The Nuts and Bolts

FIRST Robotics Competition

Carmel High School - Rolls-Royce - TechHOUNDS
Team 868

Issue 2.3

February 16, 2009

Inside this issue:

*The build season is almost over! We've worked over **130 hours** in the past six weeks, and we are looking forward to our competition season! Inside this issue, you will see the accomplishments of each division, and some insights of our members and mentors.*

Upcoming Events:

- **End of Build Season:** Feb. 17, 2009
- **Buckeye Regional:** Feb. 26—28, 2009
- **Boilermaker Regional:** Mar. 19—21, 2009
- **Atlanta Championships:** Apr. 16—18, 2009

What's 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**.

Robot Operations *Update*

*"The Robot Operations team has completed a feat that we've only been able to dream about in past years—actually **finishing the robot** before build season is over, with time to spare! The construction and assembly of our **collector system** is finished, along with the **drive train** and the **program** to run the robot. We have thus mounted the collector assembly to the drive train; with the **electrical board** and wiring done soon, we will have a fully functioning robot with which to **practice**. We have also started making the **encoder wheel** for speed and acceleration readings. To finish off the robot, we have started to prepare the "**lexan**" (or plastic shielding) with sponsors' names to cover the exposed sides.*

The remaining days of build season will be used to practice our strategy on our playing field. We're looking forward to the competitions coming up!"

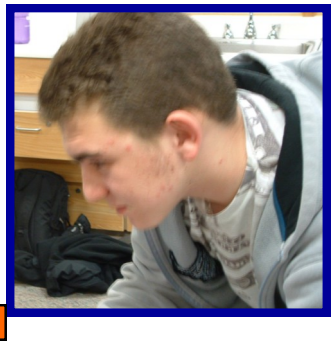
— Charles Nepomuceno
Robot Operations Lead

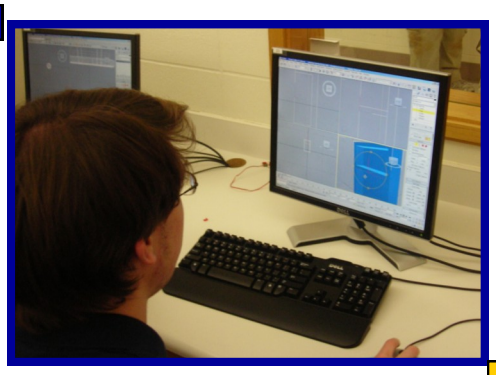




*"TechHOUNDS has inspired me to set **high goals** for myself and strive towards them."*

-- **Daniel Volokhova**
Programming





*"As a member of TechHOUNDS, not only am I a student, but a **teacher** to all my fellow members."*
(Regarding teaching new members in Animation the 3ds Max software)

-- **Joey Broerman**
Animation

*"TechHOUNDS has been a really great learning experience for me and will have a large impact on my **future**."*

-- **Alex Kramer**
Public Relations

Construction *Update*

*"In the construction department, things are moving along nicely. All vertical and horizontal metal conduit supports are **cut, drilled, bolted, and assembled**. These poles will support an American flag along with the banners above our crate to showcase our **sponsors** and the two curved banners in the corner of our pit with our team name, number, and pictures. Also, we designed a wooden top for the bottom half of our toolbox. This will be used as a good work area to **hammer** and **drill** into at competitions. A **band saw and a drill press** can also be secured on to the top. Another project that was completed in the past weeks was to re-vamp the **battery box**. This altered box can now quickly charge batteries with the doors closed to conserve space. The battery box will also have a vise mounted to a cap that fits securely around the top of it. Finally, the **playing field** is completely finished to allow the Robot Operations team to practice.*

We are now working to practice assembling our pit during the competitions within thirty minutes, and preparing our packing lists to take to our events!"

— Andrew Johnston
Construction Lead

A Day in the Life of a TechHOUND

Starting in January, the TechHOUNDS have a busy schedule for six weeks—the team meets every weekday for three hours, and even for a few hours on weekends and holidays! During this time, not only do students learn technical knowledge on the team, but a skill important for life: time management. Here is an example of an active, involved member who has learned to balance school, friends/family life, and TechHOUNDS.

Meet Tom!

Freshman,
First-Year Member

"I plan to go into a field of engineering in college and as an occupation later in my life, but I don't know what field—TechHOUNDS is helping me with that decision."

