

***FIRST* Tech Challenge Team 7842 Browncoats**



2019-2020 Team Plan

ftcbrowncoats@gmail.com | www.ftcbrowncoats.org

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1.0 Introduction

1.1 *FIRST*® Description

FIRST (For Inspiration and Recognition of Science and Technology) is an international youth organization, founded in 1989 by Dean Kamen, to inspire young people's interest and participation in science and technology. The mission of *FIRST* is to encourage young people by engaging them in mentor-based programs which build science, engineering and technology skills that inspire innovation and that foster well-rounded life capabilities including self-confidence, communication, and leadership.

1.2 *FIRST* Tech Challenge Overview

The *FIRST* Tech Challenge (FTC) is a robotics competition that provides the opportunity for student teams to compete head to head using a competitive sports model. Guided by adult coaches and mentors, students develop STEM (Science, Technology, Engineering, and Math) skills and practice engineering principles while realizing the value of hard work, innovation, and sharing ideas. Teams also must raise funds, design and market their team brand, and do community outreach. Each season concludes with regional Championships and two exciting *FIRST* World Championships.

1.3 Our Team

We are team 7842 Browncoats and this is our seventh year competing as a *FIRST* Tech Challenge team. We're so excited for this year's challenge and we cannot wait to see where it takes us! Every year is a learning experience for us, and we love applying what we learn to our next season. As a team, we strive to embody *FIRST* and expand the program in our community and throughout the country. Through our outreach events, we hope to inspire others to start their own team or volunteer at *FIRST* events.



2.0 Executive Summary

2.1 Team Purpose

Team FTC 7842 Browncoats' mission is to spread awareness and recognition of *FIRST* Robotics and STEM throughout our community, while also teaching students important life skills such as team work, communication, cooperation, experimentation, public speaking, building, programming, technical writing, marketing, fundraising, and more. Not only do we plan to introduce *FIRST* to as many people as we can, but to also get them involved with the program through our efforts.

2.2 Team Motto

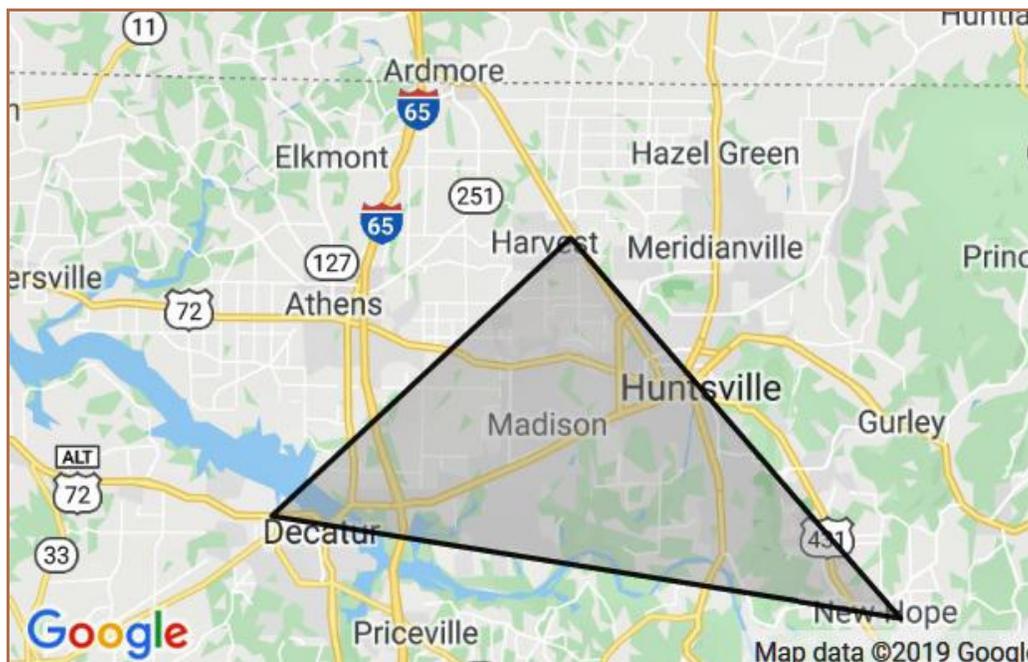
“We’ve done the impossible, and that makes us mighty.”

