Spring 2012

Monkey Business

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

Monkey Business
Produced and Edited by
Jackie Zhang
with Eric Yeh

In this issue

P.1 **Build Season 2012**
Funky Monkeys go to New York
P.3 **Freshmen Page**
P.4 **Room 612: Our New Home**
CalGames



Funky Monkeys go to New York

By Nikunj Khetan with Akshat Agrawal



Our mascot shows off our new team flag at the New York Regional.

I had never been so far from home without my parents looking after me. Signing up to go to New York was a bold step for me, and in the beginning, I had many qualms about staying without my parents. But, I found the competition to be so engrossing that, within minutes of the first day, I had forgotten all my previous apprehensions and was thoroughly immersed in the world of robotics.

First and foremost, the matches were, in a word, exhilarating. It was as if I were watching a real basketball game -- the robots fiercely competed to score points and the tension during close matches was tangible. The end game made my heart race, my eyes glued to the field as the robots rocked slowly back and forth until the bridge was balanced or until the time was up. When multiple robots balanced on one bridge,

See **NEW YORK**, *Page 3*

Building a Robot in 45 Days

By Robert Ying with Matt Wang

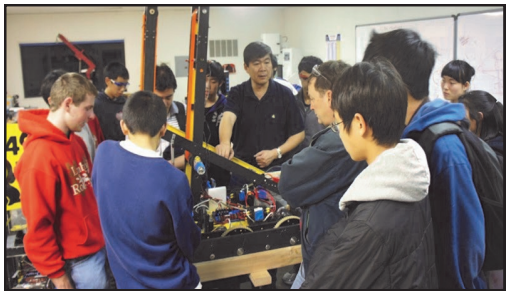
How we built the Tail of the Monkey

"Good luck, and we'll see you at the competition!" As the video that explained the 2012 *FIRST* Robotics Competition game faded from the screen in the main auditorium of San Jose State University, the crowd's excited chatter filled the room. The game was revealed, kicking off Build Season 2012.

The 2012 FRC game is called "Rebound Rumble." As implied by the name of the game, this year's robots have to meet the demanding challenges of basketball, with over twenty balls on the field and four hoops to shoot into. While the primary objective of the game is to score basketballs, bonus points can be scored by balancing robots on bridges at the center of the field. To win the game, the team would have to build a robot that could effectively score both on the bridge and into the hoop—not a trivial task, given the six-week time constraint.



Students and their mentors work together to assemble their robot.



The team discusses how to add on the bridge manipulator–the tail.

Working with the Firebirds (*FIRST* Team 3501) from the nearby Fremont High School, the Funky Monkeys gathered to brainstorm ideas for Build Season 2012, from practical discussions of drivetrains and ball launcher designs, to the fantastical ideas of hovercraft-robots. At the end of a two-hour discussion, representatives from each group of ten students presented their ideas to the combined teams, including a detailed game analysis and a competition strategy. Thereafter, Mr. Xie, the lead design mentor, laid out a plan for the following six weeks of build season. Both new and experienced members left with a sense of direction, determination, and drive, ready to tackle the daunting task of building a robot.

See **BUILD SEASON 2012**, *Page 2*

© *FIRST* Team 846 The Funky Monkeys

Building a Robot in 45 Days

Continued from page 1



Tony Peng writes the code for the robot's key detection system.

Starting from physics principles, the team worked on solving the various design challenges of the game, experimenting with the various parts of the field in computer and Lego simulation. In daily design meetings, members and mentors worked together to model the dynamics of robot propulsion and ball launch trajectories, as well as discussing abstract concepts of electrical and computer engineering: students, especially, had many opportunities to learn about the practical applications of the sciences taught in school.

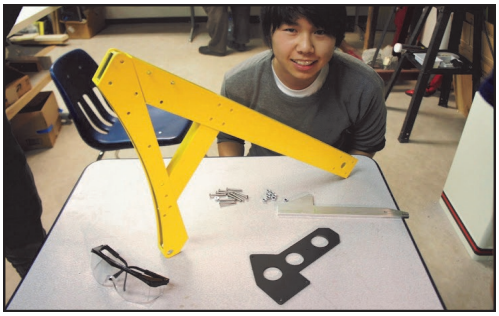
> Both new and experienced members left with a sense of direction, determination, and drive.

With a general robot concept in mind, the team began developing a computer model of the robot. Throughout the design period, the team used Autodesk Inventor, an industrial tool for mechanical design, to model all of the components of the robot on the computer based on the calculations previously performed. As the robot took shape in the virtual reality of Inventor, the machining team made that vision tangible. Using the newly-acquired Tormach pCNC milling machine, they transformed computerized drawings into professional-quality components for the robot.

