THE NUTS AND BOLTS

Carmel High School—Rolls-Royce www.techhounds.com
TECHHOUNDS TEAM 868

FIRST Robotics Competition
Issue 3.1
January 25, 2010

INSIDE THIS ISSUE

The 2010 Build Season has officially begun! On January 9, 2010, *FIRST* unveiled the challenge for this year, and since then the TechHOUNDS have been busier than ever, setting ambitious goals and accomplishing various tasks. The TechHOUNDS are eagerly getting the "ball rolling" toward their eventful six-week journey!

UPCOMING EVENTS

- **TechHOUNDS Open House**
  TBA
- **End of Build Season:**
  February 23, 2010
- **Kansas City Regional:**
  March 4—6, 2010
- **Boilermaker Regional:**
  March 18—20, 2010

WHAT IS FIRST?

The *FIRST* Robotics Competition is part of ***FIRST*** *(For the Inspiration and Recognition of Science and Technology)*, an organization that, according to founder Dean Kamen, strives to "transform our culture by creating a world where science and technology are celebrated and where young people dream of becoming science and technology heroes". For more information, please visit **www.usfirst.org**.

FIRST®

PRESEASON OVERVIEW

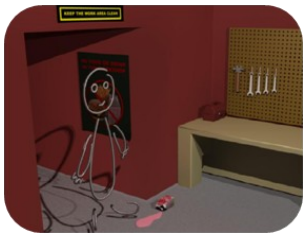
*A major portion of the year-round TechHOUNDS schedule is **Preseason**, where new students are recruited and trained in the fall semester for the quickly-arriving six-week Build Season. Members are introduced to each division through special activities and meetings held once a week.*

Website: The Website team worked on successfully **switching servers** and **updating general content** for the 2009-2010 season, in addition to creating a **plan-of-action for build season**.

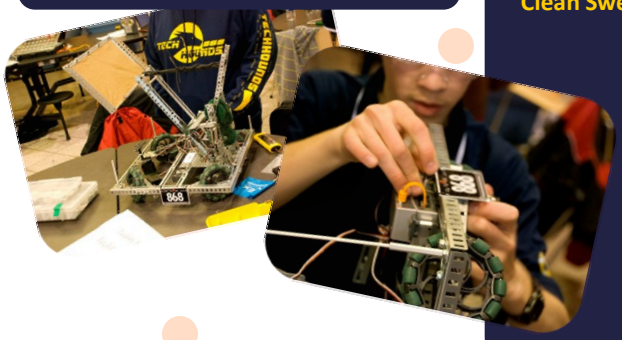
Aux. Construction: The Auxiliary Construction division, after a thorough training of tools, put their knowledge into practice by designing and building **pickleball paddles** and **ladder golf ladders** for the **Carmel High School Physical Education Department**. The wooden pickleball paddles were specially engraved with the CHS PE emblem utilizing a laser cutter, and the ladders were constructed out of PVC pipe. The results of the team's labor **replaced existing worn-out equipment**. Other examples of building projects include the construction of **boxes**, which will be used to train dogs in the **Carmel Police Department** to detect illegal substances, and a **table** that holds and charges batteries — this will be part of the pit, the 10' by 10' area where we work on the robot between matches in competition.

Robot Operations: After each member was **tool trained**, the Robot Operations team **disassembled past years' robots**, **learned how to design drive trains**, and **practiced mechanical skills** by designing and building the basics of a t-shirt launcher.

Animation: Members first learned how to use **Autodesk 3D Studio Max**, a professional animation software. After practicing basic skills through small projects (like animating their own names), students designed an animation about safety, which was a solid foundation for the process during build season.



VEX ROBOTICS



This year the TechHOUNDS have branched into a new robotics event: the **Vex Robotics Competition**. Seven VEX members were presented with the challenge of "**Clean Sweep**". In Clean Sweep, two robots must work together to move foam baseballs, footballs, and soccer balls over a wall and into goals. The **TechHOUNDS Vex Team** first approached the challenge by building a robot capable of picking up the balls and storing them in a hopper until needed. Their first competition was held at **Zionsville High School**, where they had a successful showing, scoring a 119 to 64 win over the eventual winner. After the competition, they made some modifications and improvements for the **Warren Vex Competition**, where they placed **9th out of 46 teams**. Over the next few months, they will make slight adjustments to the robot and its programming to get it ready for their next competition in March.