- Captain Malcolm Reynolds

2.3 Team Origin

The Browncoats are a community *FIRST* Tech Challenge robotics team from the Huntsville, Alabama area. Currently, the team is made up of six students - ranging from 6th to 12th grade. Between them, these students represent an area covering 365 square miles of North Alabama.

The Browncoats evolved from the *FIRST* Tech Challenge team, 12-Volt Ninjas, which was formed in 2011. In 2013, members from the *FIRST* Lego League team, Acronym, were brought in, and the team name was changed to Browncoats after our favorite science fiction television series, *Firefly*.



2.4 Team History

Each year we have progressed farther and done better than previous seasons. We've gone from winning first place awards at qualifying competitions, to State Championships. 2018-2019 was our most successful season to date, during which we competed in the World Championship for the second time!

Our awards for the 2018-2019 season include:

| Springdale Qualifier | Alabama State Championship | Tennessee State Championship | Arkansas State Championship | Houston World Championship |
|--------------------------------------|--------------------------------------|-------------------------------------|--------------------------------------|---|
| Winning Alliance Captain | Finalist Alliance | Semi-Finalist Alliance | Finalist Alliance Captain | 8 th Place out of 80 teams in our division |
| Design Award Winner | Design Award Winner | Inspire Award Winner | Connect Award Winner | |
| 2 nd Place Think Award | 2 nd Place Inspire Award | 2 nd Place Control Award | 2 nd Place Innovate Award | |
| 2 nd Place Control Award | 2 nd Place Control Award | | 3 rd Place Motivate Award | |
| 3 rd Place Innovate Award | 2 nd Place Innovate Award | | | |
| | 3 rd Place Motivate Award | | | |
| | Dean's List Finalist | | | |

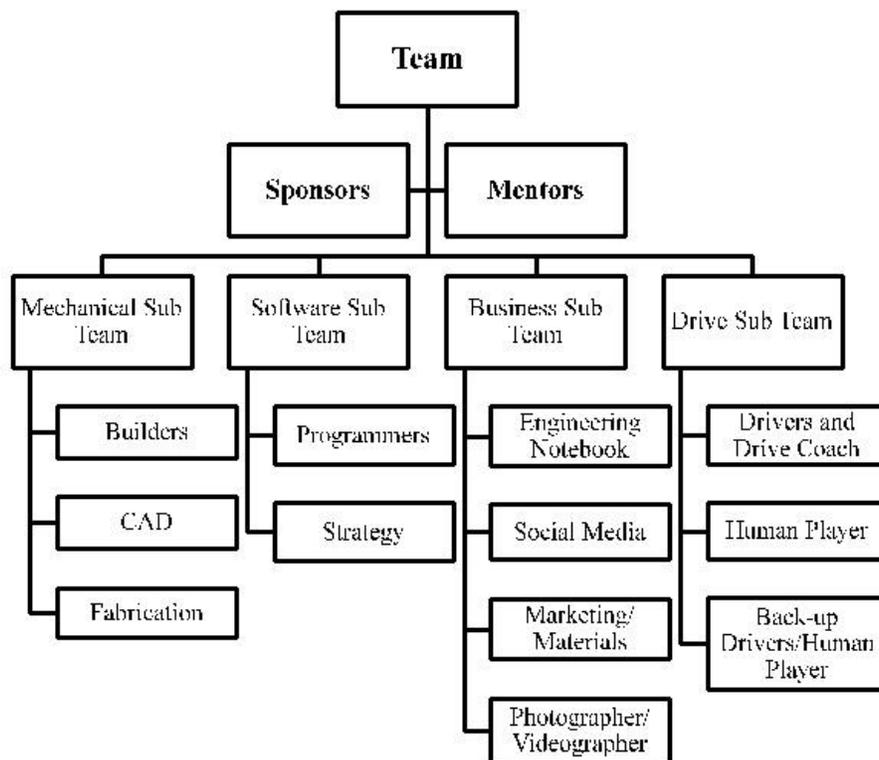


2.5 Team Organizational Structure

Our team has mentors from many different fields, including a physicist who has worked with NASA, a mathematics professor, along with several engineers who coach the students on engineering principles, computer programming, and construction. Team members take on the responsibility of managing the team, deciding roles, and completing project tasks.

