

Business Plan



HVA RoHAWKtics
FIRST Team 3824
2016

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I. **Executive Summary**

- A. Team 3824's mission statement is to engage students in the business of science and technology by:
 - 1. Introducing students to new and innovated technologies.
 - 2. Providing experiences in learning new skills and working with knowledgeable mentors.
 - 3. Establishing a sustainable and competitive program.
- B. Gracious Professionalism™ is the core value of Team 3824. The team's "home", the Manufacturing Demonstration Facility (MDF), for this reason is open to other *FIRST* teams. There, the team shares meals, advice, problems, parts, and experiences with both rookie and established teams. Members and mentors work six days a week during build season, exemplifying their dedication to the team and the *FIRST* community. This dedication requires impeccable time management in *FIRST* robotics, other extra-curricular activities, and, most importantly, academics.

II. ***FIRST* Description**

- A. *FIRST* is defined as "For Inspiration and Recognition of Science and Technology." It encourages students to let their creativity flow and inspires them to think critically and methodically. *FIRST* helps students recognize their potential and to build upon it to become future leaders. The ideals of the program emphasize the importance of science and technology and how much they affect the world.
- B. Gracious Professionalism™ is one of *FIRST*'s community/self-building standards and is defined as "a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community."
- C. Coopertition™ is the balance between cooperation and competition. This means in the midst of intense competition the team still holds *FIRST*'s value of Gracious Professionalism™.

III. Program Summary

A. Team 3824 began in 2011. A student at Hardin Valley Academy (HVA) interested in robotics asked a computer science teacher, Mrs. Mary Lin, to start a robotics team. With only one week until the registration deadline for the 2011 Smoky Mountains Regional, the team had to find sponsors. That year, Team 3824 worked out of a school closet. Despite this limitation, the team competed at the Smoky Mountains Regional, where members won the 2011 Rookie All Star and Highest Rookie Seed awards. This allowed Team 3824 to compete at the *FIRST* Championship in St. Louis.

In its second year, Team 3824 sought sponsorship from the Oak Ridge National Laboratory (ORNL), which included the opportunity to move its work place from "the closet" to the state-of-the-art Manufacturing Demonstration Facility (MDF). At the MDF, the team learned to use additive manufacturing, commonly known as 3D printing, in the making of the robot. At the 2012 Smoky Mountains Regional, Team 3824 won the Engineering Excellence Award sponsored by Delphi. At the 2012 Peachtree Regional, the team won the Industrial Design Award sponsored by General Motors.

In the team's third year, Team 3824 started using carbon fiber composites to reduce the weight of the robot. The hard work paid off; the team earned the 2013 Engineering Excellence Award sponsored by Delphi at both the Palmetto and Smoky Mountains Regionals. The team was also a finalist at Palmetto and won the Hard Hat Safety Award. The biggest accomplishment in the 2013 season was winning the Smoky Mountains Regional. At the 2013 *FIRST* Championship, members made it to the elimination rounds in the Curie division.

In the fourth year, Team 3824 went undefeated at the Palmetto Regional, earning a number one seed and as the winning alliance, a chance to compete at the 2014 *FIRST* Championships. The team also earned the Industrial Design Award sponsored by General Motors. At the Smoky Mountains Regional, mentor Lonnie Love earned the Woodie Flowers Finalist Award as well as the robot being awarded its second Industrial Design Award sponsored by General Motors. The team's focus on safety also earned an Industrial Safety Award sponsored by Underwriters Laboratories.

In the 2015 competition season, Team 3824 was a champion at both the Palmetto and Smoky Mountains Regionals. At Palmetto, the team secured the number one seed, went undefeated for the second year, and won the Industrial Design Award sponsored by General Motors. During that same year, members were able to compete and win at the Smoky Mountains Regional. Along with winning this regional, the team was awarded the Excellence in Engineering and Industrial Safety awards.

- B. Team 3824 has grown to more than 60 students primarily from HVA, a public high school in Knoxville, TN. The team has also opened its doors to students from Bearden High School, homeschools, and the Tennessee School for the Deaf. These students have diverse backgrounds and interests and come from all four HVA academies (At HVA, students are divided into STEM, Health Sciences, Liberal Arts, and Business, Law, and Public Affairs.).

