Story and photos by Rick Coscarelli

16TH ANNUAL ROBOFEST WORLD

LAWRENCE TECHNOLOGICAL UNIVERSITY

"ROBOBOWL" PLUS!

Dr. CJ Chung and his team of volunteers have done it again, mixing STEM (Science, Technology Engineering and Math) with fun and excitement.

This year's competition takes autonomous robotics to another level. With three major events scheduled for the day, Exhibition Challenge, Vision Centric Challenge and the exciting Game Competition, "RoboBowl", there was much to see.

Since 2000, over 16,000 students have competed in Robofest, including teams from 13 US States, England, Canada, China, France, India, Brazil, South Korea, Mexico, Singapore, Ghana, and South Africa. This year's annual Robofest had 92 teams from 10 different countries competing.

Teams compete in the junior (grades 5-8), senior (grades 9-12), and college divisions.

This year's Competitive Landscape:
Senior Exhibition - 12 teams
Junior Exhibition - 12 teams
Senior Game - 20 teams
Junior Game - 27 teams
Senior Vision Centric Challenge - 9 teams
College Vision Centric Challenge - 12 teams

Additionally, over 800 attendees were on hand to watch the various competitions.

Summaries of the Three Competition Challenges
Exhibition:
Teams may enter any intelligent, autonomous, interactive robotics project. There can be up to five members per team and the project may be composed of any material.

Team from Seoul, South Korea working feverishly on entering unknown factors into robot.

Associate Dean of Arts and Sciences at LTU, Glenn Bauer.

However, hard wired remote controls (joy sticks) are not to be used. The project must employ sensors and any project that is human interactive is encouraged.

Vision Centric Challenge (VCC):
Robots are to follow a line on the floor to a series of waypoints. Each waypoint will have a paper with mixed shapes and colors

Dr. CJ Chung, Founder and Director of Robofest.

providing information to the robot which must execute the instructions provided. Each waypoint for colored paper in the Advanced High School Competitions will have numeric values and in the College

Gravity fed ejection toward Pins/Bottles.

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LISD Team #1542-5 "Perpetual Motion Squad" showing off their security team robots during the "Exhibition Competition".

Competition the shapes of the waypoints will have numeric values providing information to the autonomous robot. College and Advance High School will each have different parameters to follow. There are strict robot specifications as to size and functionality and there must be no human interaction with the robot during its run.

"RoboBowl "Game Challenge Summary:
Each robot must throw, shoot, or kick a tennis ball to knock down four pins (water bottles). Each team will be awarded points based upon knocking the water bottles down, just moving the water bottles and the team will also be awarded points if the ball ends up in the pin's/ bottle's side area. Additionally, the robot must measure the height of the black rectangle shape at the top of the game board. The height of the rectangle provided information on the position of two of the pins/bottles. The hidden information, provided just before the start of the competition, gave the teams the location of the next set of pins/bottles.

Female competitors played a large role in the competition.

VCC (Vision Centric Challenge) robot following directions as supplied by the paper markers.

LISD Team 1542-4, "N/A", with their robots programmed to do search and rescue.

Audience of more than 800 enjoyed the competition.

Dr. Chris Cartwright (l), Game Chief Judge and Emcee, Dr. Matthew Cole keeps the RoboBowl Competition under control and moving quickly.

Intense review and scrutiny of every robot detail in preparation for their run.

