



# BROWNCOATS

## Team 7842 Engineering Notebook

### Team Plan



## 1.0 Introduction

### 1.1 Our Team

We are team 7842 Browncoats and this is our eighth year competing as a *FIRST* Tech Challenge team. Every year is a learning experience for us, and we love applying what we learn to our next season. As a team, we aim 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.

### 1.2 Team Contact Information

Team Email address: [FTCBrowncoats@gmail.com](mailto:FTCBrowncoats@gmail.com)

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

Team Facebook page: FTC7842Browncoats

Team Twitter: Ftcbc7842

Team YouTube: FTC Browncoats

Team Instagram: ftcbrowncoats

### 1.3 Team Mission Statement

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 teamwork, 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 we also plan to get them involved with the program through our efforts.

### 1.4 Team Motto

“We’ve done the impossible, and that makes us mighty.”  
- Captain Malcolm Reynolds

### 1.5 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 7<sup>th</sup> to 12<sup>th</sup> grade. Between them, these students represent public, private, and home schools from the North Alabama area.



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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*.

### 1.6 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. 2019-2020 was our most successful season to date, during which we advanced to the World Championship for the third time! Our awards for the 2019-2020 season include:

Hot Springs Qualifier	Springdale Qualifier	Arkansas State Championship	Alabama State Championship	Houston World Championship
Winning Alliance Captain	Finalist Alliance Captain	Winning Alliance Captain	Winning Alliance	Cancelled
3 <sup>rd</sup> Place Inspire Award	1 <sup>st</sup> Place Inspire Award	2 <sup>nd</sup> Place Inspire Award	1 <sup>st</sup> Place Inspire Award	
2 <sup>nd</sup> Place Connect Award	3 <sup>rd</sup> Place Design Award	1 <sup>st</sup> Place Innovate Award	Promote Award Winner	
2 <sup>nd</sup> Place Innovate Award			Dean’s List Finalist - Jalynn	
3 <sup>rd</sup> Place Design Award				

### 1.7 Team Organizational Structure

Our team has been fortunate to have mentors from many different fields, including a physicist who has worked with NASA; several Engineers who coach the students on engineering principles, computer programming, and construction; and former team members, currently in college, who share their experience with the current team. Team members take on the responsibility of managing the team, deciding roles, and completing project tasks.

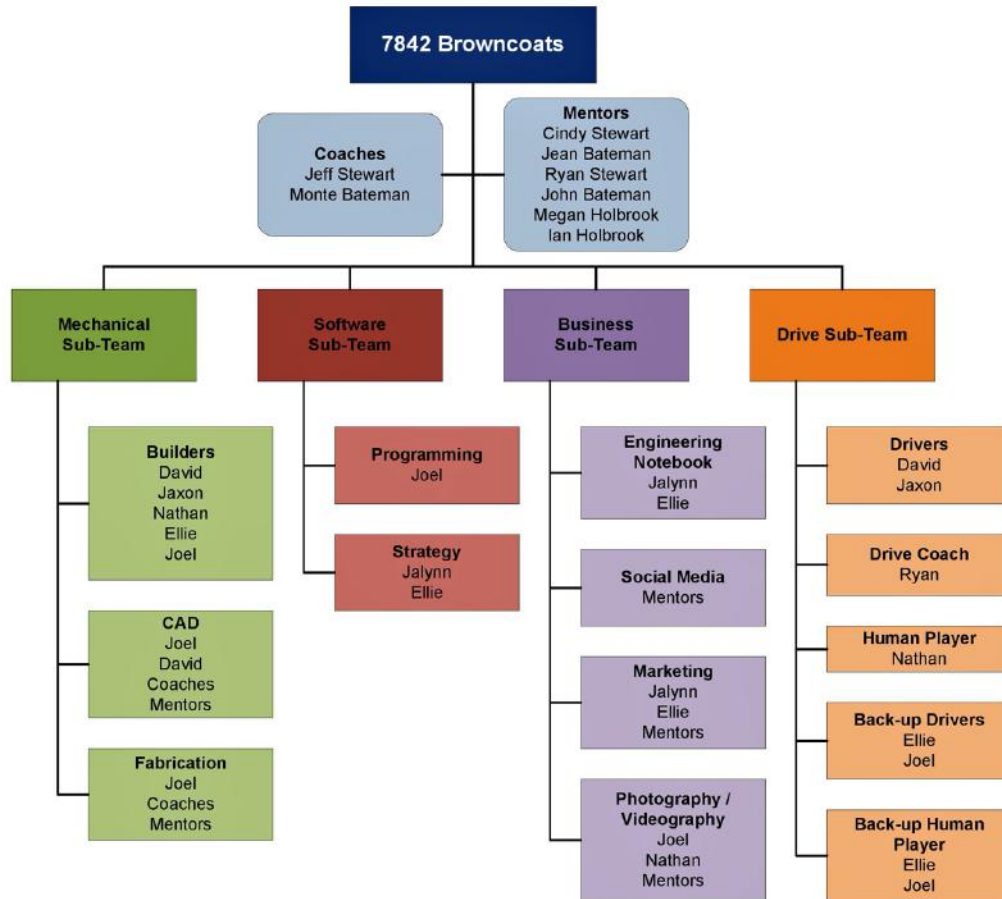
The Browncoats are separated into four main Sub Teams. Every team member has to choose one sub-team to be a part of, but they can be a part of multiple or all of the sub-teams if they want. These sub-teams are: Mechanical Sub-Team, Software Sub-Team, Business Sub-Team, and Drive Sub-Team.