IV. Situation Analysis

A. SWOT Analysis:

1. Team 3824 prides itself in its strengths. One of these includes the organizational structure of the team. Through this structure, the team is able to meet deadlines, communicate clearly and efficiently, and provide opportunities for newer members to learn. In addition to this, the team has

been given the ability, through the MDF, to be supported by knowledgeable mentors. These mentors work alongside team members; instead of them being the leading force of robot design and marketing for the team. Many of the mentors are also relatives of members. This works to create a stronger and more comfortable working environment for Team 3824. In addition to gaining valuable mentors from the MDF, the team has the privilege to have access to state-of-the-art technology. The main resource gained is the team's ability to large scale 3D print. By invoking the use of this technology, Team 3824 can create multiple robots in a single build season with stronger and lighter materials. Finally, the team excels in the documentation of all of the team events, especially competitions. By doing this, Team 3824 is able to keep its team history alive and available to everyone.

2. On a different note, Team 3824 must also recognize its weaknesses. One of these weaknesses is the challenge of losing members, especially during build season. The team meets every night from six p.m. to nine p.m. and on Saturdays from nine a.m. to four p.m. This, in many cases, has proven to be stressful on students, who struggle to balance school work and other extracurricular activities in addition to the team. Another problem is the loss of sponsors. Team 3824 relies heavily on its sponsors to fund events and getting to and from competition; without sponsors, the team would not be able to prosper. Team 3824 also runs the risk of design issues during build season, as any other team does. This is heightened through the team's continual use of 3D printed technology, which is only recently becoming a new field of interest to companies. Lastly, the team has had difficulty with being sustainable. Team 3824 is a fairly new team, so it is difficult to see sustainable aspects from it.

3. Opportunities are found in many ways to Team 3824. For example, the team's school fully supports the members and team. The school allows the team to host events to raise money for the team and other organizations. As discussed before, it has proven to be an immense opportunity to the team to be able to work at ORNL, specifically at the MDF. There, Team 3824 has been given the chance to become known as the "3D printing team" in the *FIRST* community and ultimately landing the team a spot in the 2016 *FIRST Robotics: Behind the Design* book. This has given the team national recognition. Another opportunity that has accompanied the team at the MDF is sponsors. Many of the team's sponsors were affiliated with ORNL and later the team. Outreach has also become a vital opportunity to Team 3824. Through these events, the team is able to spread the word of the team and of STEM to the community, nation, and world. One way to accomplish this publicity is to utilize social media. The team is found on multiple social media platforms in order to connect to various groups.
4. Finally, Team 3824 must recognize and understand the threats towards the team. An example of a threat is inclement weather. Since build season is in winter, weather, such as snow, is nearly inevitable due to the team's location in Tennessee. This keeps students from being able to come to the facility and closes school. If the schools are closed, the team does not meet that day. Also, inclement weather can cause complications for traveling to events like competition. Next, the team runs the chance of losing privileges at the MDF by not following their rules of conduct. If this were to happen, the team would not only be without a facility to build in but also lose mentors that work there and the many resources found there. Additionally, other FRC teams provide a competitive environment not only at competitions but throughout the *FIRST* and STEM community. With this in mind, there is a possibility of the dilution of funds from

certain sponsors if more teams were to join in the team's area. This competition does not only accompany other *FIRST* teams but also with other organizations in the STEM field. Team 3824 has had conflicts with gaining new members for the team that are already a part of other organizations. The team faces the threat of losing mentors when they leave or retire too.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Organization • Number of members/mentors • Resources • Knowledgeable mentors • Students and mentors work together • Familial involvement • Documentation 	<ul style="list-style-type: none"> • Limited student participation • Sponsor loss • Design issues • Sustainability
Opportunities	Threats
<ul style="list-style-type: none"> • School support • MDF/ORNL • Sponsors • Outreach • 3D printing • Social Media • National Recognition 	<ul style="list-style-type: none"> • Other teams • Other organizations • Inclement weather • Losing privileges at the MDF • Dilution of funds due to influx of area teams • Mentor loss

V. Objectives

A. Individual Goals:

1. Team 3824 holds all of its members to the same set of goals. Members are required to maintain a grade point average of 2.0 or higher and are asked to make an effort to gain skills applicable to everyday life. Additionally, team members are expected to support other students in learning these new skills. Team members are to conduct reviews where each student identifies skills they wish to learn too.