The Browncoats are separated into four main Sub Teams. Every team member has to choose one Sub Team to be a part of, but they can be a part of multiples or all of them if they want to be. These Sub Teams are:

| Mechanical Sub Team: | Software Sub Team: |
|--------------------------------|-------------------------------|
| •Builders | •Programming |
| •CAD | •Strategy |
| •Fabrication | |
| Business Sub Team: | Drive Sub Team: |
| •Engineering Notebook | •Drivers and Drive Coach |
| •Social Media | •Human Player |
| •Marketing/Marketing Materials | •Back-up Drivers/Human Player |
| •Photography/Videography | |



2.6 Team Relationships and Sponsors

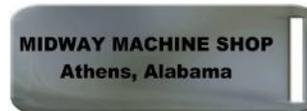
We would like to give a huge thank you to all of our sponsors! Everything we do is possible because of their support, and we couldn't be more grateful! Our 2019-2020 season sponsors are:



LOCKHEED MARTIN



TOYOTA



- **AvaLAN Wireless** has graciously given us the space inside their offices that we need to keep our field set up and to meet and practice.
- **Lockheed Martin** presented our team with a grant at the Space and Missile Defense Symposium to help fund our 2019-2020 season.
- **AUVSI Pathfinder** has been a sponsor of and given grants to us for several years.
- **SOLIDWORKS** has provided all of our team members with free student licenses.
- **The National Space Club of Huntsville** has helped us financially which helped fund our trip to the 2019 World Championship.
- **Toyota** has given us a grant.
- **REV Robotics** chose us as one of fifty teams to receive a sponsorship grant.
- **Huntsville Hamfest** has invited our team to help run the Youth Lounge at their annual conference for the past four years which helps us promote *FIRST* and our team to the community.

- **Alabama Estate Planning Attorneys** has helped us by paying for our Dropbox subscription for the past three years.
- **Guise Dental - Family & Cosmetics** has helped us financially.
- **Midway Machine Shop** used their CNC machine to custom cut metal parts for our robot

3.0 Sustainability

3.1 2019 Mission Statement

For the 2019-2020 season, the Browncoats will work to spread *FIRST* and *FIRST* Tech Challenge throughout Alabama by participating in community outreach, by reaching out to local schools, and by providing mentors to new teams.

For the Skystone game, our goal is to build a robot designed to perform every aspect of the challenge through teamwork and the application of engineering design principles. We plan to compete in local scrimmages, Arkansas qualifiers, the Arkansas State Championship, the Alabama State Championship, the Kentucky State Championship, and hopefully to qualify for the World Championship with the overall goal of improving on our best ever standings.

3.2 Team Development and Growth

Every year, we hold different classes over the summer to train our rookie members. One of the hardest parts of joining a team is learning how to build and program once the season starts, so as soon as we have our team finalized, we immediately begin the classes to give the newer members a foundation to start on. Some of these classes include:

- Building
- Programming
- CAD
- Soldering
- Public Speaking
- Engineering Process

Sometimes our mentors or student mentors run these classes, or other times our veteran team members will run them. For our public speaking class, last year we had a member of our local Toastmaster's chapter come in and speak with us about presenting, and this year we had one of our team member's acting teachers come in to help us not only with speaking, but also projecting, and enunciating.

During the build season, we use the divide and conquer method to make sure everyone has a part on the robot. We pair our veteran members with our rookie team members to work on their subsystem assignments together as a way of training our new members, and hopefully better preparing them to take the ropes for next season.

3.3 Providing Mentors

We've noticed that a lot of rookie FLL and FTC teams can have trouble finding mentors for their teams, so we do our best to provide mentors for them. At a lot of our outreach events, many people express interest in mentoring teams, so we've started a list of these people to send to teams who need them.

3.4 Goals and Actions

| Actions | Strategy |
|---|--|
| Expand the <i>FIRST</i> Program | <ul style="list-style-type: none"> • Help start more FTC Teams in Alabama • Spread awareness of <i>FIRST</i> and STEM • Encourage schools to participate in FTC • Host informational meetings • Reach out to local schools and homeschool cover schools to introduce students and faculty to the <i>FIRST</i> program |
| Recruit new Team Members | <ul style="list-style-type: none"> • Attend outreach events related to <i>FIRST</i> and STEM • Reach out to local homeschool groups • Encourage friends and family to participate in <i>FIRST</i> • Host informational meetings at local libraries |
| Develop and fully implement the team's design process | <ul style="list-style-type: none"> • Apply engineering principles and mentor the team in a STEM-based curriculum • Expand CAD skills to support the process • Document design changes in Engineering Notebook |
| Create an easy-to-read Engineering Notebook | <ul style="list-style-type: none"> • Document each step of design process (explain each idea, problem, and solution using pictures, CAD models, and code) • Document team outreach in depth • Develop formatting that is easy to use and read |
| Create a strong competition robot | <ul style="list-style-type: none"> • Design parts in CAD before assembling • Create cardboard proofs of principles to test ideas • 3D print parts • Test and refine as it is being built |
| Provide Scrimmages and Build Days to FTC teams | <ul style="list-style-type: none"> • Connect with other teams • Host them throughout the year to give teams more opportunities to improve their strategy and designs |
| Expand our annual Rocket City Invitational | <ul style="list-style-type: none"> • Connect with teams from surrounding states • Host it at a bigger venue • Get the word out through social media, even more than we have in the past |

