Cybersonics
TECHNOLOGY TEAM 103

TECH TALK

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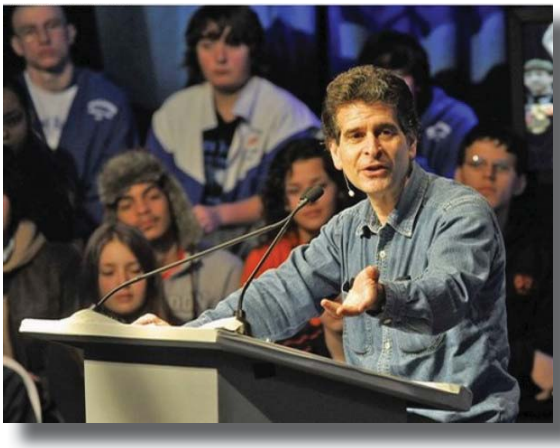
Contents:

kick off

by Megan Kish

The 2009 FIRST robotics build season began on January 3, 2009 at 9:00 a.m. The build season is when the team actually builds the robot, hence the name. Via a NASA broadcast, the game is announced as teams excitedly gather to watch and later discuss what strategies could be useful in solving the problem at hand.

In addition to setting the projector up, bringing chairs in, making coffee,and many other activ, the team members had a chance to socialize with one another and discuss ideas about the game hints that were given to all of the FIRST teams. The clues were given out a few weeks before kick off in order to allow teams to discuss their meanings and guess as to what the game would be.



Dean Kamen speaking at kick-off

Once the game was announced, the entire team was developed ideas and questions as to what the next six weeks of build season were to bring. This year's game was desgined to test Team 103's, as well as other teams', abilities to think outside of the box and work together diligently to solve a problem. The game commemorates the anniversary of the first lunar landing by the Apollo 11 spacecraft forty years ago. With 1/6 gravity, keeping the robot on track may seem close to impossible, but Team 103 along with the other teams of FIRST proved that nothing is impossible as they have shwon since the beginning of FIRST, eighteen years ago.

After discussing the game for a few minutes, the event ended. The members of the team left with ideas about solving the problem, recording their suggestions on paper in order to present them to the rest of team. They resumed discussion on the following Monday, after reading about the game on the FIRST website.

In addition to learning about the new game and to brainstorming ideas and ways to approach it this year, this occasion gave the team a chance to bond and become closer together. The entire team had been looking forward to what was to come, the new friendships that were to be made, and the skills to be learned.

January third, the "kick-off," went especially well. The "newbies" received a chance to see the start of the season and learn the workings of the new game, while all of the veterans saw yet another game unfold. Cybersonics Technology Team 103 was really looking forward to having a successful season and, assuming that it goes as well as kick-off, the season can easily be considered a success.

the game lunacy

by Rachel Stoczko

In 1969, NASA's Apollo program came to fruition with the success of the Apollo 11 spacecraft in fulfilling John F. Kennedy's goal of conducting a manned lunar landing. It was a scientific breakthrough that would forever change humanity. For nearly two-and-a-half hours, Neil Armstrong and Buzz Aldrin explored the moon while Michael Collins orbited above in the Command Module. This historic expedition occurred exactly 40 years ago. In honor of the brave crew of the Apollo 11, the game focuses on gravity's effects on traction.

Each alliance is given sixty moon rocks, four empty cells, and four super cells, with the moon rocks and empty cells being worth two points each when scored, and the super cells, 15 points. The moon rocks, empty cells, and super cells are all "orbit balls," usually found at Wal-Mart. Wal-Mart has, in the past, stocked these balls for the spring and summer seasons, but this year they were not, making the balls very difficult to find. They were not found online or locally, so the mentors had to drive out and buy the balls from various Wal-Marts in the area. The human player or the robot itself must try to place the moon rocks, empty cells, and super cells into the opposing alliance's trailers. The trailer is a 28 inch diameter, four-foot–high, octagonal receptacle with PVC pipes along its circumference; each robot is attached to the trailer so that it must pull it. In the last 20 seconds of the game, each alliance is issued four super cells. Scores for each alliance are determined by the game pieces in the trailers of the opposing alliance. Balls left with the human players, on the field, or in the robots will not be counted towards the alliance's final score. There are a total of 360 points that an alliance has the potential to earn if they manage to score every game piece.

The robot scoring

The playing field surface is a Glasliner FRP wall siding, a Fiber Reinforced Plastic, or fiber glass, material. Each robot must use only wheels made of Delrin, a polyoxymethylene composite. The combination of these wheels on the playing surface greatly lowers the coefficient of friction. This simulates the lack of control and maneuverability found on the surface of the moon. Two thirds of the robot must be covered with bumpers to protect it from the trailer and other robots, and the trailer must also be covered in bumpers.