Much like in an industrial engineering project, however, time was the critical resource: with the clock running down, students and mentors alike stayed late at night to finish the crucial parts of the robot. "The last couple of weeks of build season was a test of endurance," said Treasurer Miles Chan, "The core members, already struggling to keep up with schoolwork and design our robot simultaneously, worked longer hours because our team's situation demanded it."

A critical milestone in the robot development phase came on the Monday of the final week; the engineers at the NASA Ames Research Center offered them their field to test out the robot's functionality. Working in overdrive, the team managed to assemble the robot with only a few hours to spare. At Moffet Field, the newly-christened "Tail of the Monkey" was put through its paces: among other things, the team was glad to see the "Tail of the Monkey" functioning the way the team hoped it would.

"The first time the robot moved, I was thrilled. Its motions were unrefined, but I felt a spark of hope." said Co-President Alric Siu. "I kept thinking 'We can finish; everything was falling into place.' Moving into the last week of build season is always the most exciting part, where we see the pile of scrap aluminum transform into a fully functional robot."



Alric Siu inspects the parts of the robot's tail. All the parts required extensive calculations and testing.

With two days left before Stop Build Day, when the robot would need to be sealed, bagged, and tagged for the New York Regional, the robot needed only minor tweaks before it was ready for a parent demonstration; scheduled for the evening of February 21st, it would be the first opportunity that the mentors, parents, and students of the club as a whole would be able to see the fruits of their efforts. At nighttime, the team loaded the robot into the crate and signed it.

Although build season seems like an annual routine, it is one of the most challenging and educational events for most members. During build season, the Funky Monkeys come together, and through discussions, calculations, and tests, they build a robot in 45 days.

> The last week of build season is always the most exciting part, where we see the pile of scrap aluminum transform into a fully functional robot. *-Alric Siu*



The robot, packed and ready for New York. Keeping tradition, the Funky Monkeys sign the crate on Stop Build Day.

© *FIRST* Team 846 The Funky Monkeys

New York

Continued from page 1

an enthusiastic roar erupted from the members of the audience.

The matches brought not only anticipation and excitement, but also gave the team the chance to show its spirit. Throughout the competition, we tried to stand out as a team so that people could easily identify us in the crowd. We were immensely successful. From our red hairdos, to our brightly colored team shirts, and to our ecstatic team mascot, we were a huge presence in the audience.

Work in the pits was intriguing. The atmosphere in the pits was a mix of intense focus, energy, urgency, and team drive. I watched as pit crew members pulled the robot into the pits after a match and prepared for the next match, scrutinizing the failures and successes of the robot thus far. Soon, I began to help as well, changing robot bumpers between matches, bringing materials to and from the practice field. Listening to senior members talk to the judges about our robot gave me insight into the ingenuity of the robot's design, and sparked a curiosity in me – I was eager to learn more.

We met the founder of *FIRST*, Dean Kamen, in the pits at New York. After signing many of our team shirts, he signed the key aspect of our robot, its tail and took pictures with us. We also won the Engineering Excellence Award, commemorating our excellence in design and engineering skill that we displayed in our robot.

Finally, our trip to New York not only gave me a taste of the competition at *FIRST* robotics regional, but also gave me the chance to explore and enjoy one of the largest cities in the world. As we were passing through Times Square, one of our members suggested that we should shout our team chant in the middle of Times Square at the top of our lungs. As a team, we can now brag that we have spread the word of *FIRST* in Times Square. On the final day of our visit, our team split into groups and had the opportunity to visit places such as Central Park, Times Square, The Empire State Building, and Rockefeller Center. By the end of the trip, I was exhausted, but those five days were some of the best in my life. Going to New York was a great experience, and I cherish every second of it.

Freshmen: Fresh Thoughts, Fresh Faces

New Funky Monkeys talk about their first year experience out of the barrel.

Joshua Yuan

Ever since I heard about Lynbrook's Robotics team, I've wanted to join so I can create, design, and machine a robot! What I had imagined, however, was completely different than what I experienced. Build season was much more complex and detailed than I had expected it to be. Nonetheless, I had a ton of fun. I learned how to operate machinery that I have never encountered before, such as the PCNC, a band saw, a machine drill press, and even a grinding wheel. I gained new skills and knowledge about hardware while making new friends. Being in the Lynbrook Robotics Team has made me certain that I would like to further explore STEM fields.



Brent Yi

In robotics I got to try a lot of cool things: CAD, closed-loop motor control, machining with the mill, and selling souvenirs while watching the Blue Angels at Fleet Week in San Francisco. Until Robotics, I had never applied the math I learned in school to real life, but I use it for every calculation in our design for the robot. I am amazed at how quickly our team was able to build a fully functional robot within the matter of weeks. The level of knowledge and skill many of the veteran members possess still fascinates me. Overall, joining Lynbrook Robotics has been an incredible experience.