3.5 Expanding *FIRST* in Alabama

One of our biggest goals as a team is to spread an awareness of *FIRST* and to help expand the program in Alabama. Every year we host informational meetings at our local libraries to specifically inform people about the program and how to start a team. We also encounter many school teachers at our outreach events, and we give them lots of materials to encourage them to start a team in their school district.

To sustain the program in Alabama, we mentor FTC teams to help them get on their feet and keep them going for many years. We're always willing to help them if they need us for anything! We also host build days and scrimmages, along with our annual end of season Rocket City FTC Invitational to give teams more chances to get their robot on the field and compete. This is also a great way to have a lot of the local teams get together to share ideas and help one another out.

3.6 Volunteering/Community Service

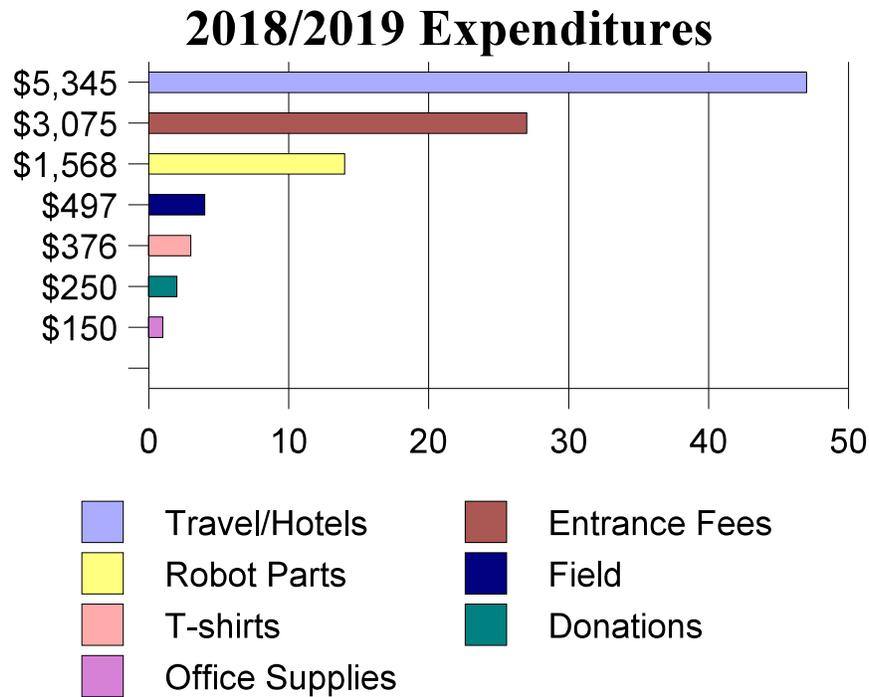
Our team strives to better our community. For the past two years, we've held winter clothes and canned food drives and donated them to rescue missions to keep the less fortunate warm and fed through the winter, and we're continuing the tradition this year by donating to homeless Veterans.

We also do a lot of volunteering, especially with *FIRST* Lego League. We love volunteering at their qualifiers and state competitions, and we've done robot demonstrations in the past to introduce kids who will be joining the next level of *FIRST* soon.