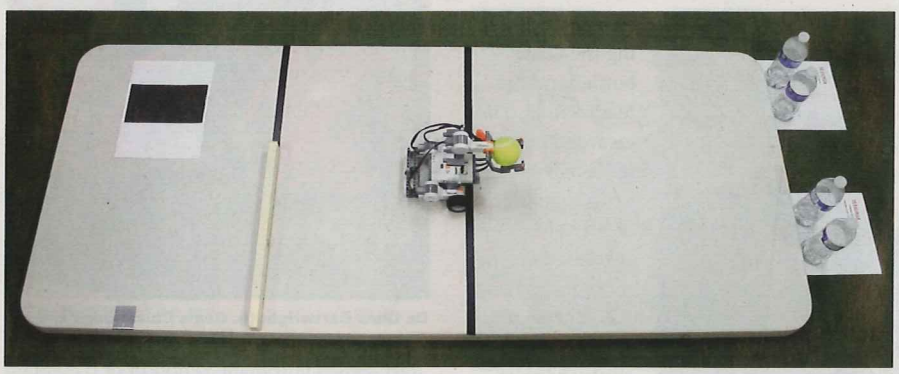
Focusing on the "RoboBowl" Competition

This was an exciting competition as teams conceived of a number of different ways to eject the tennis ball toward the pins (water bottles). Rubber bands, gravity dropping, spinning wheels and spring loaded ejection techniques were used to propel the tennis ball toward the water bottles. All techniques had varying success with those that used rapid ejection achieving the most points. Robot construction varied dramatically.

But what was most interesting during this competition was the extent to which both judges and competitors scrutinized the game rules and gaming conditions. Several times during the competition the competitors would question the positioning of the bottles and in one case, smudge marks created on the black rectangle paper may have caused a missed reading by a competing robot. This challenged the judges and after careful scrutiny and discussion, they ended up with a consensus of opinion resulting in a re-run for the robotics team.

Game Judges.

VCC (Vision Centric Challenge) - Luxrobo, College Division Team #2080-2, 1st Place - On the far left, DENSO, Program Manager, Community Affairs, Miss Melissa Smith with LTU Provost, Dr. Maria Vaz on the far right.



Game Field for RoboBowl.

INTERVIEWS

I had the opportunity to ask Dr. C.J. Chung, the inventor of Robofest 16 years ago, a couple of questions during the event.

ROBOT MAGAZINE: Dr. Chung, is this year's competition more complex than previous competitions?

DR. CHUNG: The complexity is almost the same as previous years but this year it seems much more fun as it involves moving objects like throwing balls. In previous years we focused more on the computer programming part, so if you just focus on the programming part you may not see the complexity outside the robot but this year involves throwing objects so it does seem more complex.

RM: Do you have any thoughts about where you will be going next year relative to the challenge?

DR. CHUNG: Yes, already we are designing the game for next year, either robot golf or robot joust.

Dr. Chung is also planning and will be preparing for World Robofest to be held in Hawaii in 2017!

RM: How many would you say are in the audience today?

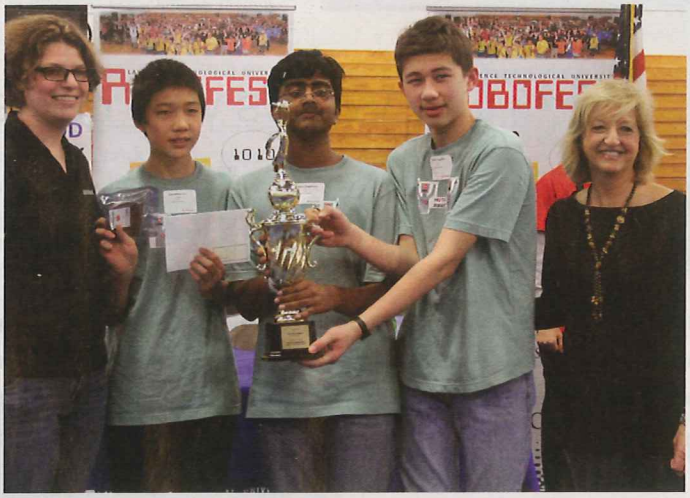
DR. CHUNG: The audience is about 800 strong today.

