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TECHNO GUARDS, FIRST FTC TEAM 2848
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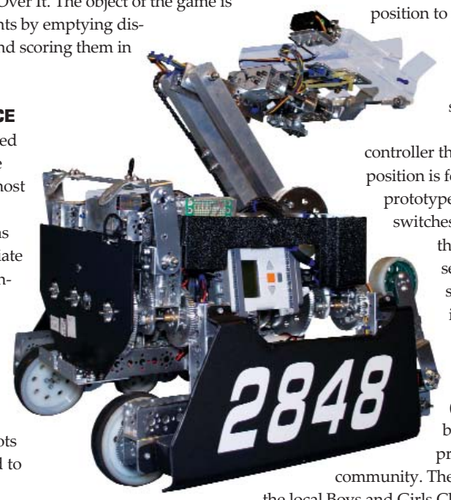
Techno Guards, a FIRST Tech Challenge (FTC) team

As we went to press, we wanted to share an extraordinary robot designed and built by the Techno Guards, a FIRST Tech Challenge (FTC) team. The FIRST Tech Challenge game is played on a 12 x12 foot field. Two alliances, one red and one blue composed of two teams each, compete in matches consisting of a 40 second autonomous period followed by a two-minute driver-controlled period. Every year the challenge changes, this year it is called Get Over It. The object of the game is to score more points than your opponents by emptying dispensers filled with 6 inch long batons and scoring them in stationary and rolling goals.

THE ROBOT: ALICE

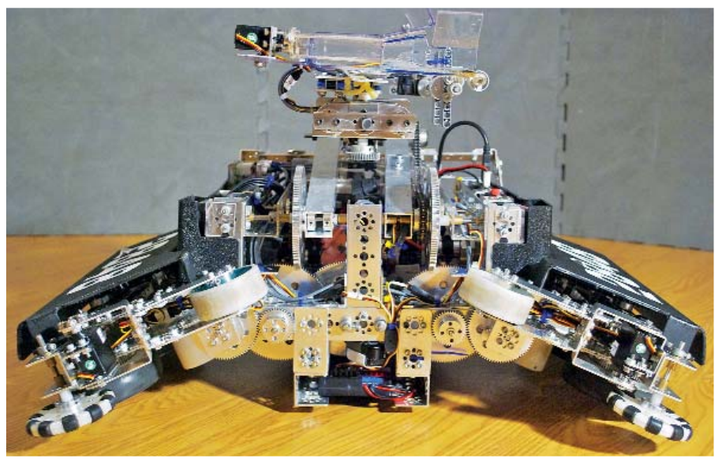
Alice, weighing in at 35 pounds, is named after Alice in Wonderland, because, like her, it gets bigger and smaller. Unlike most other robots, Alice expands in all three dimensions. Its arm can lift up as high as 42 inches, it can reach forward to negotiate obstacles extending the length to 21 inches, and when it "stances" it can go as wide as 25 inches. Stance is a name for the ability of the robot to raise or lower the chassis by changing the camber of the entire wheel/leg structure. It's used to change the center of mass on the robot, to prevent other robots from accessing portions of the field, and to provide different turn radii.



The robot uses eight 12V DC motors, controlled by three Tetrix Motor controllers. Four of the motors are for the drive system, two of the motors operate the arm, and the other two power the stancing mechanism. The stance system uses a dual geared reduction system with an 18:1 ratio. The arm and shoulder motors are mounted within the main robot body and control the motion of the arm through a chain and gear drive system. All of the motors have encoder feedback and are run by PID control.

The baton collector "hand" has a hall effect sensor to sense the magnetic batons, and is mechanically designed to automatically adjust it's position to optimally dispense the tubes from the three different dispensers. In practice, the Techno Guards are one of only six teams in the entire country to successfully detect and score a magnetic baton during competition.

The robot is controlled by a single NXT controller that is programmed in RobotC. Arm and stance position is fed back to the controller through a HiTechnic prototype circuit board. The board reads four limit switches, three position sensors (potentiometers) and the magnetic sensor. An additional HiTechnic sensor multiplexor is used to feed two gyroscopic sensors, an accelerometer, and an infrared sensor into the program.



THE TEAM

The team prides themselves on their robots (the last 2 years, they have won awards at both State and World), but are also equally as proud of the work that they do together in the community. They run a weekly robotics club for the youth at the local Boys and Girls Club (and worked with LEGO charity to obtain LEGO Mindstorm kits for the club), they mentor new and existing FLL and FTC teams, put on robotics and STEM (science, technology, engineering, and math) seminars and that's just for starters.

The Techno Guards recently won the Inspire Award (highest award a team can be given) at the FIRST Tech Challenge - Nor Cal Regional Championship. This award automatically gave the Techno Guards an invitation to compete at the FTC World Championship in St. Louis April 27-30, 2011.

The Techno Guards consist of four high school students from three different local high schools. They are: Chris Vogel - 3rd year member and Fabricator/Driver (Senior - Horizon Charter School), Karl LeVezu - 3rd year member and Mechanical Design/Driver (Senior- Maidu High School), Gavin Owens - 3rd year member and Programmer/Controls (Sophomore - Christian Brothers HS), and Alejandro Vega - 1st year member and Graphic Design/Electrical (Freshman- Horizon Charter School).