START

6:00 am : Wake up

7:30 am : Get to school and hang out with friends

7:50 am : Regular school day starts

School alternates between *Blue and Gold days*—in other words, the weekdays alternate in class periods:

Blue Days:	**Gold Days:**
Biology	Spanish
English	Student Resource Time
Gym	World Geography
Algebra I	AVID

"During the time between class periods, I talk to friends. My hardest class is English, since it takes more time for me to complete the reading assignments."

3:05 pm : School ends

Mondays, Wednesdays, and Fridays

Tuesdays and Thursdays

5:30 pm : Dinner with TechHOUNDS

6:00—9:-00 pm : TechHOUNDS Meeting

3:30—6:30 pm : TechHOUNDS Meeting

Homework, then bed at **11:00 pm**

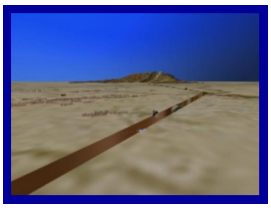
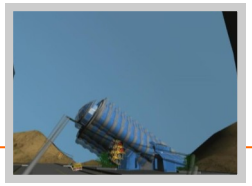
Repeat

"Whenever I have time (either before TechHOUNDS or after, depending on the day), I get started on my homework right away so it gets done faster, and I don't have to stay up late. I try to hang out with friends on the weekends."

Animation *Update*

*"With the submission deadline at the end of build season, the animation team has continued to draw and render our video consisting of three **scenes**. Once the scenes are rendered, we will use a video editing program called Sony Vegas to stitch our scenes together. Soon, **voiceovers** will be recorded by **Mr. Hutson**, an adult mentor, and **Brian Bauman**, a student member. This is the first year that audio will be added in our animation! Our storyboard and animation will be available on www.techhounds.com soon—please be sure to check it out!"*

— Joey Broerman
Animation Lead



Website *Update*

*"The website submission is due at the same time as the animation, and we are working hard to update everything on our site, including a new **photo gallery**, **current** members and mentors, **sponsors**, this year's **game**, **calendar**, and features of some **accomplishments** of the 2009 season. Some new elements will be added as well, such as an embellished **menu**. We are also making it easier for our leaders and administrators to make changes to the site. This is a long and tedious process, but we are hoping to have www.techhounds.com completely updated and functioning by the end of the build season."*

— Brian Bauman
Webmaster


Programming *Update*

*"The programmers have had several accomplishments over the past weeks. One of these was **coding the camera**. In the portion of the game where the robot must be autonomous, the ability to track other robots' trailers is essential.*

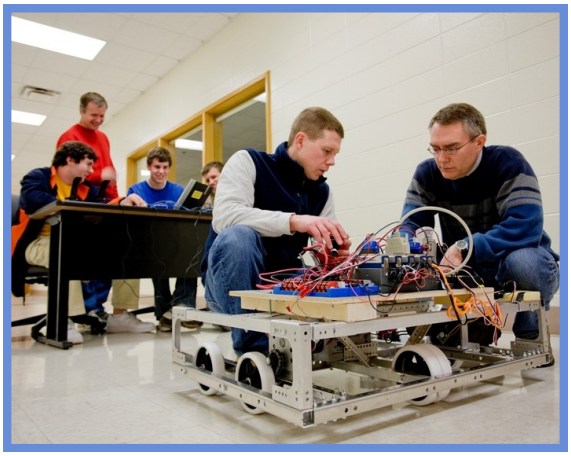
*Another creative accomplishment included the design and construction of an **electronics board**. This board attaches to the robot and is responsible for all electronic components on the board. This is where the programming for autonomous is stored and controlled. The control system for the robot is centered around its "brain", the **Compact RIO (C-RIO)**. After the game's autonomous period, the electronics board acts as a wireless receiver to receive wireless information broadcast from our control board for the teleoperated period of the game.*

*The design and construction of the **control board** was directed by the programmers as well. This is not an innovative design in technology, but is essential for the operation of the robot. In the gaming arena, there are human operators at the controls of each robot, who utilize joysticks and buttons to command their robots. An organized control board is necessary for the compilation of all these inputs to send to the robot.*

