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Goal of USF's robot Lego soccer: Inspire study of science

By [Dong-Phuong Nguyen](#), Times Staff Writer
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Children from the University of South Florida's Preschool Program Summer Camp cheer as 6-inch robots made of mostly of Legos play soccer in the college of engineering building on the Tampa campus Wednesday. The final score: 4-1, blue team.

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TAMPA

It was an hour before game time, but the soccer players weren't anxious, nervous or even excited. They were, however, a little confused.

That's because the players were robots, programmed by humans to play soccer. For weeks, the 6-inch, squarish robots had been practicing inside a lab, following code that instructed them to go after a little red ball.

On Wednesday, game day, the field was set up in an atrium inside the University of South Florida's College of Engineering building, which soaked up natural light. That confused the robots.

The programmers sweated, fretted and wrung their hands. For days, they had fueled themselves on soda and coffee, got little sleep and failed to calm their nerves with a trip to Denny's.

Finally, they recalibrated the robots' coding and hoped for the best.

• • •

Associate professor Miguel Labrador wanted more visibility for USF's department of computer science and engineering. So he decided the 14 students from universities nationwide

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who came together for the summer for USF's Research Experience for Undergraduates program would wire Lego Mindstorms to play soccer.

For the past decade, teams from universities across the world have been competing in RoboCup, a soccer competition involving robots. The contests have been held in Austria and China. Next year, it's in Singapore.

Winning is a big deal, Labrador said. It means your engineering program is at the top of its game.

Labrador used grant money to purchase six Mindstorms at \$250 each. The students worked together to build the first robot, which is made up of about 300 tiny Lego pieces. It took them two weeks to build. Once they finished one, the second one took only hours.

Then the coding began using sophisticated programming. The two goalies were equipped with three sonars that can detect sound waves, much like how bats can sense how far away an object is based on how long its echo takes to return inside a dark cave. When a ball went toward the goalies, the robots moved quickly toward the sound waves.

The goalies, which could also recognize color, were wired to stay in bounds within the green turf.

The other four robots were programmed to follow the red ball (anyone wearing red was asked to stand in the back of the room); to move the ball toward the goals (they were programmed to move toward either the goal with the magenta or the blue background), and to kick the ball.

Because color played such a big part with the sensors, the difference in the artificial light in the lab and the light from the atrium caused some confusion. The programmers arrived early and worked up until game time, scratching out numbers on a note pad and reconfiguring code on a laptop.

"We were a little scared," Andres Buss, one of the project's mentors, said later. "It was very hard work."

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The match began about 2:30 p.m. with an audience of summer campers at USF and the children of university employees.

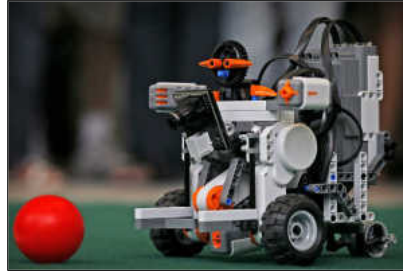
Kids giggled when the robots went off course and laughed when the robots knocked each other down. They moaned when a robot missed a goal, and cheered wildly when one scored.

The final score: 4-1, blue team. The engineers celebrated.

"The goal was to demonstrate something about computer science," Labrador said. "I hope it inspired some of the younger students. Maybe they will be interested in engineering and come to USF. That would be wonderful."

Dong-Phuong Nguyen can be reached at (813)909-4613 or nguyen@sptimes.com.

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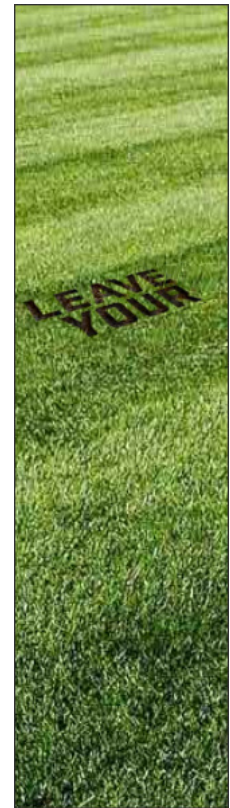


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The Legos robots are fitted with small cameras to help them find a small red ball and move it up and down the field.

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