There are minimal rules this year involving robot interactions and collisions because of the reduced traction on the field. However, there are some key regulations involving the robot dimensions, including that it cannot exceed five feet in height and 120 pounds in weight, and it must be contained within a box 28 by 38 inches. The trailer hitch must be attached to the robot with the materials in the 2009 Kit of Parts.

Overall, this game is difficult, but the team is always up for a challenge. Everyone had worked so hard to get the robot to perfection. In the end, though, the team is most proud of all of the new knowledge they that they have obtained and all the great relationships formed with the other students and mentors.

upcoming competitions

by Darby Codd

Cybersonics Technology Team 103 has attended many competitions with their robots in a tradition that has continued for 18 years. The competitions are important to the team, as they give the team members an opportunity to converse with other teams about strategies that they found were useful during build season, helpful fundraising ideas, and the season in general.

The competition season began on February 26, with the regional competition held at Trenton, New Jersey in the Sovereign Bank Arena. This regional was very exciting, as the team had won at the regional for the past four years and hoped to do so again in 2009 Competitions are three day events, with practice on the first day, qualification rounds and some awards the second day, and the last qualification matches,alliance formation, elimination rounds, and award distribution occurring during the final day.

The practice rounds allow teams to get a feel for the track and, as one would expect, practice driving their robots. They also ensure that the robots are working properly and that their robots pass inspection. These matches have no bearing on the official scores, as the seve only as preparation for the upcoming days. The qualification rounds on the second day of competition are when teams first compete against each other to have scores kept. The qualification rounds show where a team resides in rankings in comparison to the other teams participating in the competition. The final section of the competition is what can be considered the actual competition, where the eight highest-ranking teams can pick any two other teams each to be in their alliance. These matches are structured as elimination matches and determine which alliance will win the competition.

On March 10, the team left for Florida to compete in the Orlando regional at the University of Central Florida, which started March 12 and ended the 14thThe team left on March 12 and arrived home the 15. While in Florida, Team 103 experienced Disney World, and had a lot of fun spreading the word about Cybersonics when curious people asked about it. The competition gave 103 a chance to really bond with the other teams and forge friendships that could be useful at later times.

After Florida, the team still had one more competition. They traveled to Philadelphia for a three-day competition that began on March 19 and extended until the 21. For the Philadelphia and Trenton competitions, the team drove to the competitions everyday.

The competitions provided a lot of fun for all of the team, as well as excitement, joy, inspiration, and even some craziness. FIRST robotics competitions bring everyone in the league together to show that the teams are the future and that the teams will continue to learn and build on everything they have learned before. Cybersonics Technology Team 103 is showing that they can change the future, making it better and brighter.

a special thanks

by Rachel Stoczko

As the build season began, Team 103 realized how much of a group effort was required in order to be successful. The team would have been useless without the aid of the parents who provided food for them every day of the season and the mentors who lent a helping hand until nine at night. Cybersonics Technology Team 103 will always be grateful for all of the support that they receive from their school, community, and sponsors.

The parents of Team 103 support the team members throughout the long hours of build season and ensure that the team is always well-fed. The team would like to thank their mentors for guiding them in the right direction. Team 103 is grateful for all the mentors and their time. Because of the time the mentors have donated to Team 103, all of the team members have become better people who have acquired the skills necessary for success in the future. Mentors have helped shape the team's talents into extraordinary things that are valuable to possess. Thank you for your donations.

Rob Reilly, a mentor, and Mark Passerini working during build season

Thank you to the Springfield Fire House for letting the team hold the spaghetti dinner at that facility. Team 103 raised a fair amount of money that has helped fund the program. The Spaghetti Dinner would not have been a success without the help of the Fire House. The team would also like to thank the local businesses that have shown their support. The robot itself costs a huge amount of money. Donations to Team 103 are greatly appreciated.

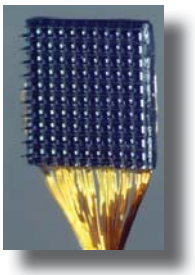
Cybersonics Technology Team 103 does very well in all of the competitions, but none of it would be possible without all the help we receive in and out of build season. Parents, mentors, sponsors, contributors, and everyone that has helped this team come so far. The team will be able to success and go far in life. So in short, thank you for helping Team 103 grow to their full potential.

techie talk with aaron

by Aaron Willey

Brain-computer interfacing had once been considered a field isolated to science fiction. However, unbeknownst to the much of the population, research in establishing communications between the human brain and computing devices has been occurring since as early as the 1970s, when the University of California Los Angeles, funded by the National Science Foundation, and then DARPA, initiated studies in this fascinating area. Thus, investigation into melding neurons with technology began, sparking an enormous amount of further research and leading to the production of numerous innovations. Feats at one time regarded as impossible are now being performed in the laboratory and even being offered to the general public – the deaf are being permitted to hear, those without control of their own limbs can now interact through advanced prosthetics, and an ingenious, albeit rudimentary, method for providing vision to the blind is available.

