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## Building Blocks - Young engineers study nanotech using LEGOs

Matt Bower , Daily Times



WARWICK - Many of us played with LEGOs or Lincoln Logs when we were young, but the Engineers of Tomorrow, a team of 10 boys and girls ages 10 to 13, is taking LEGOs to the next level.

This group is not only playing with LEGOs once a week, it is participating in the 2006 FIRST LEGO League, where it will be required to build a LEGO robot and study the world of nanotechnology.

Mary Johnson, coach of the Engineers of Tomorrow, said most of the team consists of home-schooled children, including three Warwick students: Miranda Valdes, 10, and Michael Valdes, 12, and Johnson's 12-year-old son, Harry.

Johnson said the team will spend the next three months designing and building an autonomous LEGO robot that will compete in an obstacle course built out of LEGO bricks at the Rhode Island FIRST LEGO League competition, to be hosted by Roger Williams University in Bristol on Jan. 13, 2007.

In addition to creating and building a robot, Johnson said, the team will complete a research project on a subject in nanotechnology and conduct a five-minute presentation to defend its decisions and designs in front of a panel of judges.

She said the team will pick a specialty within the theme to focus the research project on.

"We try to incorporate the research project portion into each of our weekly meetings," she said. "This week we read about self-replicating atoms and self-replicating robots."

Johnson said part of the goal is the kids will be excited about the robot part, so they'll

be interested in the research part.

"That allows them to learn about topics they might not study in a classroom," she said.

During one of the recent team sessions, Johnson said, the group performed a lab experiment to test the claims of Nanotech pants sold under the Cherokee and Dockers labels. She said the advertising for both brands of pants claims nanotechnology makes the pants resist and repel stains.

Johnson said FIRST (For Inspiration and Recognition of Science and Technology) was founded by Dean Kamen, inventor of the Segway and holder of 150 patents. It's a nonprofit group dedicated to inspiring young people to pursue careers in science and technology, she said.

Johnson said, according to Kamen, the FIRST LEGO League's goal is create "mathematically competent, technologically literate children."

"The FIRST LEGO League is an international competition for 9- to 14-year-olds that was started to get kids excited about subjects such as math, science, and technology," she said. "The goal was to get kids to be as excited about those fields as they are about sports."

Harry, who's been involved with the league for three years, said it all started when he saw an advertisement for the robotic competitions four years ago.

"I was looking at robots and knew that's what I wanted to do, so I begged my mom to join a team," he said.

Johnson said she promised her son if he couldn't find a team to join, she would start one for him. After searching in vain for a team, Johnson became the coach of the Engineers of Tomorrow, which has been taking part in the competition for three years.

"It's been wonderful. We work on the robot for a couple of months and then we enter it in a competition," Harry said. "I've learned a lot about robots from it and I'll be participating as long as I can."

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the age requirement for the advanced league, where participants work with metal robots, is 14 years old.

Mike Valdes said he got involved with the team through Harry.

"I've known Harry for a while and heard he was starting a team," he said. "I'm interested in both LEGOs and robotics, so I decided to join."

Valdes said he's also been a member of the team for three years and he enjoys the variety of new themes each year.

"It's great because each year is a different theme," he said. "It's nanotechnology this year, but other themes have been marine biology and disability awareness, so I've been able to broaden my knowledge on those topics. I enjoy it a lot."

Miranda Valdes said this is her first year on the team but, she said, she joined it because her brother, Mike, had been doing it for three years and she wanted to try it out.

"It's been good. I've learned how to program and build structures better," she said. "I want to do it for a few years to try new and different things."

Johnson said other members of the team include: Kyle Inman, 13, and Shane Inman, 10, of Chepachet; Calder Brown, 13, of Providence; Andrew Wallace, 11, of North Providence; Julia Smith, 11, of Cranston; and Alex Stein, 12, and Markus Stein, 11, of Barrington. She said the Steins are the only public-school children on the team and their father, Matthew Stein, is the team's technical mentor.

Johnson said Stein, an associate professor in the School of Engineering, Computing and Construction Management at Roger Williams University, became the technical mentor unintentionally.

"Matt came over one afternoon to drop off some technology toys and he got along with the kids so well, three years later he's still coming over to play," she said. "It's nice to have that partnership for each of us to help because the kids are all at different skill levels."

Because Stein is well-versed in the field of robotics and technology, Johnson said, he handles that aspect of things, while Johnson is able to draw analogies for the children to see between different topics, so they can understand how everything works together.

"I've learned a lot, too. I didn't know anything about computer programming, so learning how to think through the process of building something and telling it what you need it to do is an exciting thing to be a part of," she said. "I'm demonstrating to them that learning is a lifelong thing."

Johnson said she's excited about the creative problem-solving part of it.

"It encourages the critical thinking process, forcing them to apply what they're learning to the task at hand," she said. "You really have to think and work through something that can be frustrating and require time and a lot of skills, but teamwork is a big part of it."

Johnson said the league provides students an opportunity to work on a variety of skills in a way that allows them to be excited about it because it's fun.

"Not only are they strengthening their skills in math, science, and technology, but they're also improving their writing and presentation skills because they do a skit for their research project presentation," she said.

Johnson said the league is very kid-focused and stresses that the kids should do the work themselves with minimal assistance from parents.

"Harry is very independent," she said of her son, "but the league is kid-focused, so the kids do all the work together. As a team, they act as one individual. I think the league is great and it's been a good opportunity on a number of levels."

Johnson said the team will be competing against 45 other teams at the Rhode Island competition in January, where last year it won third place for Robot Performance and received a Judge's Award for third place overall. She said the winner of the state competition goes on to the international competition in Atlanta, Ga.

For more information on the Engineers of Tomorrow, visit [www.engineersoftomorrow.com](http://www.engineersoftomorrow.com).

For more information on FIRST and FIRST LEGO League, visit [www.firstlegoleague.org](http://www.firstlegoleague.org).

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