B. Short-Term Goals:

1. Team 3824 also has several short-term goals that include: winning Regionals, going to *FIRST* Championship, and earning the Regional Chairman's Award along with other team awards (such as the Engineering Inspiration Award, Entrepreneurship Award, Design Awards, Safety Awards, and the Woodie Flowers Award).

C. Long-Term Goals:

1. Team 3824's long-term goals are to ensure that the team is sustainable and continues to pursue excellence. To achieve this, the team has made it a goal to maintain an alumni database, encourage alumni to mentor the team, and continue mentoring and/or sponsoring FLL and FRC teams. The team also works to maintain a winning tradition and a tradition of Gracious Professionalism™ at competitions and the MDF. Lastly, Team 3824 wants to make a lasting impact on the community through outreach and spreading the word of STEM.

VI. Marketing Strategies

A. Team Marketing

1. One of the main actions Team 3824 is taking to be sure the team will continue to grow and develop is by mentoring underclassmen on how to become future leaders within the team. Through the team's training workshops, newcomers acquire skills necessary to succeed in their *FIRST* experience. At the team's school there is a Freshman Day where Team 3824 sets up a booth advertising the *FIRST* Robotics experience and encourages students to join the team to see what *FIRST* is all about. Additionally, the team supports and mentors FLL teams. These elementary

and middle school students developed an interest in *FIRST* competitions and discover the opportunities of FRC.

2. Team 3824 works closely with its school to gain recognition among the community, future members and sponsors, and on a wider scale. The team has a promotional robot, a t-shirt cannon, used to entertain the student body at school sports games and pep rallies. At these school events, members sell glow sticks to raise money for different charities like East Tennessee Children's Hospital.
3. To ensure that there are still members on the team long-term, Team 3824 makes an effort to maintain an interest in *FIRST* amongst elementary schools. To do this, Team 3824 has sponsored and mentored six area teams. The team is annually invited to showcase the robot to FLL and FTC teams at the Cookeville Regional. Team members also make appearances at various STEM related events including the FLL Qualifying Tournament the team hosts and the STEM camp hosted by Hardin Valley Academy.
4. To expand Team 3824's resources, it recruits mentors through a variety of methods. Most of the mentors are recruited through networking; however, several are found through familial connections. The team also comes in contact with interested people through community outreach. Some of the team's mentors are ORNL/MDF employees who after watching Team 3824 in action made the decision to get involved.
5. Funding for competitions is a major concern for any *FIRST* Robotics team. Generally, Team 3824 needs about \$80,000 a year to support its robot design, construction efforts, and traveling expenses. The team is fortunate to have the following dedicated sponsors: Oak Ridge National Laboratory, UT-Battelle, Manufacturing Demonstration Facility, Bechtel, Knox County Schools, Naoko Blue & Associates, Consolidated Nuclear

Security, DowAksa, Local Motors, 3DSystems, Boeing, Ingenutec, and Strongwell.

6. Another component of Team 3824's marketing strategies is attracting and maintaining sponsors. The team obtains sponsors by attending outreach events and following up with marketing letters and phone calls. Members also send sponsors thank you letters that include a framed picture of the team and personally thank them at every opportunity. Team 3824 implements an annual sponsor event, called Dignitary Day, to show the results of their investment along with sending sponsorship brochures. Another opportunity to keep current sponsors and gain the attention of future ones is through a presence on social media. Team 3824 is found on Facebook, Twitter, and Instagram. The team has a continually updated website with all of its information and has recently received an ever-growing presence in the news media through television and radio interviews along with mentions in newspapers.
7. To prepare for the loss of sponsors and to assure the long-term viability of the team, students are required to strategize a method to maintain sponsors. Originally this consisted of the team sending letters and reaching out to sponsors; however, team members have noticed this is not enough. To keep them informed, team members have encouraged sponsors to visit the team's website and social media accounts to see the team's updates. The team also sends sponsorship brochures, thank you notes, and team photos at the season's end.