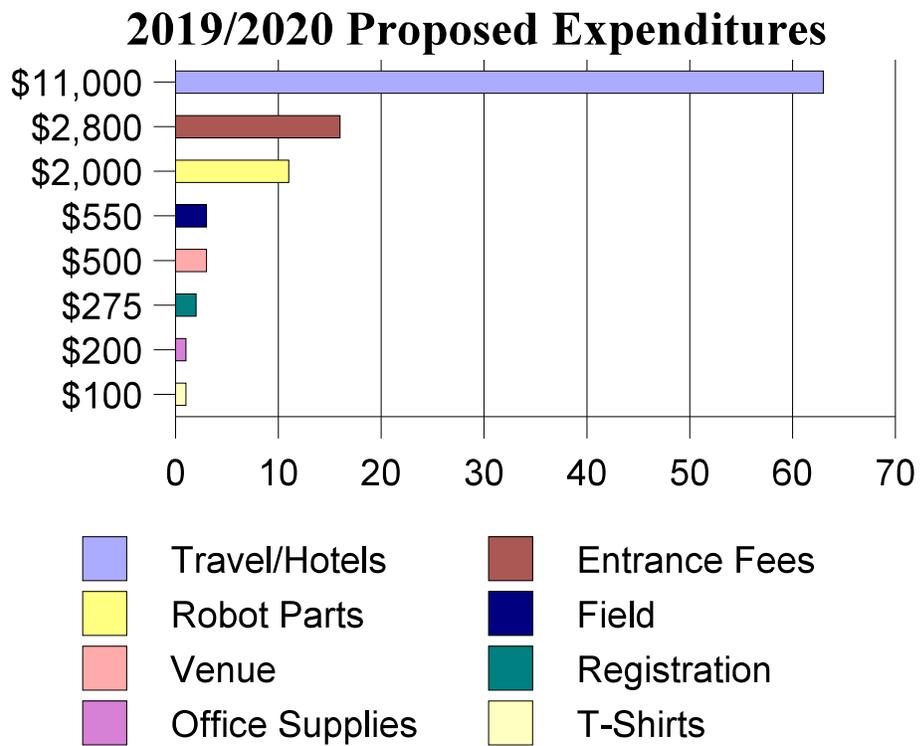
A Florida FTC team attended our Rocket City Invitational that was working to help rebuild the FLL program in the panhandle after Hurricane Michael practically wiped them out. To help them out, we donated FLL kits for them to pass on to struggling FLL teams.



3.7 Team Budget



Total: \$11,262



Total: \$17,476

3.8 Fundraising

As a team, we work together to raise money and come up with ideas for fundraising opportunities to help our season move along as smoothly as possible. We've put together sponsorship packets that we take to local businesses and STEM companies, and we reach out to as many people as we can. Some of our methods for fundraising include:

- Garage sales
- AUVSI Pathfinders Grant Presentation
- Kroger's Community Rewards
- Amazon Smiles
- Giving Tuesday on Facebook
- Handing out sponsorship packets to local businesses
- Company grants
- Applying for Publix and Sam's gift cards

3.9 2019-2020 Outreach

Every year our team participates in outreach events across our state to introduce *FIRST* Robotics and STEM to as many people as we can. We try to attend events with different age groups and demographics, including kids, students, teens, adults, teachers, the engineering community, and more. This way, we're spreading the word to different parts of our community and inspiring *everyone* to participate with *FIRST*!

We currently have over 1,000 hours of outreach, we've attended 19 events, and we intend to do even more before the season is over! The events we've attended include:

| | |
|---|--|
| Engineering Connections | |
| <p>Space & Missile Defense Symposium One of our annual outreach events is the Space and Missile Defense Symposium, where we get to set up a booth, demonstrate our robot, and connect with our local and national engineering community.</p> | <p>AUVSI Pathfinders Symposium Pathfinders invited us to attend their annual symposium at the Space and Rocket Center, where we showed our robots to hundreds of students in attendance at Space Camp at the Space Center, and we handed out lots of flyers to people interested in <i>FIRST</i>.</p> |
| Community Connections | |
| <p>Goldsmith-Schiffman Elementary School Robot Demonstration FLL Team C.R.A.B. invited us to demo our robot at their school to a class of elementary schoolers to show the differences between FLL and FTC.</p> | <p>Vacation Bible School Robot Demonstration We attended the United Methodist's Church's VBS where we demonstrated our robot to over 200 kids and introduced them to the program and showed how everything worked.</p> |

