



MONKEY BUSINESS



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

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Build. Learn. Inspire.

The Funky Monkey's new motto

Stephen Giandomenico (*alumnus*)

On November 5, 2013, the team selected its first real motto: "Build. Learn. Inspire." This is another step towards creating a bolder team image that readily identifies not just who we are, but what we do as a team.

The motto is intended to embody three main activities of the club: First and foremost, we build things—whether they be robots, grant proposals, or the team itself. Second, we learn in the process of that building. Lastly, we then take that knowledge to inspire others to do similarly. It is this full cycle that these three verbs represent.

The motto will debut across the back of this year's T-shirts to help spread the word. So go forth, and build, learn, and inspire!

Officers at Large

New officer position, continued responsibility

Benedict Chua (*sophomore*)

Over the summer, we introduced a new officer position to our team: "Officer at Large". This position gives veteran members an opportunity to step up and take on additional unassigned responsibilities within the team, and recognizes them for their efforts. Any veteran member may apply, and any number of students may become Officers at Large. This supplements the otherwise very limited officer team, which is often too small for the number of qualified candidates.

Officers at Large have all the rights

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Rahul Iyer (Hardware Lead) shows an eager student how to drive the 2013 robot at City Hall, while Cupertino Mayor Orrin Mahoney supervises.

Engineering for Everyone

Hands-on demos to inspire young and old alike

Shaiva Patel (*freshman*) & Amrita Iyer (*sophomore*)

The Funky Monkeys are all about inspiring all age groups and providing opportunities to up-and-coming engineers.

Take three-year-old Kellen for instance, grandson to Lynbrook's very own Executive Assistant Jan Broman. At Lynbrook's "Night on the Quad" this past September, Kellen, a shy little boy, was immediately drawn to the team's mini robotics field where a demo of the 2013 robot was being held. Over the course of the evening, he went from being a passive spectator on the side lines watching Frisbees fly all around, to an active participant steering the robot himself alongside a member of the team. We later heard that Kellen went home with robots still on the mind, taking with him the spirit of robotics.

Kellen is only one of the many people

whose interest the Funky Monkeys seek to capture, and Night on the Quad is just one of the many events that the team uses to reach out to the community. The team also does demos at the nearby Miller Middle School and John Muir Elementary, allowing students to get exposed to these kinds of technical activities at a younger age. Through events like these, the team "gives a huge number of kids an opportunity to be involved in the core engineering of robotics," says Lynbrook Principal John Dwyer.

This past autumn, the team also did demos at Memorial Park with the Rotary Club and at City Hall, providing those of other generations a connection to what robotics students are doing. The Funky Monkeys are always trying to show that robotics can be enjoyed by more than just high-school students, that everyone can be involved in some way, and instigate a little creative thinking along the way.

Kellen's adventure during Night on the Quad is one of the small moments in life the Funky Monkeys continually aim to recreate. As Ms. Broman put it, "Moments like those influence lives."

Offseason Highlights

Collaboration in Design

The Funky Monkeys are awarded for their collaborative design process

Morgan Chan (*freshman*)

At CalGames, we were the first runner-up for the Computer Aided Design (CAD) Award. Computer Aided Design involves the use of software to create three-dimensional models of machines, allowing one to see them from any angle, simulate their functionality, and easily make adjustments to their designs before they are manufactured.

Our most important achievement has been the engagement of more members in robot design. We credit this in large part to our new design process, as well as the workshops hosted by veteran team members teaching new members how to use CAD.

This past build season we implemented

a new top-down project structure in our design process. Rather than one person designing the entire robot (as has happened in our early years), we split the responsibility among multiple people, assigning each one a specific subsystem. We then used version control software to make it convenient for multiple people to edit the design of the robot. We also used parameterized models, a system that automatically updates models whenever changes are made to related parts. This allowed people to make adjustments to the robot without causing conflicts in the individual subsystems. Even so, the subsystem leads had to collaborate extensively to make sure their designs would work well together. Finally, creating machinist drawings of all the parts provided even more opportunities for students to get involved.

The collaborative efforts of our team members resulted in a highly competitive robot, with the added bonus of increasing the overall ability of the team. While in previous years we had trouble getting



A CAD rendering of the 2013 robot.

more students to do design work, twenty-four different people contributed to the design of our last robot. The top-down structure has so far been a huge success, and we will continue improving upon it during the 2014 build season.

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Robotics teams rally together to compete during the offseason

Julia Ma (*sophomore*)

This past fall, the Funky Monkeys competed in two offseason events: CalGames, and for the first time, Madtown Throwdown. Offseason competitions like these offer a second chance at the last FRC game, providing lots of opportunities for new members to get involved with robotics before the official season begins.

