

Students put robots to the test

One weekend in April, 2010, 20,000 screaming and cheering fans showed up at the Georgia Dome in downtown Atlanta. The stadium is home to the Atlanta Falcons, a professional football team, but these fans weren't cheering for their favorite football players. They were cheering for robots — and for the high school students who had built them.

Students on more than 300 teams from across the country had brought their homemade robots to Atlanta for the FIRST Robotics Championship. During the competitions, robots played “Breakaway,” a game where they scored points with a ball and climbed over obstacles — kind of like soccer, but all the players were machines. Plus, the robots earned extra points for their teams for achieving other feats.

“At the end of the match, we get bonus points if the robot hangs [from a tower on the field],” says Evan Ostrow, a high school junior from Ambler, Penn., “but our robot hasn't got the hang of hanging yet.”

The FIRST Robotics Championship in Atlanta lasted for only a few days, but the projects last all year. High schools register for the event in the autumn, and during the fall and winter they get ready to build robots.

And then the fun part starts. In January, each team receives a giant box of parts. These parts may include pieces of metal and wires, gears and strings. For six weeks, the high school students quickly plan and build their robots, using the parts they received in the box. Then these young engineers take their creations to regional competitions to compete against other teams, hoping to make it to the final championship.

At the final competition, different schools come together to form teams called “alliances.” During matches, alliance teams — made up of robots from the different schools — compete against each other. In April, at the end of the finals weekend, one team was crowned champion. This winning team was made up of teams from Redondo Beach, Calif.; South Windsor, Conn.; and Milford, Mich.

The highest award given at the competition, however, went to a team from Wissahickon High School in Ambler, Penn., and their robot named “Miss Daisy.”

Miss Daisy's gnome

Were you to stumble into Miss Daisy's “pit” at a FIRST competition, you'd know it because it's the one with a giant sign reading “Welcome to our garden.” (The pit is the area where the students work on the robot, much like the “pit” at a track is where mechanics work on a racecar.) You might find fake flowers and grass, pictures of bees and birds, and you might find students who wear headpieces that look like flowers.

It might feel festive, but these students are serious about their robots. Wissahickon has been sending a team to the FIRST competition for 11 years, with about 50 students involved each year. Throughout the season, professional engineers and scientists from the community visit the team to talk about technology and science. The students meet after school, and the program is designed to both help the students learn about science and to make their community better.

Every year, the team names its robot “Miss Daisy” — which means there have been many robots with that name over the years. The Miss Daisy team is broken down into different groups. Some students work on specific aspects of building the robot; others take Miss Daisy to elementary schools and community programs to teach younger children about robotics. When these children get older, they often join the robotics team — and then go on to study science or engineering at college. Team members estimate that more than 35,000 people have seen and operated a robot called Miss Daisy.

This year, Miss Daisy didn't win the final rounds of Breakaway, but because the team is so effective at getting other students and the community involved in science and technology, it was given the Chairman's



First Robotics High School Competition. Credit Adriana M. Groisman

Award in Atlanta. This award, FIRST's highest honor, is given to the team that best embodies the FIRST mission: getting students involved in science and technology. The full name of FIRST is For Inspiration and Recognition of Science and Technology.

Of course, there's one team member from Miss Daisy that didn't make it through the season — a garden gnome. "Every year we buy a garden gnome that only lives as long as we have good fortune," says Emily Ostrow, a 9th grader who updates the team's website with current information, news and videos.

This year, the garden gnome traveled with the team to regional competitions in Philadelphia and New York. It even traveled to Atlanta for the finals, but when the team thought their good fortune was running out, they decided to smash the gnome.

The sacrifice worked: Miss Daisy went on to the playoffs, and the team went home with a trophy for the highest award (which, according to their tweets, had a hard time going through security at the airport).

The team is planning for next year's events, as well as keeping up with Miss Daisy's busy social schedule. Also gearing up for next year is Dean Kamen, who started FIRST nearly 20 years ago.

Dean Kamen does his chores

Dean Kamen is better known for inventing a two-wheel, battery-operated vehicle called the Segway. Kamen, who has invented a wide variety of gadgets and machines, says he got his start with building useful devices after disagreeing with his mother.

"I always thought it was unreasonable and silly to get up in the morning and make your bed," he says. "All you're going to do is jump into it at night." Kamen remembers that even though his reasoning was good, he lost that debate with his mother — but he still found a way to stop making his bed. He invented an automatic bed-maker.

He tied ropes to the corners of his bedspread and ran them through pulleys attached to his bed. Then, in the morning, all he had to do was pull on the ropes, which would pull up the bedspread. Voila! His bed was made. Despite his success, he says, his mother wasn't thrilled: "It was a little hard on the corners of the bedspread," Kamen recalls.

Kamen's later inventions, such as the Segway, did bring success. These days, his company builds hardware for medical devices, but it also works to create new technologies that could help the developing world. Their projects include finding cheap, Earth-friendly ways to provide things like electricity and clean drinking water to poor countries.

The students who build robots through FIRST, he says, always surprise him. "At every competition, we're astounded by some of the great things the kids do," he says. He points out that engineers at his company can use anything they can think of to build a machine, but the FIRST students can use only the parts in the box they receive in the mail.

But he's even happier with the way FIRST is attracting students who don't usually excel at science or mathematics in school. He points out that subjects like physics and math are often taught abstractly, making it hard for students to understand why science would be useful. By using science skills to build something — and watch it work — students start to see the power of science.

At the end of a season, he says, "these kids have a whole new perspective on what's possible and what they can do with their lives."

Meet the engineers of the next generation

Vanessa Ronan, captain of the team at Mary Louis Academy in Queens, N.Y., says that her team had to spend a week working on the electric system of their robot, an effort that helped the students understand ideas like voltage and current.

And Jenni Hercheck, part of the winning team behind Miss Daisy, says that building robots has "really changed what I want to do with my career and the rest of my life. Before I joined I didn't know what to do," she adds, "but now I'm interested in engineering and going to study it at Johns Hopkins. Without my work on the robotics team, I wouldn't be going into engineering."

Ronan, Hercheck and all the hundreds of thousands of students who have worked on FIRST robots have joined a large and growing community. Many of the students who compete go into engineering, the sciences or mathematics. At the Massachusetts Institute of Technology, a university known for its strong science and

engineering programs, one in 10 students in the class of 2012 participated in the FIRST competition in high school.

POWER WORDS

engineering The application of scientific and mathematical principles to practical ends, such as the design, manufacture and operation of efficient and economical structures, machines, processes and systems.

robot A mechanical device that sometimes resembles a human and is capable of performing a variety of often complex human tasks on command or by being programmed in advance.

technology The application of science, especially to industrial or commercial objectives.

physics The science of matter and energy and of interactions between the two, grouped in traditional fields such as acoustics, optics, mechanics, thermodynamics, and electromagnetism.