SUMMER EVENTS

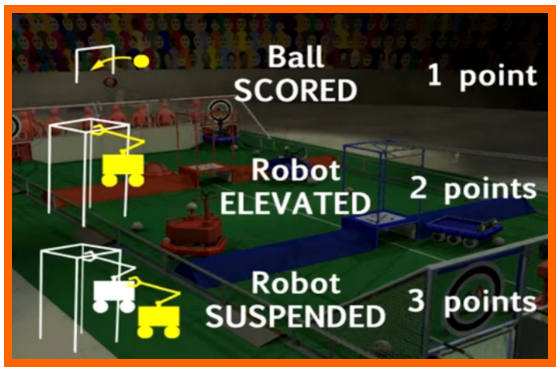
FIRSTEP *— The FIRSTEP Summer Camp program was created by the TechHOUNDS Robotics Team to lead younger students with interests in science and technology on their **"first step"** in learning more about these exciting fields. For one week, we explored the world of robotics with 1st-8th graders through several sessions, where students learned to model structures on the computer with Legos, built Lego robotics and more advanced robots, and worked to construct a toolbox using simple metal and power tools in our machine shop.*

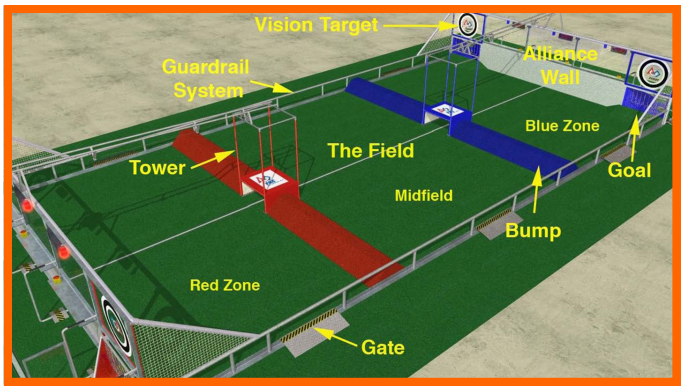
Indiana Robotics Invitational *— The TechHOUNDS also attended the biggest off-season event of the summer, where over seventy teams from all over the nation participated in a competition similar to a regional. We modified our 2009 robot drastically over the summer to increase speed, traction, and agility, as we always try to improve — we ended up placing in the top ten ranks!*

INTRODUCING...BREAKAWAY

*On January 9, 2010, FIRST unveiled this season's new game, **Breakaway**. Offering an entirely different set of challenges, as well as unprecedented opportunities for specialization and teamwork, Breakaway is a simple game which will present complex problems.*

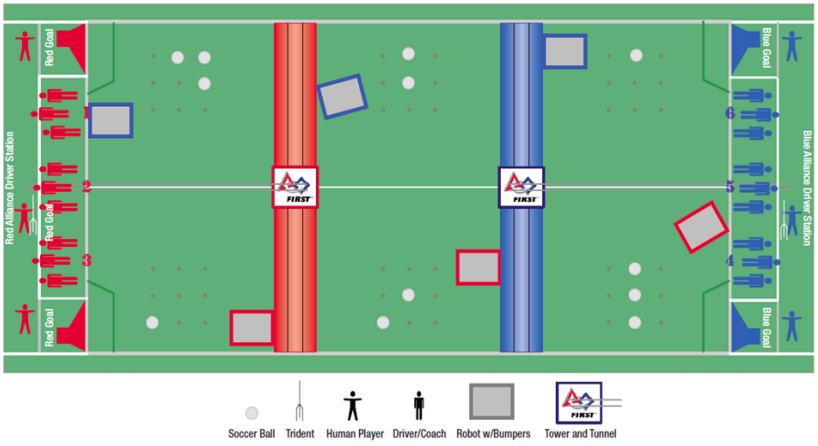
The **goal of the game** is simply to score as many soccer balls into ***your*** goals as possible in the two-minute, fifteen-second game, along with an added game-play twist at the end. Balls are not allowed to be possessed (carried or held), so each robot will need to push, kick, or corral the balls across the field. Each game will be played with two alliances of three robots each, so **competition** and **cooperation** will both be crucial on the field. This cooperation is most evident in the finale of each match, where bonus points can be scored for either hanging off of your team's tower, worth two goals, or off of an allied robot who is already hanging off of the tower, worth three.





This year's 27' by 54' field, pictured to the left, has **two sharply inclined speed bumps**, dividing the field into thirds, with **tunnels** in the center of each speed bump. This means that each robot will need to be able to either climb the bumps or fit through the 18" tall tunnel if they want to move to different sections of the field. A **hanging guardrail system** is also part of the field, allowing balls to be returned to play after they are scored. A **human player** uses a device called a **trident** to lift the ball onto the **guardrail system**.

The match will start with the **twelve soccer balls** and **six robots** placed as shown to the right, at which point a fifteen-second **pre-programmed autonomous period** will begin; then drivers may take the controls for the remainder of the match (known as the **teleoperated period**). After these two minutes, the match will end; the goals and bonuses for hanging will be tallied; and one alliance will be the victor.



*Please visit **www.usfirst.org** to see* FIRST's *animation of this game and other information, including the Competition Manual.*

Written by
Scott Blankenbaker

THE 2010 BUILD SEASON

We are almost halfway through our six-week journey, and **Week One** and **Two** have been quite hectic for the TechHOUNDS! Over the first few days, we brainstormed strategies on how to play the game during each phase (autonomous, teleoperated, and end game) and ultimately formulated a robot design, which is now being prototyped.