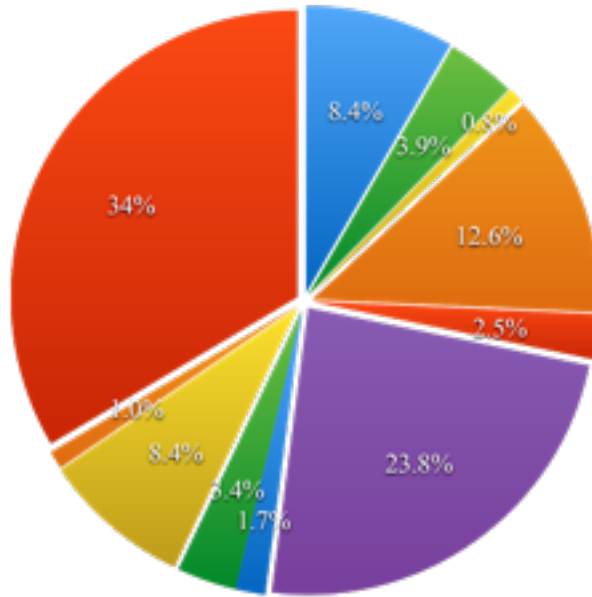
- B. Team 3824 utilizes the resources it receives from the MDF and sponsors in numerous ways. The budget for the team is around \$80,000. This money goes towards the actual construction of the robot, travel expenses, buying team uniforms, and purchasing tools and parts. By the end of build season, majority of

this money has been spent; the money left over is used during summer events that Team 3824 takes part in.

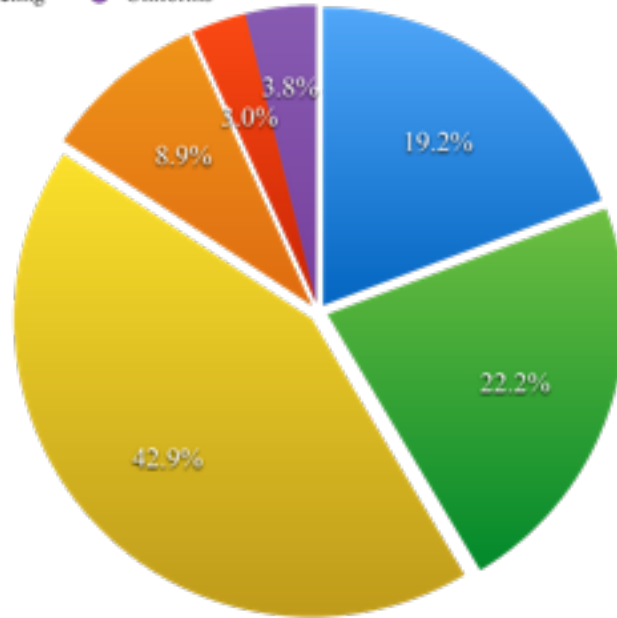
2014-2015 Finances

	Cost	Total
Corporate Sponsorships	+\$37083.00	\$37083.00
Donations	+\$600.00	\$37683.00
Team Dues	+\$20000.00	\$57683.00
Excess from Prior Years	+\$11917.00	\$69600.00
Entry Fees	-\$15000.00	\$54600.00
Travel Fees	-\$44000.00	\$10,600.00
Robot Expenses	-\$6000.00	\$4600.00
Marketing Expensive	-\$2000.00	\$2600.00
Uniforms	-\$2600.00	\$0.00

- Dow/Aska
- CFI Isulation
- Consolidated Nuclear Energy
- Techmere
- Knox County School System
- Membership Fees
- UT Battelle
- Local Motors
- Bechtel
- Magnum Venus Products
- Individual Contributions



