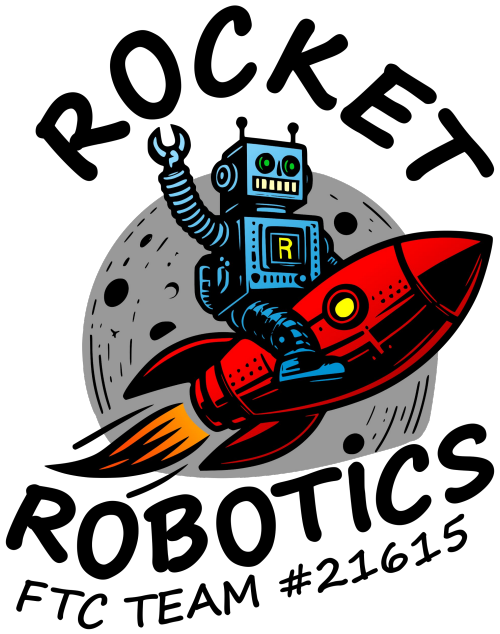


Engineering Portfolio

Your team did awesome work. Now help the judges see it.

Nadiya Rudomino, Coach
Caroline, Student
Rocket Robotics #21615

2026 FTC Kickoff

What is an engineering portfolio

The best evidence of your season, chosen on purpose.

Not everything you did

Not a diary of every meeting, every photo, every idea. A judge has minutes, not hours, and cannot find the good parts.

Your best evidence

The pages that prove what your team built, what you learned, and why it mattered.

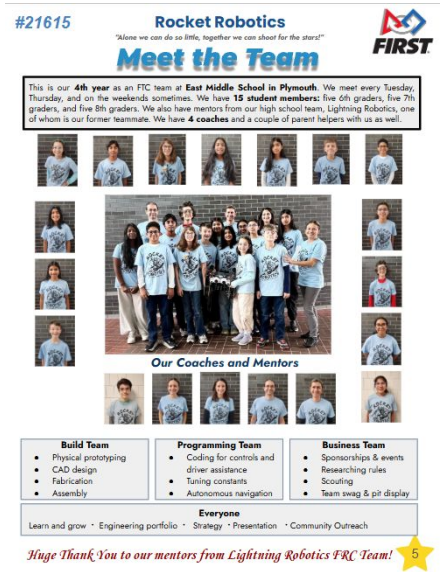
The test for every page:
Why should a judge care about this one?

There are 3 ways to communicate with judges. Portfolio is the only one where you have a complete control

Rules for your portfolio

1	15	15 MB	10 pt
cover page	content pages	maximum file size	minimum text size

From the pre-release manual. Verify these numbers in this season's manual before you submit.


#21615 Rocket Robotics

"Alone we can do so little, together we can shoot for the stars!"

FIRST

Meet the Team

This is our **4th year** as an FTC team at **East Middle School in Plymouth**. We meet every Tuesday, Thursday, and on the weekends sometimes. We have **15 student members:** five 6th graders, five 7th graders, and five 8th graders. We also have mentors from our high school team, Lightning Robotics, one of whom is our former teammate. We have **4 coaches** and a couple of parent helpers with us as well.

Our Coaches and Mentors

Build Team	Programming Team	Business Team
• Physical prototyping • CAD design • Fabrication • Assembly	• Coding for controls and driver assistance • Tuning constants • Autonomous navigation	• Sponsorships & events • Researching rules • Scouting • Team swag & pit display

Everyone

Learn and grow · Engineering portfolio · Strategy · Presentation · Community Outreach

Huge Thank You to our mentors from Lightning Robotics FRC Team!

5

- **Use first name and last initial**
  Protect your students.
- **Judges will not click links**
  Only things they see will count.
- **Credit any AI or research**
  Say what you used and what it did.

Rocket Robotics
FTC 21615

Build pages for the awards

Use the award words as your page headings. Make it impossible for a judge to miss your evidence.

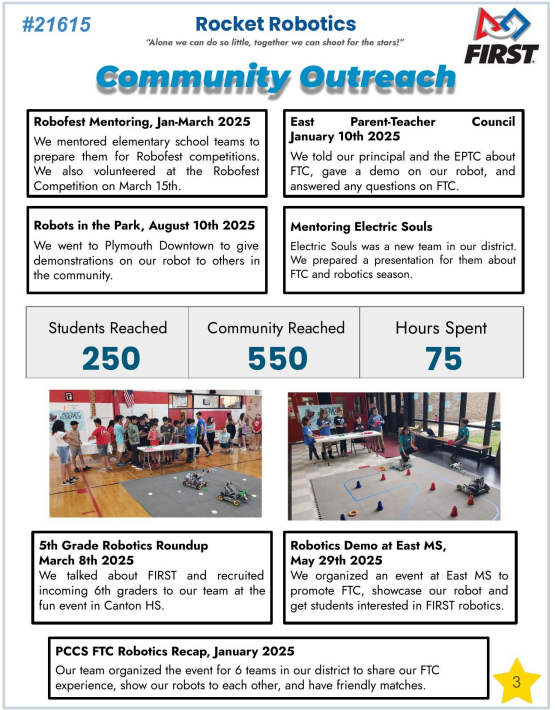
Portfolio required

- **Inspire**
- **Think**
- **Control**

Portfolio supports

- **Connect**
- **Reach**
- **Sustain**
- **Innovate**
- **Design**

A judge hunting for reach evidence should find a page called **“Reach”**


#21615 Rocket Robotics

“Alone we can do so little, together we can shoot for the stars!”