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### 1.7 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 2020-2021 season sponsors are:





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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.
- **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.
- **Toyota** has given us a grant for the past two years.
- **REV Robotics** chose us as one of fifty teams to receive a sponsorship grant.
- **Alabama Estate Planning Attorneys** has helped us by paying for our Dropbox subscription for the past four years.

## 2.0 Sustainability

### 2.1 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
- CAD
- Public Speaking
- Programming
- Soldering
- Engineering Process



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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 reins the next season.

## 2.2 Goals and Actions

Actions	Strategy
Expand the <i>FIRST</i> Program	<ul style="list-style-type: none"> <li>• Help start more FTC Teams in Alabama</li> <li>• Spread awareness of <i>FIRST</i> and STEM</li> <li>• Encourage schools to participate in FTC</li> <li>• Host informational meetings</li> <li>• Reach out to local schools and homeschool cover schools to introduce students and faculty to the <i>FIRST</i> program</li> </ul>
Recruit new Team Members	<ul style="list-style-type: none"> <li>• Attend outreach events related to <i>FIRST</i> and STEM</li> <li>• Reach out to local homeschool groups</li> <li>• Encourage friends and family to participate in <i>FIRST</i></li> <li>• Host informational meetings at local libraries</li> </ul>
Develop and fully implement the team's design process	<ul style="list-style-type: none"> <li>• Apply engineering principles and mentor the team in a STEM-based curriculum</li> <li>• Expand CAD skills to support the process</li> <li>• Document design changes in Engineering Notebook</li> </ul>
Provide Scrimmages and Build Days to FTC teams	<ul style="list-style-type: none"> <li>• Connect with other teams</li> <li>• Host them throughout the year to give teams more opportunities to improve their strategy and designs</li> </ul>
Expand our annual Rocket City Invitational	<ul style="list-style-type: none"> <li>• Connect with teams from surrounding states</li> <li>• Host it at a bigger venue</li> <li>• Get the word out through social media</li> </ul>

## 2.3 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



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outreach events, and we give them 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. We also do a lot of volunteering 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.

### 2.4 Volunteering/Community Service

Our team strives to better our community. For the past four 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.