With the constant turnover as the senior classes graduate, there is always a void at the beginning of each year. There are usually lots of new members, as well as a new drive team, and new leads for all the different subsystems and club activities. Events like these allow new team members to receive firsthand experience driving, modifying, and programming the robot. Consequently, the new teams are not also facing a new machine, but rather stick to a familiar one until the new build season arrives in January.

Calgames is a friendly competition played by multiple high school robotics teams scattered from all over the Bay Area. This event was started in 2003 by the Western Region Robotics Forum (WRRF), and has since attracted teams from all over the West Coast. This year



The Funky Monkeys at Madtown Throwdown, showing off the "Wow Factor" award.

Monkey Business

The Funky Monkeys make their team an enduring organization

Stephen Giandomenico (*alumnus*)

Team 846 won the Entrepreneurship award during WRRF CalGames this October. The Entrepreneurship award recognizes teams that demonstrate a business organization and execution that can help them succeed on the field.

As our team has grown throughout the years, both in members and in scope, it has become more and more important to create an efficient structure around the work that we do. Over the past couple of years in particular we have implemented a system in which each project is assigned a Directly Responsible Individual (DRI) and a Point of Contact (POC). The DRI system ensures that there is a single person who is in charge of and responsible for each project, while the POC system provides an experienced member to call upon for help. Together, these systems

allow new members to take on new responsibility, while still ensuring that each project is on a path to success. These complement our other efforts towards creating a sustainable team, such as off-season workshops in which veteran members pass on their knowledge of all things robotics to rookie members, and annual grant applications that acquire funding for the team (and in the case of the Symantec grant, all five teams in our school district).

Another major endeavor has been the construction of a strong team image. The team has created all sorts of paraphernalia over the years, such as buttons, shirts, hoodies, photo journals, newsletters, and vinyl stickers, which are distributed to our sponsors and advocates. With these, we create a bold brand that extends beyond that of a mere after-school team.

This year, we are proud to be able to say that our high school club runs like a business, building upon not just individual contributions, but the collective efforts of the large membership that it contains.

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Training the Future

Veteran team members run workshops to share their knowledge

Owen Li (*sophomore*)

Every year, FIRST Team 846 is flooded with rookie members trying to get involved with robotics. All these new members are great, but there is one major problem: many of them have yet to acquire the skills they will need to be successful contributors.

To help new members learn everything they need to get involved, the Funky Monkeys held weekly workshops during the fall to teach machining, computer aided design (CAD), electrical systems, software, and 3D animation. Through these different workshops, veteran members took their accumulated knowledge and transferred it to the incoming rookies.

"I love it when I see people understanding the topics, and can watch them use that knowledge," said junior Raphael Chang (Software Lead), who led the software workshop, amazed at how quickly students were grasping ideas that took him prior years to learn and master.

Shooting for Autonomy

Teams from around the world make humanoid robots to play soccer

Megan Lau (*junior*)

June 30th, 2013. The HuroEvolution AD team from Taiwan's National Taiwan University of Science and Technology and the Jo iTech team from Japan's Osaka University came together in Eindhoven, the Netherlands to face off in the final round of the 2013 Robocup competition. In this final game, these two astonishingly advanced humanoid robots played small-scale soccer, rotating roles as goalie and kicker to compete for the spot of the Robocup World Champion. After an exhausting and suspenseful match, Japan emerged victorious with a close win of 4 to 3 over Taiwan.

This annual international competition, Robocup, was started in 1997 with the ambitious goal to create a team of robots capable of playing soccer against the human winners of the FIFA World Cup while following the rules of soccer. From this goal sprang multiple variations of Robocup competitions: soccer, home, and rescue. The most popular is the adult size humanoid soccer competition where competitors build 130 centimeters or taller, fully autonomous humanoid robots.



Varun Parasaratthy reviews two students' code during the Software workshop.

Not only did the rookies learn a lot, but so did the instructors. "It really was a test of my abilities," said senior Eric Yeh (VP of Engineering), who taught the machining workshop. "I had to differentiate between what was important and what wasn't, and had to teach the students in a concise, yet informative manner."

Overall the workshops were a great success, boasting high attendance and significant progress of all members from start to finish. Freshman Vaishnav Balaji said, "I was impressed with how much Eric was able to teach us in that short

amount of time. It really was incredible the amount of thought he put into these workshops."

Team 846 also gave introductory classes available to members of neighboring teams during the WRRF workshops this past December. These introductions to Robot Subsystems and to CAD were led by sophomores Srinjoy Majumdar (Co-Electrical Lead) and Rahul Iyer (Hardware Lead) respectively, and fifteen other students assisted in teaching the courses. The two presentation teams spent many hours throughout the preceding weeks preparing the requisite course materials, so that attendees would get the most out of these workshops. Through these classes, the team aims to bring up the base level ability of all robotics teams in the Silicon Valley.



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A humanoid soccer robot slowly dribbles the ball towards the goal.