- Entry Fees
- Marketing
- Bus Fees
- Uniforms
- Hotel Rooms
- Robot Production

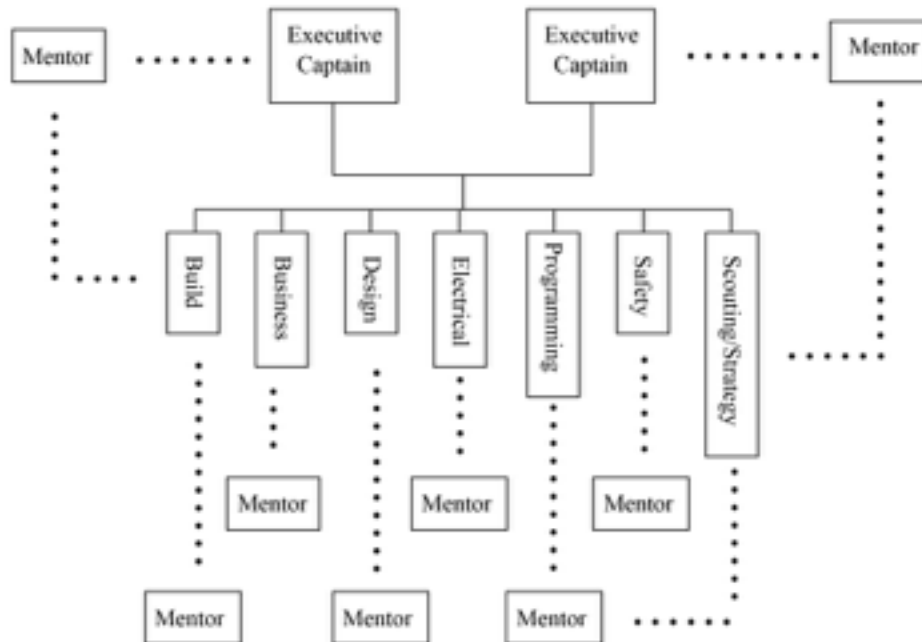


VII. Implementation

A. Mentor Roles

1. The strength of partnerships between the students and mentors relies on the consistency of the working relationship. The mentors bring guidance, advice, and experience to teach the team not only about basic engineering and business skills, but also about emerging technologies and strategies. They have shown the team how to use power tools and SolidWorks®. The mentors have also introduced Team 3824 to more complex technologies such as additive manufacturing and carbon fiber composites. They promote an atmosphere of trust for everyone to complete tasks safely and competently to achieve the team's goals.

B. Team Structure



VIII. Team Impact

A. Team 3824 has made an impact on its surrounding community and the *FIRST* Robotics community with its advances in additive manufacturing.

1. Summer 2011: The team spoke to Sullivan County School Board members about starting *FIRST* teams in its area.
2. Fall 2011: Team 3824 began a partnership with Oak Ridge National Laboratory's Manufacturing Demonstration Facility which invited it to work in their facility; the team, in turn, asked if it could share this space with other *FIRST* teams in East Tennessee. Nine teams responded to the offer. The team was excited about the prospect of working with these other FRC enthusiasts all in one place, it decided to create a program entitled "Lunch and Learn" in which students ate lunch, collaborated, and problem-solved about robots. Last year it grew to 14 teams showing up for the Saturday sessions. Team 3824 continues to attract new teams to participate in this event.
3. Fall 2011: Team 3824 produced its first promobot.
4. Fall 2011: Team 3824 volunteered at Farragut Fall 5K and Pet Parade by leading runners and their four-legged friends around the trail.
5. December 2011: The team was invited to demonstrate the robot from the Logo Motion game at the FLL Cookeville Regional Tournament. The team has been invited to showcase the robots at this event each year since.
6. Summer 2012: Team 3824 hosted a workshop for rookie team mentors in order to help them start-up a successful team. Word of this workshop spread, encouraging veteran teams to participate as well.
7. Summer 2012: The team hosted a cookout for an inner-city Atlanta FRC team and introduced them to additive manufacturing.
8. Summer 2012: Team members volunteered at a HVA STEM Camp for elementary-aged children. With the kids, the team built a large hovercraft

out of plywood and then let the children take the reins. The team then duplicated it on a smaller scale, creating one out of a CD.