### 2.5 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:

- Yard sales
- Amazon Smiles
- Facebook fundraisers
- Grants from local companies
- Kroger's Community Rewards
- AUVSI Pathfinders Grant Presentation
- Giving sponsorship packets to local businesses
- Applying for Publix and Sam's gift cards

### 2.6 Team Budget

2019-2020 Expenditures		2019-2020 Income	
<i>FIRST</i> Fees		Rewards Programs	
Team Registration	\$275.00	Amazon Smiles	\$67.11
Field Elements	\$587.49	Krogers Rewards	\$83.02



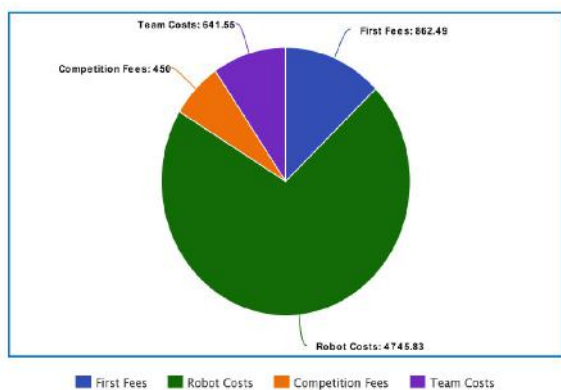
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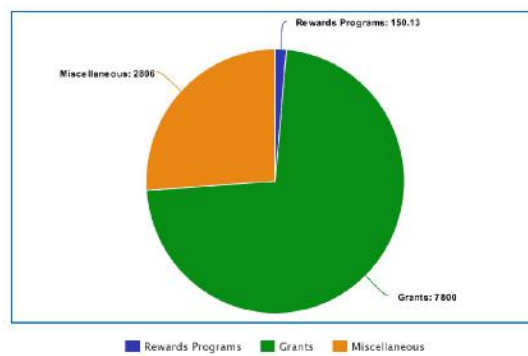
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2019-2020 Expenditures		2019-2020 Income	
Sub-Total	\$862.49	Sub-Total	\$150.13
<b>Robot Costs</b>		<b>Grants</b>	
goBILDA kit	\$673.67	Lockheed Martin Grant	\$5,000.00
Robot Parts	\$4,072.16	AUVSI Pathfinders Grant	\$800.00
Sub-Total	\$4,745.83	Toyota Grant	\$1,500.00
<b>Competition Fees</b>		Women in Defense Grant	\$500.00
Arkansas State	\$200.00	Sub-Total	\$7,800.00
Alabama State	\$250.00	<b>Miscellaneous Income</b>	
Sub-Total	\$450.00	New Team Member Fees	\$300.00
<b>Team Costs</b>		Facebook Fundraisers	\$1,245.00
Travel/Hotel <i>(team members pay their own travel expenses)</i>	\$0.00	Yard Sales	\$1,200.00
T-Shirts/Costumes	\$329.97	Outreach Event Donations	\$61.00
Printer/Office Supplies	\$311.58	Sub-Total	\$2,806.00
Sub-Total	\$641.55		
Total Expenses	\$6,699.87	Total Income	\$10,756.13



2019-2020 Expenses



2019-2020 Income





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2020-2021 Proposed Expenses		2020-2021 Proposed Income	
<b>FIRST Fees</b>		<b>Rewards Programs</b>	
Team Registration	\$275.00	Amazon Smiles	\$65.00
Field Elements	\$550.00	Krogers Rewards	\$100.00
<b>Sub-Total</b>	<b>\$825.00</b>	<b>Sub-Total</b>	<b>\$165.00</b>
<b>Robot Costs</b>		<b>Grants</b>	
Robot Parts	\$4,000.00	Toyota Grant	\$3,000.00
<b>Sub-Total</b>	<b>\$4,000.00</b>	Madison Street Festival Grant	\$500.00
<b>Competition Fees</b>		<b>Sub-Total</b>	<b>\$3,500.00</b>
Arkansas State	\$200.00	<b>Miscellaneous Income</b>	
Alabama State	\$250.00	New Team Member Fees	\$300.00
World Championship	\$2,000.00	Yard Sale	\$1,000.00
<b>Sub-Total</b>	<b>\$2,450.00</b>	Facebook Fundraiser	\$600.00
<b>Team Costs</b>		Tennessee Valley Robotics video contest	\$100.00
Travel/Hotel <i>(team members pay their own travel expenses)</i>	\$0.00	<b>Sub-Total</b>	<b>\$2,000.00</b>
T-Shirts/Costumes	\$250.00		
Lap Tops/Office Supplies	\$900.00		
<b>Sub-Total</b>	<b>\$1,150.00</b>		
<b>Total Proposed Expenses</b>	<b>\$8,425.00</b>	<b>Total Proposed Income</b>	<b>\$5,665.00</b>

## 2.7 2020-2021 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





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more. This way, we’re spreading the word to different parts of our community and inspiring everyone to participate with *FIRST*!