During the matches, one robot acts as goalie, while the other attempts to kick the ball into the goal. Although games run at a relatively slow pace, the intense environment keeps viewers engaged in the matches of extreme precision. Soon enough, technology may advance so much that robots run across fields like humans do.

The Robocup community spans across people of all ages. Like the *FIRST* competitions in which high schoolers come together to compete, college students from around the world partake in Robocup. Also, similar to *FIRST*'s namesake "For the Inspiration and Recognition of Science and Technology", Robocup's goal is to "advance the state of art of intelligent robots". As this goal comes closer to being obtained, the areas of Science, Technology, Engineering, and Math (STEM) advance and spread to more global audiences as well.

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there was even a team who came all the way from Idaho.

On the other side of the valley, Madtown Throwdown has been hosted by Madera High School since 2009, with the top priority of offering many enjoyable rounds of matches for low prices. For many teams, this event is the last chance to play in a tournament with their current robot.

These events are also the perfect opportunity for rookie members to see what robotics competitions are like—the rush of teams on the field, the suspense of a robot being knocked down by another, the bright smiles of hard-working team members collecting an award. "[The team] wasn't talking, but they were getting what they needed to do done quickly and efficiently," recalls rookie member Pragna Upputuri. Her sister, Prapurna Upputuri, adds on, "It was amazing how everyone worked together so well, and the amount of dedication they had."

Officers at Large

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and privileges of the regular officer team, however they do not have specifically assigned duties. This allows these officers to easily take on new projects—such as writing scouting apps or creating new media for the team—and expand the scope of the club. Through this new system, we are bringing more students into leadership roles, and encouraging more activity within the club.

The Officer at Large system replaces the old Honorary Officer system, which—while otherwise successful—faltered in that the position was often viewed as a merit award, resulting in many qualified candidates being publicly turned down and embarrassed. To address this, the new position, Officer at Large, instead emphasizes members' ongoing contribution and future commitment to the team.

The new application process is also structured to reduce the possibility of major upsets. To become an Officer at Large, applicants must first be nominated by an existing officer, and then collect written endorsements before going to a public vote. In this way candidates are

Scrambling for Space

Funky Monkeys visit Team 649's workshop at Saratoga High School

Morgan Chan (*freshman*)

A couple of months ago, we had a workshop visit exchange with Team 649 "M-SET Fish" from Saratoga high school. It turned out to be an excellent opportunity to reflect on how we have each made use of the limited space made available to us through our respective schools.

Saratoga's workshop differs from ours in several ways, but the most immediate contrast is that their retrofitted science room is only about three-fourths the size of our portable. With all their equipment and machinery, their room is very cramped, not to mention that they built two *FIRST* Tech Challenge robots in addition to their FRC robot this year. We were impressed to see how they manage to work efficiently in such tight quarters. Whereas our room has space enough for clearly defined work areas, their partitions are not as obvious. They make do by placing each robot on its own table, while all their machinery—a few benchtop lathes, a bandsaw, manual mills, and a drill press—are lined up against the walls. In spite of these difficult working condi-



able to test the waters and know ahead of time whether they will be successful. Applicants without sufficient support or follow-through can quietly bow out and wait until they have established their credibility before trying again, thereby avoiding the embarrassment of a negative public vote.

The team officially implemented this system at the beginning of the fall term,

tions, they still manage to put out competitive robots each year.

By contrast, our team's workshop is based in one of Lynbrook's portable rooms, which we have divided into three distinct functional sections. In one third of the room, we have set up workstations for CAD design and programming. In the middle of the room, we have left an open workspace for building and testing the robot. At the far end of the room is our machine shop, in which we have managed

with great success. As of this writing, we have admitted nine additional members into our officer team as Officers at Large. The new system is helping us ensure that every veteran member has an opportunity to continue growing and assume more responsibility within our team, and is recognized for their ongoing contributions.

to fit a CNC mill, a lathe, two tabletop mills, a drill press, and a band saw. Then as each competition season goes by, our past years' robots continue to accumulate in the corner of the room, slowly encroaching on our work areas.

As both of our teams continue to expand our activities, investing in more machinery, tools, and new robots, space continues to be an issue. The task of wisely allocating it is an ongoing challenge we expect not to go away anytime soon.

Funky Facts

There are 24 officers on our team and counting.



7 machines in our school workroom can be used to cut metal.

Shesi Xie, Christopher Suen, and Henry Chu founded the team in **2001**.

96% of the 2013 robot was machined and assembled by students.



846
The 2013 robot weighs **118** pounds.

Before finally having a workroom at school, the location of our build season workshop has moved 6 times, from garage to garage.

148+ zip-ties are holding the 2013 robot together.



The autonomous mode of our 2013 robot can shoot 6 Frisbees in 15 seconds.



For the first time in 12 years, our team competed in the finals of an official *FIRST* competition at the 2013 Boston Regional.