*One part of the game is the illusion of the moon's gravity. The slick surface material, in conjunction with the wheels, causes the robot to **likely slip** should normal torque be applied to the wheels. Programmers are key in this problem on making our drive train system "learn" if it is slipping, and what to do if it should slip. This is best explained in **coding for motor compensation**. This takes encoders (devices on the wheel axle that tell the central processing unit (CPU) how many revolutions per minute the wheel is turning) and uses their input to tell if the wheel(s) is/are spinning faster than the robot is moving. To tell if the robot is moving we use something called a gyro (a device sensing acceleration is several directions). When the gyro tells us our velocity is below than what the encoders say the wheels are turning, we must compensate and turn down the motors running the wheels until **the velocities match**. This best compares with anti-lock brakes. When slipping and trying to decelerate, car brakes automatically release some pressure to let the wheels return with traction on the road. Likewise, our robot is trying to accelerate and will slip, so we need to compensate and return traction to the surface of the playing-field. We have programmed this "**motor compensation**" and have worked on the **encoders** along with **gyro coding**.*

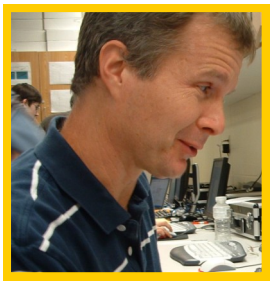
We have accomplished so much—we are excited to see the results of our hard work during competition!"

— Matt Johnston
Programming/Electrical Lead



From the Mentors' Perspective

Our mentors have observed and helped us towards our goals for the past six weeks; here are some of their comments regarding their experience with us.



Mr. Blankenbaker: First-Year Mentor and *Software Developer and Owner of a Consulting Company*

What have you been helping out with this year?
"I've been helping out in the programming area, but learning about as much as I've been helping!"

What made you want to mentor us?
"I see TechHOUNDS as providing an educational opportunity which is lacking in the normal curriculum in our school systems. By participating in this team, I feel that I am providing a useful contribution to our community."

Mr. Jeffers: First-Year Mentor and *Service Architect at Eli Lilly and Company*

What do you think students are gaining from TechHOUNDS?

"At first I thought building a robot or animation and competing would be a fun challenge. But after watching for a few weeks, there is a lot more going on. Teamwork, meeting deadlines, coaching, mentoring, influencing others and building consensus are skills I see at work every day. These are skills needed to succeed in every job site, project team, committee, corporation or board room in the world."

Mr. Frederick: First-Year Mentor and *Employee at Kirby Risk with a Background in Mech. Engineering*

What made you want to mentor us?
"I saw some of the information about FIRST on television and on the internet, and I thought it looked like a great experience for everybody involved. As a recent Carmel transplant, I was very excited to learn that CHS has a team, and so I decided to get involved and see what it's all about.

I've got to say that I am very impressed by the students I've worked with in TechHOUNDS. These are some extremely thoughtful and conscientious young folks."

Mr. Skoog: Seventh-Year Mentor and *Director of Engineering at Sanitary Management and Engineering Company, Inc.*

"My daughter was a member from 2003 to 2006, and I still enjoy being a mentor at TechHOUNDS, helping out with Construction, Robot Operations, or any other miscellaneous task."

Mr. Nepomuceno: Fourth-Year Mentor and *Quality Manager at STMicroelectronics*

What's the best thing you like about TechHOUNDS?
"The concept of 'student built, student managed' team. I am very proud to see what everyone in the team can do to accomplish the goal at hand."

What do you think students are gaining from TechHOUNDS?
"There are a lot of tools that the student can gain from TechHOUNDS that will put them a step ahead from any other student. Problem solving techniques are used, programming skills, design skills, animation skills, leadership, project management, teamwork, etc.…these are things that makes a student become a more valuable professional when the time comes."

Mr. Hutson: Seventh-Year Mentor and *Retired Teacher*

"I think that FIRST has something valuable to offer young people and teaches youngsters new skills while pointing them toward meaningful pursuits both fun and rewarding."

A Special Thank You to…

*All **parents and supporters** who have provided dinner for us so far this build season, or have helped us out in any other way, along with our skilled **teachers and mentors**…*

*An additional thank you to **Mr. Spence**, our professional photographer, whose pictures are featured throughout this issue…*

We sincerely appreciate all of your contributions and are eager for the rest of the build season!

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