Matt Wang

I joined Lynbrook Robotics this year, and I have to say, it has been really fun. Prior to build season, I attended CAD workshops to learn how to use Autodesk Inventor to model complex parts, lessons which I greatly enjoyed. During build season, I spent time in room 612 doing miscellaneous tasks. Even though I lacked technical experience, there was always something for me to do. I was able to learn a sundry of skills, such as using a mill, while working with veteran members and mentors. From this experience I got to apply my knowledge of physics into real life concepts. All in all, I think that being in Lynbrook Robotics has contributed greatly to my knowledge in science and technology.



© *FIRST* Team 846 The Funky Monkeys



The pit crew at CalGames

CalGames

By Angela Li

I got my first taste of the *FIRST* Robotics Competition at CalGames for the 2011 FRC game Logo Motion.

Sitting in the stands, I could hear the teams cheering fanatically as their robot battled it out on the field. The energy of CalGames was contagious, and soon, I found myself enjoying every aspect of it. I've heard people talk about the competition, but hearing about something and experiencing it are two completely different things. I was kept on the edge of my seat the whole time and found myself dancing along to the Macarena between matches.

Aside from the spirited atmosphere, all the different ideas teams came up with to tackle the challenges fascinated me. Visiting the pits and listening to other teams explain the mechanics of their robot made me realize how much work and effort teams had put into their robot. Although this hard work and dedication may frighten me, as I am a rookie, I was still excited for build season to begin.



Getting funky with the Macarena.

A New Room for the Funky Monkeys

By Akshat Agrawal with Matt Wang and David Yang

FIRST Team 846 receives its own room on campus .

The first thing one would notice when nearing the entrance of Room 612 is a multitude of sounds: an electric drill whirring, large steel bits cutting into aluminum, people conversing, in general, the sound of progress and enthusiasm. Giving us the ability to do many things that we were previously unable to do, this room exclusively for robotics is now the center of LRT life.

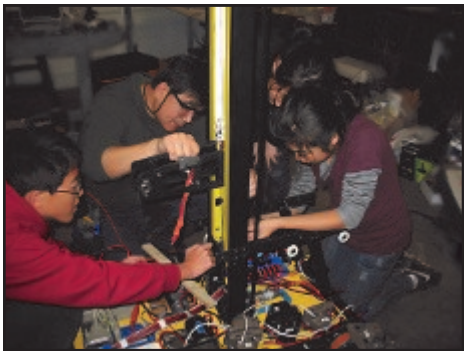
As of now, Room 612 is a functional workshop. Upon entrance, there is a computer workstation used for designing parts and writing code. The computer station is followed by a large central space, for testing robot function or assembling parts. Finally, towards the back of the room, there are several exciting machines, such as the bandsaw, the drill press, and of course, the pCNC mill.

This is the first year that Lynbrook Robotics has had the privilege of having its own room. In previous years, the team met at a member's garage. It was inconvenient for the members to have to go outside of school for robotics, but even more inconvenient for the family hosting the team, who had to put up with us when we worked late hours at the heart of build season.

Room 612 has not only allowed the team to meet on campus, but also has allowed us to become a bigger presence in the school community. Having the robot stationed on campus makes it so that students, even those not in robotics, do not have to go very far to see what is going on.

Also, it has allowed us to train members on the aforementioned machinery. Before, we would go to a machine shop and make our parts; it was not only untimely to go back and forth, but also made the machines less accessible. Only a handful of students could go to the machine shops. With the machine shop on campus, we have a larger group of students that know how to use each machine, and thus we became a more capable team.

The team has gratefully made Room 612 the hub of the Funky Monkey. We would like to thank our principal and advocate, Ms. Davidson, and Lynbrook High School for making it available for us to use. It allows us to use our time more efficiently and allows more students to get involved. If anyone wants to see a robot, use machines seldom seen in high school facilities, or work on hands-on projects, there is no better place than Room 612.



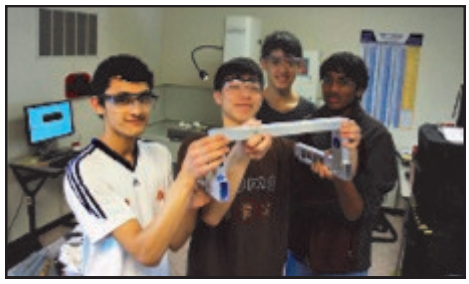
Over the last 10 years, the team has worked in five students' garages.



Students meet everyday after school in our workshop in Room 612.



Having more space has enabled the team to buy machines such as our Tormach pCNC 1100 mill.



This year, students machined nearly all of our robot parts themselves.

© *FIRST* Team 846 The Funky Monkeys