| Community Connections (continued) | |
|---|--|
| <p>Garage Sale and Robot Demonstration We held a garage sale to raise funds for our teams, and while there we demonstrated our robot to all of the shoppers.</p> | <p>Informational Meeting We held an informational meeting at our local library to introduce <i>FIRST</i> to more people, and we successfully helped start a new FTC team in the Huntsville area.</p> |
| <p>Huntsville Hamfest We run the youth lounge at the Huntsville Hamfest where we demonstrate our robots to hundreds of kids and we provide all kinds of STEM related activities. Every year, nearly 5,000 people attend from all over the country.</p> | <p>Kickoff/<i>FIRST</i> Open House At the Skystone kickoff event, we were able to connect with other FTC teams and hand out flyers to people interested in participating in <i>FIRST</i>.</p> |
| <p>Madison Street Festival Our team attended the Madison Street Festival with over 50,000 people in attendance. We were set up in the Teen Zone where people of all ages drove our demo bots and we handed out tons of information about <i>FIRST</i> Robotics and STEM.</p> | |
| Giving Back to <i>FIRST</i> | |
| <p>Rocket City FTC Invitational Every year our team hosts the Rocket City FTC Invitational to provide teams one more chance to get their robot on the field and compete before taking it apart. This year we had teams from all over, including Alabama, Tennessee, Georgia, Mississippi, and even Florida. It's always so much fun, and we have a blast hosting it!</p> | <p>Game Manual 0 Game Manual 0 is a guide written by FTC alumni and veterans, including our Co-Captain, Ian! There are nearly 250 pages of information about a variety of topics related to FTC, including an enormous number of mechanical topics, as well as a very in depth wiring guide and an overview of software topics. They wrote this guide to help more students get a grasp on the program, allowing them to focus more on building robots.</p> |
| <p>Huntsville STEAMWorks Open House This event was a great way for us to network with other teams from three of the four levels of <i>FIRST</i>, learn from each other, and to also meet with the new <i>FIRST</i> in Alabama senior mentor.</p> | <p>Build Day We hosted a build day for all FTC teams in Alabama. We learned not to host events over fall break, but we were still able to help a rookie FTC team by answering all their questions and sharing our engineering notebook. It was a great experience!</p> |
| <p>FLL Qualifier 11/16/19 Four of our team members and mentors volunteered at the UAH FLL Qualifier. We helped out with many different jobs, and we had a great time connecting with the FLL teams!</p> | <p>FLL Qualifier 12/14/19 Our team volunteered at the Columbia High School FLL Qualifier. Our jobs included: judge, judging assistant, head judge queuer, pit admin, and practice table assistant. We all had so much fun with our jobs, and we're so glad we got this opportunity!</p> |

| | |
|--|--|
| <p>FLL State Championship Robot Demo We attended the <i>FIRST</i> Lego League State Championship and brought along our 2019-2020 robot and elements from the Skystone game to introduce the FLL teams to FTC in hopes of inspiring the teams to join <i>FIRST</i> Tech Challenge when they're older.</p> | <p>FTC Skystone Scrimmage Our team hosted a scrimmage for all FTC teams so everyone could practice in a competition-like setting before the Alabama State Championship. We had five teams in attendance, and we were able to help lots of them with any questions they had. It was a fun day, and it was a great way to continue sustaining FTC in Alabama by encouraging teams to continue participating for years to come.</p> |
| <p>Community Service</p> | |
| <p>Winterfest Clothing Drive Our team collected winter clothing and blankets for Stand Down Together to benefit homeless veterans to keep them warm for the winter.</p> | <p>Huntsville Women's & Children's Hospital Our team visited the Huntsville Hospital for Women and Children. We demonstrated our robot and explained what <i>FIRST</i> Robotics is. Then, each child (and parents) took a turn driving our demo bot. After that, we helped them build battery-powered race cars that they could drive around and take with them.</p> |
| <p>Huntsville Downtown Rescue Mission Our team still had a lot of clothes left from the donations that Stand Down Together didn't need, so we took them to the Downtown Rescue Mission to help those less fortunate and keep them warm.</p> | <p>St. Jude's Clinic Visit After our visit to the Huntsville Hospital for Women and Children, the staff invited us back to visit three kids at Huntsville's St. Jude's clinic. All of the children and nurses alike enjoyed our robot demonstration, and the kids had a blast driving our demo bots and making their own air cars that they were all able to decorate!</p> |

4.0 Resources

4.1 Team Contact Information

Team Email address: FTCBrowncoats@gmail.com

Team Website: <http://ftcbrowncoats.org/>

Team Facebook page: FTC7842Browncoats

Team Twitter: Ftcbc7842

Team YouTube: FTC Browncoats

Team Instagram: ftcbrowncoats