two offseason competitions and been a role model for many other robotics teams around the area.

So how do you start your journey with us? The easiest way to get involved is to find an area of robotics that catches your attention. Our robotics team is more than just math and science. For instance, we have many talented artists who help our team maintain a great image. We also publish newsletters like these every three months with all student written articles. Through experiences like these, I've been able to learn and grow with the team, and I'm proud to call myself a Funky Monkey.

*-Srinjoy Majumdar, Co-President 2015-2016*

*Build Season Continued...*

around the world, would build a 120 pound robot to compete in the game. To add difficulty, everyone would have only forty-five days to finish.

Hitting the ground running, the Funky Monkeys gathered immediately to begin the brainstorming process. Rookie members, veterans, and mentors pitched their ideas, which ranged from simple stacking mechanisms to ambitious tote shooters. Some ideas were immediately weeded out, as others were recorded for future consideration. Through the daily design meetings over the next two weeks, members and mentors analyzed robot concepts, and applied their knowledge to simulations and prototyping.

With every dilemma came a difficult decision, and every decision a debate. One of the first things we had to choose was the shape of our robot frame: wide or long? A long robot meant stability, at the cost of turning ability and space for an active game piece intake. A short but wide robot presented the risk of tipping and complicated the issue of mounting electronics; however, it gave us extra space for an improved intake mechanism. In the end, we chose to have a wide robot. Slowly but surely, our team chipped away at each design issue and converged on one robot concept.

Throughout the next couple days, the students and mentors of Team 846 worked tirelessly in the machine shop and the school's computer science room. The mechanical team worked to bring the concept to life, while the electrical and software teams helped streamline the robot bring-up process. Members of various grade levels measured and cut wires based on the CAD models, while others machined parts on the CNC machine. Our small, yet driven software team was challenged to write code for a robot that did not exist yet. With numerous test runs, failures, corrections and reruns, Team 846 was on its way to preparing a robot ready for competition.

As clock ticked past 12 AM, the Funky Monkeys looked up from their work. It was the end of the build season, February 17th. Everyone stared at the hastily-assembled robot sitting on the carpet. Each had mixed feelings -- success, pride, and slight sadness. However, one thing was clear -- that there were plenty of opportunities to improve the robot. And so our entire team set new goals, so that by start of our first competition, we would turn our robot into a worthy competitor.

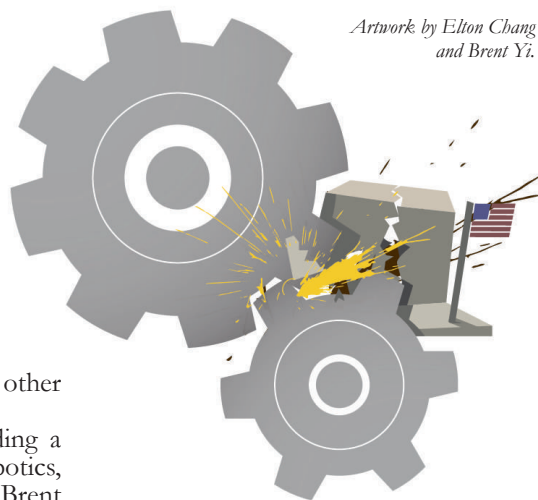
*Balancing School and Robotics Continued...*

and stressed from school, but they can still find time for robotics. This year, most students spent 20 to 40 hours machining, programming, or designing at school. On average, sophomores and juniors spent 25 hours each week at robotics during build season, which is a staggering 20% of their school week without accounting for sleep, other extracurriculars, and homework.

Despite all these difficulties finding a balance between academics and robotics, students like former Co-Presidents, Brent Yi and Raphael Chang still managed to

*"Instead of watching the Game of Thrones, he spends his time studying and building in the robotics room."*

succeed in both. On top of keeping the Robotics team in order and contributing over 40 hours each week during the build season, Brent has handled three AP classes and kept his GPA above 3.7. Even more astonishing, he still has time to design and create an electric skateboard and sleep seven hours a day. Brent says the only secret to his success is good time management. Instead of watching the Game of Thrones, he spends his time studying and building in the robotics room. Next year, he plans to major in