Much of the research in brain-computer interfaces (BCIs) has been carried out using animal subjects. The earliest research was conducted by a groups led by Schmidt, Fetz, and Baker, who found that, after implanting sensors into the brain of monkeys, the monkeys were able to voluntarily control the rate of monitored neurons simply through closed-loop operant conditioning, i.e., punishment and reward. During the 1980s, Apostolos Georgopoulos of johns Hopkins university discover the relationship between the direction in which rhesus macaque monkeys moved their arms and the electrical responses in the motor cortexes of the monkeys. The 1990s saw a rapid development of this technology, with some of the most successful groups being able to control eternal devices by monitoring and analyzing the electrical responses of groups of neurons. In 1999, researchers under Yang Dan of the University of California deciphered the neuronal signals produced by the retina by monitoring 177 neurons in the thalamus of cats. After showing these cats several videos and recording the neural activity, the scientists were able to produce the videos from the collected activity by applying decoding algorithms to it. Miguel Nicolelis, a prominent researcher in the field of BCIs, managed to create an implant for owl monkeys that would interpret the electrical activity in their brains and use these decoded signals to allow the monkey to control a robotic arm. The first experiment with owl monkeys did not provide sensory feedback to the subject, thus not creating a high degree of precision and control. However, once feedback-loops were implemented, the monkey was provided with sensory input from the arm and was able to feed itself using the mechanical arm with almost no training, as if the arm were a natural extension of the monkey.



The electrode arrary of an invasive BCI

While more research with regards to BCIs may have been performed on animal subjects, there have still been many advances made in integrating the human brain with electronics. As to date, there are three

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From the Editors' desk...

As the year progressed and the build season kicked into high gear, we all got a prospective of hard work ethic and time management. Animations were falling into place, the robot attained greatness every day, articles were written, and Florida awaited us. We had worked so hard, and continued to do so, until we had reached our final goal; competing and giving our all. Many different ideas and techniques have shaped our group, but we've still worked towards the same goal of shaping Cybersonics into what it represents. Solving problems is mainstreamed in this team and the obstacles we approach and collaboratively overcome further improve the connections between team members. We have all built not only strong minds, but strong friendships with each other and our mentors. By seasons' end we will have solved problems bigger then ourselves. As some of us move on to the next chapter, the rest of us will continue to prosper on Cybersonics Technology Team 103.

what's the word with 103?

by Darby Codd and Megan Kish

Question: Overall, what were your favorite parts of build season?

Team Answers:

Rachel Stoczko – Late nights,and all the crazy conversations among the team!

Jeremy Reed – Getting to finish everything that needs to be done before the competitions.

Jonathan Weaver – Watching the robot run for the first time.

Word of the Month: Ecstatic
What does this word mean to the kids of Team 103?

Logan Bonner – Getting the ball tower to work

Kelsey Hvorcency – Being really excited for all the competitions.

Robbie Small – It means being excited for all the upcoming events and competitions.

Tori Dix – Being excited for all of the competitions and having a running robot.

techie talk

continued from page 3...

major methods of accomplishing this: invasive BCIs, which are implanted directly into the gray matter of the brain; partially-invasive BCIs, which are implanted inside of the skull, but are placed outside of the brain; and non-invasive BCIs, which utilize methods such electroencephalography (EEG) and functional magnetic resonance imaging (fMRI). All of these techniques record the activity in the brain, with invasive and partially-invasive BCIs making use of electrodes to record this activity, and non-invasive BCIs analyze brain activity by measuring blood flow in the case of fMRI, and in electroencephalography, electrical activity on the scalp is measured. One of the earlier instances of BCIs being used in humans is the case of "Jerry," a man suffering from non-congenital (acquired) blindness. By implanting electrodes into his visual cortex, a low-resolution feed from a monochrome video camera was used to create electrical activity in the visual cortex to produce phosphenes, which give the sensation of seeing light. Though rudimentary, this implant allowed Jerry to perform simple tasks without assistance. In the field of motor neuroprosthetics, BCIs have been used to allow those without control of their own limbs, caused by paralysis or other conditions, to manipulate robotic arms and other objects, such as a computer cursor. Several companies have been developed for the sole purpose of commercializing BCIs, with some focusing on their medical uses and others on the general consumer market for BCIs. The uses for BCIs are nearly unlimited, and the future will likely bring about many new innovations through their use.

Upcoming Events:

June 12th- Fundraiser dance at Palisades Middle School
June 19th- SUMMER!

This Month's Staff

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