I was curious about one of the volunteers patrolling the pit area so I decided to find out what was going on. I met with Keith Bozin, Chief Proctor at the event, and he explained that he was there to ensure that no parents or mentors were involved in the pit area and to insure also that there was no outside interference to help the students work on the competition. Additionally, student competitors could not use their cell phones in the pit area. Keith commented that this year's competition offered a practical application for each team to overcome. They had been practicing with tables of a certain color shade, which were provided by Dr. Chung. However, with the large number of teams making it to this World Championship, Dr. Chung had to buy a new set of tables which were a different color shade and the teams had to quickly reprogram their robots to recognize the new playing surface. As Keith commented, "Teams have to be able to adapt and change as the

Sr. Exhibition - AbsentMinded, 1st Place, Team #2250-1, 1st Place- On the far left, DENSO, Program Manager, Community Affairs, Miss Melissa Smith with LTU Provost, Dr. Maria Vaz on the far right.

Sr. Game (RoboBowl) - Robocruisers, 1st Place, Team #1259-15, 1st Place- Third from the left, DENSO, Program Manager, Community Affairs, Miss Melissa Smith with LTU Provost, Dr. Maria Vaz on the far right.

VCC (Vision Centric Challenge) - IMC Falcon, Sr. Division Team #2186-3, 1st Place- On the far left, DENSO, Program Manager, Community Affairs, Miss Melissa Smith with LTU Provost, Dr. Maria Vaz on the far right.



Jr. Exhibition - Metal Robots, 1st Place, Team #1726-1, 1st Place- On the far left, DENSO, Program Manager, Community Affairs, Miss Melissa Smith with LTU Provost, Dr. Maria Vaz on the far right

situation changes."

Robofest is unique in several respects. First, competitors are given information about unique competition rules just 30 minutes before each competition and during the competition information is acquired by the robot during its travel. Second, all teams, after a 30 minute set-up for the hidden rules and practice time, must put their robots in "quarantine" and cannot touch their robots until it is their turn to compete.

One of the guest speakers was the Associate Dean of Arts and Sciences at Lawrence Technological University, Glenn Bauer. I asked him the following question:

RM: **Why would the division of Arts and Sciences be interested in this competition?**
GLENN BAUER: We firmly believe in STEM education, however, most people only think of engineering as the anchor but we are talking science, math and the technologies which are all rooted in arts and sciences. So this is about developing the entire mind, not just creating gadgets.

I also had a chance to meet with and discuss the projects of the two LISD teams (Lenawee Intermediate School District, from my home town of Adrian, Michigan) who were entered in the "Exhibition Competition". They both had exhibits of autonomous robots.

Jacob and Alex Hallet and Kendra Williams from Team #1542-5, Perpetual Motion Squad, developed a set of robots that would serve as a security team in a given area. They moved autonomously until they discovered something suspicious via sensors and then cameras and could be navigated remotely via wireless control.

Dakota Perry, Alex Silberhorn and Jay Maher #1542-4, N/A, were doing a search and rescue operation with robots that will search a defined area for a human and will respond back to a control site upon discovery. This included the necessity to ensure that two or more robots did not interfere with each other via specific sensing and programming instructions.

Jr. Game (RoboBowl) - NCA Lights, 1st Place, Team #1551--7, 1st Place- On the far left, DENSO, Program Manager, Community Affairs, Miss Melissa Smith with LTU Provost, Dr. Maria Vaz on the far right.

FIRST PLACE WINNERS

Vision Centric Challenge – College Division - Luxrobo, Team #2080-2

Vision Centric Challenge – Senior. Division - IMC Falcon, Team #2186-3

Junior Exhibition - Metal Robots, 1st Place, Team #1726-1

Senior Exhibition - AbsentMinded, 1st Place, Team #2250-1

Junior Game (RoboBowl) - NCA Lights, 1st Place, Team #1551-7

Senior Game (RoboBowl) - Robocruisers, 1st Place, Team #1259-15

This was a great competition and a fun day for both spectators and competitors! Everyone is looking forward to next year.

Links
Exhibition Information
www.robofest.net/index.php/current-competitions/exhibition

VCC (Vision Centric Challenge)
www.robofest.net/index.php/current-competitions/vision-centric-challenge

"RoboBowl" Information
www.robofest.net/index.php/current-competitions/game

2015 Game Animation
www.youtube.com/watch?v=LJ0afkDSuZA&feature=youtu.be

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IEEE - http://sites.ieee.org/sem/
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