*Artwork by Elton Chang and Brent Yi.*

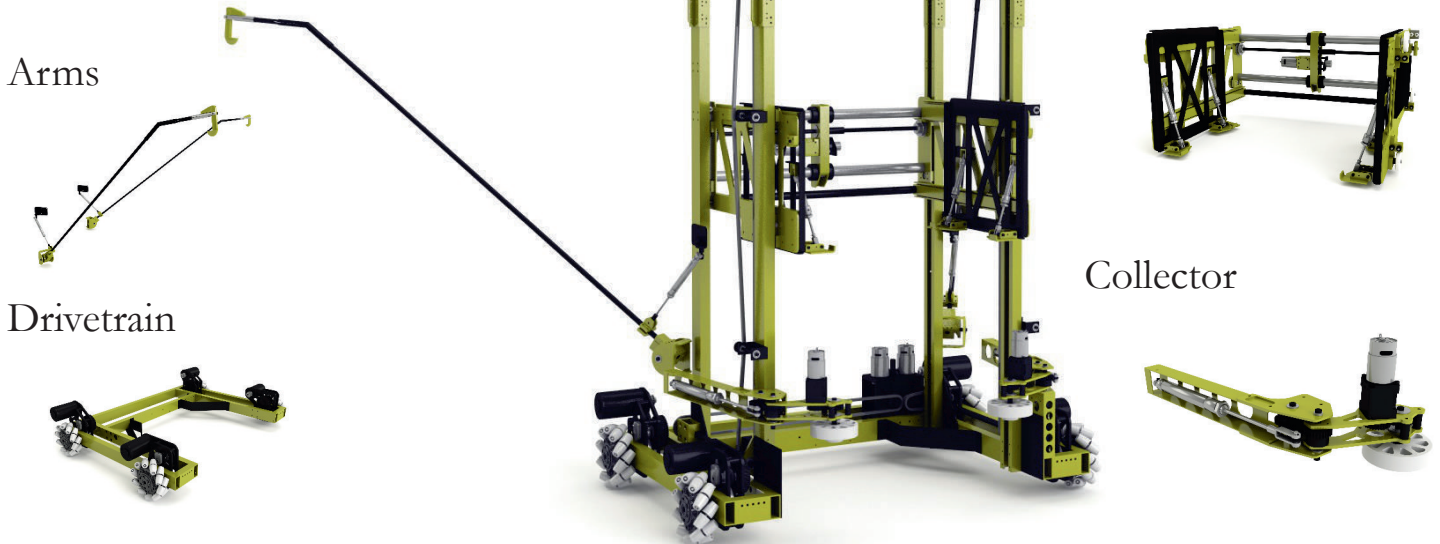
computer science at UC Berkeley. Our other Co-President, Raphael Chang will be heading to the Massachusetts Institute of Technology this fall to study computer science. Because Raphael is usually very attentive in class, he understands the concepts taught in class and can quickly finish homework, thus saving a lot of time for robotics. During the build season, Raphael has managed to not only spend around 45 hours each week on the robot design and assembly, but also keep his perfect 4.0 GPA.

Everyone has different formulas to how to stay involved in both the build season and school. Some may have Brent's and Raphael's methods of good time management and staying focused in class to save time, while others will find and develop new study habits as they change and grow. Everyone's definition of success is different and it's up to you to find a path to your vision of success.

# JUNKY MONKEY

Height: 77 in. | Length: 27 in. | Width: 42 in. | Weight: 119 lbs.

The 2015 challenge for thousands of FIRST robotics teams this year was "Recycle Rush". During the first fifteen seconds, alliances composed of three teams use pre-coded instructions to score points by stacking recycle containers, or containers, on top of crates, or totes. In the tele-operational period, lasting two minutes and fifteen seconds, the two alliances stack totes and containers onto platforms. Stacks are scored as two points per tote, and six points per tote if a container is placed on top.



## ARMS

In order to quickly grab the containers on the center step, our robot has two carbon fiber arms with hooks at the end. The arms, which have 160 degrees of freedom, swing down and the hooks fall into the holes at the top of the containers, and the robot drives to pull the containers off the step and over the landfill.

## COLLECTOR

Attached near the base of the robot, the collector intakes totes and containers into the frame of the robot. The collector can retract into transport configuration and extend for intaking. The collector features high-friction wheels to quickly grab game pieces and align them inside the robot for stacking.