9. July 2012: Team 3824 was invited to play a pickup game of basketball with the robot from Rebound Rumble to raise money for Oak Ridge National Laboratory's United Way fundraiser.
10. Fall 2012: The team volunteered with the Shangri La Therapeutic Riding Academy (STAR), a place for persons with special needs or disabilities to participate in horse-related activities. For two weekends, the team mucked out stalls and did general maintenance jobs around the campus. Last spring, the team partnered students from the team with clients of STAR. Members helped clients to stay focused and build confidence in themselves.
11. Fall 2012: Team 3824 began sponsoring two FLL teams, providing them with the funds to finance their team. It also mentored one of the teams with kids from the team.
12. Spring 2012: The team grabbed the attention of the incoming freshmen at HVA by demonstrating a robot at Freshman Day.
13. January 2013: Students collected over 200 pairs of glasses at HVA and the MDF to send with a local eye doctor, Dr. Dorian Lain, on his annual trip to Ghana, West Africa.
14. August 2013: Team 3824 took on mentoring a second FLL team.
15. November 2013: The team planned and hosted an FLL Qualifying Regional Tournament for teams to advance to the FLL Cookeville Regional Tournament. Volunteers from the team and various FRC teams from the community offered their time and talents to help make this event a success. 2013 Carbon Fiber Facility Ribbon Cutting: Team 3824 talked to Governor Haslam and other dignitaries about the program and team members showcased its robot.

16. March 2013: Alcoa Regional Advanced Manufacturing Partnership (RAMP) Assisted LJ Robinson in promoting TN *FIRST*, talked to local manufacturers and companies, and talked about the importance of STEM education.
17. July 2014: For Farragut's Fourth of July Parade team members created a float and showcased a robot as the team walked down the streets handing out flyers and bouncy balls. It also showcased 3D printing and the team's robot at Farragut's Red, White, and Blues community celebration.
18. July 2014: 3D Printing Demo Kick-Off: An hour and half presentation on additive manufacturing and how to use CAD and the 3D printers. Team members also explained characteristics of each printer, common problems and how to fix them.
19. July 2014: At Valleypalooza, an open house for HVA students, the team introduced the student body to the robotics team.
20. Fall 2014: Team members presented the robot and a 3D printing demonstration at MUSE Children's Museum in Knoxville.
21. November 2014: Team members designed 3D printed ornaments and decorated a tree for East Tennessee Children's Hospital's Fantasy of Trees, which draws 20,000 people over a 3-day period. The team also sold glow sticks at HVA football games to raise funds for ETCH.
22. Fall 2014: Team members volunteered to mentor two FLL teams.
23. December 2014: The team coordinated and hosted an FLL qualifying tournament and demonstrated FRC robots to participants.
24. Build season 2015: Team 3824 welcomed FRC Rookie Team 5571 to the MDF. It continued its popular MDF Lunch and Learn Saturday series and incorporated safety education at these meetings.
25. July 2015: The team returned to the Farragut's Fourth of July Parade with the robot and a float. Team members handed out flyers as a means to promote 3824.

26. August 2015: Team 3824 made a presence at Valleypalooza again.
27. Fall 2015: Team members continued attending football and even basketball games with the newly designed NightHAWK, the promobot.
28. October 2015: Team members sold glow sticks for the Mighty Maya Campaign to support a faculty member's ill, newborn.
29. October 2015: Team members collected glasses and calculators for Glasses for Ghana.
30. October 2015: Team 3824 travelled to Blue Grass Elementary School to show the kids 3D printing and one of the robots.
31. November 2015: The team participated in the Fantasy of Trees for the second time.
32. December 2015: Team 3824 members organized and hosted an FLL qualifying tournament at HVA for the third year.
33. Build Season 2016: Team 3824 showed students from the Tennessee School for the Deaf the MDF and integrated many as new members.

IX. Contact Information

- A. For more information about *FIRST* Robotics Team 3824, please visit the website www.rohawktics.org or contact one of the teacher advisors:

Beth Love, beth.love@knoxschools.org

John Tilson, john.tilson@knoxschools.org

Hardin Valley Academy

11345 Hardin Valley Road

Knoxville, TN 37932

(865) 690-9690