Unfortunately, due to the COVID-19 global pandemic, the Browncoats were unable to participate in our usual yearly outreach events. We have and will continue to seek different ways to reach out to our community, despite the strange times we are living in. The events we have been able to attend include:

<h2>Engineering Connections</h2>	
<p><b>Space &amp; Rocket Center Robotics Day</b>          The Browncoats were invited to attend the Space &amp; Rocket Center’s Robotics Day. We were in attendance with three other <i>FIRST</i> Tech Challenge teams, two <i>FIRST</i> Lego League teams, and two <i>FIRST</i> Robotics Competition Teams. Every team brought their competition robots, and every thirty minutes, a team would introduce themselves and their level of <i>FIRST</i>. This was a great way for people to see the differences between three of the four levels of <i>FIRST</i>, and to see how much creativity goes into each robot. It also showed that while we all were given the same challenge, we all came up with different solutions to accomplish it, which is one of our favorite parts of FTC.</p>	<p><b>Software Mentoring</b>          The team did not have a team member that knew how to do programming, so Joel (who was our team photographer last year) graciously agreed to step into the programmer role and learn. The team software mentor took Joel through the on-line book “Learn Java for FTC” by Alan G. Smith. The team coach provided a hardware testbed that included a Robot Control Hub and one of each type of hardware component we would be working with. Joel worked all of the examples in the first 12 sections of the book to learn how to add hardware components to the robot and how to control them from software. The Android Studio Guide was used as a reference resource to fill in gaps not covered in the book and to ensure we were current with the 2020/2021 library requirements.</p>
<h2>Community Connections</h2>	
<p><b>Informational Meeting</b>          We held an informational meeting at our local library to introduce <i>FIRST</i> to more people. We brought our robot, Vera, to demonstrate last season’s challenge as well as our two outreach robots for the kids to drive. We handed out flyers with information about our team and <i>FIRST</i> to anyone who was interested in robotics. In addition to reaching out to our community and seeking out possible recruits, it also gave our younger team members a chance to practice driving and their public speaking skills, and we successfully recruited a new team member!</p>	<p><b>Yard Sale and Robot Demonstration</b>          We held a yard sale to raise funds for our team, and while there, we demonstrated our robot to all of the shoppers and handed out informational flyers to interested parents.</p>



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<p><b>WHNT Interview</b></p> <p>Our team was interviewed by WHNT for a 3-part web series about FLL, FTC, and FRC. We were one of the FTC teams who were interviewed. Our veteran team members, Ian, Megan, and Jalynn, as well as our coach Mr. Jeff, were interviewed. He asked lots of questions about how our team has done this season, what <i>FIRST</i> means to us, and what FTC is. Once we finished with the interview portion, we drove Vera around so people can see the challenge and how it works. Each part of the series will be available online for people to read, and we're very excited to have been a part of it! This will be a fantastic way to spread awareness of <i>FIRST</i> Robotics and STEM within our community to people who might not have heard about it before.</p>	
<p><b>Giving Back to <i>FIRST</i></b></p>	
<p><b>Robotics Video Contest</b></p> <p>During the summer, senior Browncoats team member, Jalynn, and recent alumni, Megan, collaborated on making a video for the Robotics Video Contest hosted by TN Valley Robotics. They seized the opportunity to spread the word about the <i>FIRST</i> program and share the personal influence robotics has had on each of their lives.</p>	
<p><b>Community Service</b></p>	
<p><b>PPE Donations</b></p> <p>Our team coaches and mentors were able to provide Personal Protection Equipment to many different people for protection against COVID-19, including face shields, "stress relief straps", and face masks.</p>	<p><b>Winter Clothing Drive</b></p> <p>Our team collected many bags and boxes filled with winter clothing and blankets for Huntsville's Downtown Rescue Mission to help those less fortunate and keep them warm.</p>