## ELEVATOR

The elevator on the robot lifts and stacks totes and containers inside the robot. At the base, a dual-motor worm gearbox drives the carriage up and down the elevator. A constant-force spring provides approximately 30 pounds of counterbalancing force to quickly lift multiple game pieces.

## DRIVETRAIN

The drivetrain was designed and fabricated by the all-girls subteam composed of girls from all grade levels. Using Autodesk Inventor, Amrita Iyer, along with freshmen in the subteam, designed a U-shaped drivetrain frame to allow the stack to be contained within the perimeter of the robot, giving us more stability. We decided to use a mecanum drivetrain for the first time in our history to improve the robot's agility in tight areas of the game field. With the combined efforts of other team members, Nikita Seth designed the four gearboxes, each moving a 6-inch mecanum wheel that enables the robot to move smoothly in all directions.

## CARRIAGE

In order to create stacks of totes and containers, our robot has a carriage that picks up totes. The carriage has four hooks that operate independently, allowing it to handle totes and containers of every orientation. After the carriage hooks grab hold of one tote, the carriage is moved up the elevator, a second tote is collected into the robot and the carriage slides down to pick up this tote. This cycle continues until our robot holds a stack of six totes with a container on top. The carriage also features an extension mechanism supported by drawer slides and powered by belts, allowing the stack to be extended out of the robot and deployed onto the various platforms or existing stacks.



# SENIOR GOODBYES

**D**ear Funky Monkeys,  
 As I complete my four years on this team, I remember winning our first regional, attending championships twice, winning our very first off-season event of the year, and consistently making the elimination rounds at every event. Not only am I proud of our performance at competition, I am most proud of how we've got here, how we've grown over the last few years as a team.



I remember going into room 612 my freshman year. We had just acquired our workshop from the school that year, and the room was almost empty. There was only one workstation, a bandsaw, and a mini mill, no shelves, CNC, machining area, or robots. Later that year, we acquired our CNC mill, which allocated one third of the room for a machine shop. We set up shelves and organized everything into over 50 boxes. As our workshop developed over the three years, our robots also became more robust and more student designed. Now our robot is nearly 100% student made, and we are expanding out of the space of room 612.

Not only has the team grown, robotics has also changed me. I am no longer the shy freshman in the back; no longer someone who is unsure of what I wanted to do. My journey through robotics made me an engineer and a leader, but most of all, someone with newfound confidence. Robotics was an amazing experience, and I am lucky to have the chance to devote my four years of high school into it. Thank you to everyone who's make robotics possible, and I know you'll do even better next year. I will always be there to cheer you on, forever a Funky Monkey.

— Raphael Chang  
 2014-2015 Co-President

**D**ear Team,  
 When I joined robotics as a freshman, I thought I would be extremely involved in the technical side of the team and take part in design work. I went to various workshops, touched the surface on every technical aspect of robotics, and found that I really liked machining. Now, fast forward to sophomore year when I had just begun learning to photography on my own. I still remember one of our mentors saw me holding my camera at the robotics end of year picnic at Rainbow Park and told me that our team was in desperate need of a photographer.



After four long years, I've somehow become the first Media Lead of the team and I've managed to drastically improve in photography, using Photoshop, and creating layouts in Scribus. Basically half the things you would think robotics is not about. You might be reading this and thinking "So why is she still in Robotics?," but the answer is simple: It's because of the sense of comraderie. I distinctly remember when we won the Buckeye Regional, even though I took no part in designing the Funk Cannon robot, I was excited to not only be celebrating victory with my group of close friends but also capture the moments I may never relive with my DSLR.

So to the future leaders and dedicated souls of the team, being part of our team isn't just about getting a noteworthy leadership position — it's about doing what you enjoy while benefitting yourself (and hopefully the team). Once you have forged a strong relationship with your peers in this club, you will feel that all the time spent in robotics has been worth it.

On another note, thank you to everyone who has made robotics that much more fun, and thank you to the mentors for guiding us all and helping to make us organized people. Good luck to the entire team next year and best of luck during the 2016 competition season!

— Megan Lau  
 2014-2015 Media Lead

## Where Can You Find the Class of 2015?