This year, there are **fifty-six** student members on the team, **twenty-nine** of which are **first-year members**! Each student has found a particular area of interest in which to work — there are several divisions of TechHOUNDS, all having unique goals and tasks. In the following sections, each division leader will highlight the accomplishments achieved by their team during the first two weeks.

A record number of **twenty-five adult mentors and volunteers** have joined us, bringing with them engineering, management, programming/electrical, and public relations skills. They have all been extremely helpful in their respective areas, further encouraging and learning with the team.

ROBOT OPERATIONS UPDATE

The Robot Operations Division builds the robot itself after a period of intense brainstorming, design, and prototyping.

*"The first two weeks have been incredibly productive for the Robot Operations team! During the first few days, the entire team studied the game in detail and sought all possible strategies for each period of the match. This **brainstorming process** was recorded on a large board to compare our collection of thoughts. After **finalizing our strategy**, we discussed robot design and **prototyped several ideas**. Finally we now have our **drive base designed** along with **finished Autodesk Inventor models of the drive train**. Lately, we have been using tools in the machine shop to build specific components of our robot, including **custom-designed housing for our mecanum drive wheels**."*

— **Charles Nepomuceno** and **Stephen Spence**
Robot Operations Leaders

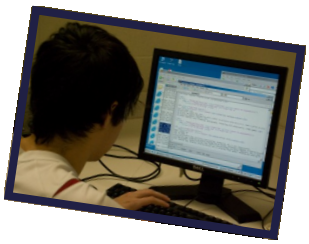
PROGRAMMING/ELECTRICAL UPDATE

After the robot has been built, the Programming/Electrical Division writes code to maneuver the robot and its appendages around the playing field by remote control.

*"The programmers have been practicing and experimenting with this year's programming features in preparation for the coming weeks. In addition to **learning the basics of programming and electronics**, the **approximately fifteen members** of the programming team have **successfully practiced coding using last year's robot** with **Java code**, a new programming principle for this year. We are excited to receive this year's robot for programming soon from the Robot Operations division!"*

— **Alex Ryker**
Programming Lead

WEBSITE UPDATE



The Website Division is responsible for the construction and maintenance of our website. It serves as an important role on the team by providing the communication link to the general public.

*"A huge thank you goes to **Catalyst Technology Group**, who has graciously provided server space for our website! We are making **www.techhounds.com** better than ever and have taken this opportunity to consider **new templates and schemes** for our 2010 website. We are also currently compiling information for the **Member Biography** section. The next few weeks are sure to be busy. Please check the website frequently for updates."*

— Thomas Keen
Website Supervisor

ANIMATION UPDATE

The Animation Division is in charge of brainstorming, modeling, and rendering a 3D animation in response to a prompt given every year by Autodesk. These animations are presented during Regional and Championships competitions.

*"FIRST and Autodesk have released the animation prompt for this year, which, in summary, is to create an invention that will benefit the local community, the larger society, the world, or even space! After much **brainstorming**, The Animation division has taken this opportunity to devise a special invention that uses and conserves several resources (but we're not revealing the specifics yet!). We have **created our storyboard**, **completed concept art** for major aspects of the animation, and also **modeled various scene components**. We are also ready to **record a first take of the voiceover**."*

— Noah Bannister
Animation Leader

AUX. CONSTRUCTION UPDATE

The Auxiliary Construction Division builds the playing field on which the robot's capabilities are tested. It also designs a custom crate for safe transportation of the robot, along with the components of our pit.

*"The list of accomplishments of the Construction division is quite long, but we still have lots to do. For the playing field, we have made **the two bumps covered with carpet**, **the front and back ramps of the goal**, **the tunnel** (which our robot could go under) **along with the tower** (where our robot could hang), and **the trident** (which is used to return balls into gameplay). For our **pit display**, we have built a **half-shelf for the crate** (which stores our robot) and a **slide-out table for the programmers** to set their laptops. We are also in the process of modifying our **workbench**, which will provide storage and workspace in our pit."*

— Andrew Johnston
Construction Leader

WORDS FROM MR. LALIT VERMA, IT MANAGER AT ELI LILLY AND COMPANY:

First-Year Mentor, Background in Physics and Computer Science

"I didn't get the opportunity to do this kind of thing when I was young, so I am very excited to be able to contribute to this team with my own knowledge and experiences. I am helping these students learn and am learning new things myself! My favorite aspect so far has been seeing people pose problems and discuss solutions, and giving my input as well. These are a bright group of team members full of vigor, enthusiasm, and sincere passion for achieving their goals."

A SPECIAL THANK YOU TO...

*All **parents and supporters** for providing dinner for the TechHOUNDS so far and promoting a productive build season, along with our skilled **teachers and mentors**...*

We sincerely appreciate all of your contributions and are looking forward to an exciting build season!

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