FIRST

Community Outreach

Robofest Mentoring, Jan-March 2025
We mentored elementary school teams to prepare them for Robofest competitions. We also volunteered at the Robofest Competition on March 15th.

East Parent-Teacher Council January 10th 2025
We told our principal and the EPTC about FTC, gave a demo on our robot, and answered any questions on FTC.

Robots in the Park, August 10th 2025
We went to Plymouth Downtown to give demonstrations on our robot to others in the community.

Mentoring Electric Souls
Electric Souls was a new team in our district. We prepared a presentation for them about FTC and robotics season.

Students Reached	Community Reached	Hours Spent
250	550	75

5th Grade Robotics Roundup March 8th 2025
We talked about FIRST and recruited incoming 6th graders to our team at the fun event in Canton HS.

Robotics Demo at East MS, May 29th 2025
We organized an event at East MS to promote FTC, showcase our robot and get students interested in FIRST robotics.

PCCS FTC Robotics Recap, January 2025
Our team organized the event for 6 teams in our district to share our FTC experience, show our robots to each other, and have friendly matches.

3

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FTC 21615

Use Visuals

Avoid using text if you can use visuals instead

- **Make it pop**
  Use bullet points, tables, color-coding…
- **When using text**
  Use bold font or highlight the key items.
- **Use keywords**
  Bring judges' attention to the most important points.
- **Write first, style later**
  Don't waste your time styling the page you might delete later.

Ask yourself:
What will judges learn from this page about our team or our robot?

January	February	March
1/8 Visit to AAA Innovation Lab, Dearborn	2/17 Visit to Stoneridge, Novi	3/5 Visit to Yanfeng, Novi
1/10 FTC Robotics Recap for PCCS teams	2/21 Demo at Gallimore Game Night	3/8 5th Grade Robotics Roundup
1/14 Robot Demo and FTC presentation at East MS Parent Teacher Council		3/15 Volunteer at Robofest Competition, Gallimore Elementary School
January - March, Robofest team mentoring at Gallimore Elementary School		

April	May	June
4/4 Visit to UofM Dearborn Robotics Club	5/22 Demo at East Middle School	
4/29 Workshop and Meet the Team at Canton Library	5/10 New coach orientation	6/3 New team members training - build & code in Java
	5/6 CAD training 5/14 CAD training 5/20 CAD training 5/27 CAD training	

July	August	September
Enjoy Your Summer Break!	8/5 New team members training - build & code in Java	Reaching out to potential sponsors
	8/10 Demo at Robots in the Park	Presentation about FTC to new teams
		9/23 Decode Game Rules Quiz for FTC teams
	August - September, Mentor and support new FTC team Electric Souls	

October	November	December
League Scrimmage	**League Meets and Qualifier**	**League Tournament**
10/21 Fundraising at Menchie's	Meet Rachel & Remy deGuzman from MRCA	**State Championship**
Reaching out to potential sponsors	Robot presentation to Paolo Gatto	12/3 Fundraising at Chipotle
	Received Sponsorships	12/7 Fundraising at Qdoba

Connect | Reach | Sustain | **FTC Events**

Our season calendar is color-coded for Connect, Reach and Sustain, so the evidence sorts itself.

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Use awards criteria outlined in the competition manual

The Think Award recognizes a team for their excellent PORTFOLIO. The PORTFOLIO is a clear and organized record of the team's engineering journey and growth this season. JUDGES look at this document to find the most deserving recipient. Teams may also share extra details about their building, design, or programming process in their PORTFOLIO to help JUDGES understand their choices.

Think Award Criteria		
Required	1	Team must submit a PORTFOLIO. The PORTFOLIO must include at least one of these engineering topics: A. evidence of use of the engineering process, B. lessons learned and applied relating to the design of their ROBOT, C. comparing choices: Show how you looked at different ideas and explain why you chose one over the other, and/or D. math choices: Show how you used math to make decisions about your ROBOT or programming design.
Encouraged	2	Information in the PORTFOLIO should be easy to read and easy to find.

Use the words from the award criteria, e.g. **Lessons learned** or **Engineering Process**

Portfolio Building Process

Start from the judging criteria, not from a blank page.

1

Copy

Paste the award criteria straight into your working draft.

2

Match

Put your evidence next to the criterion it answers.

3

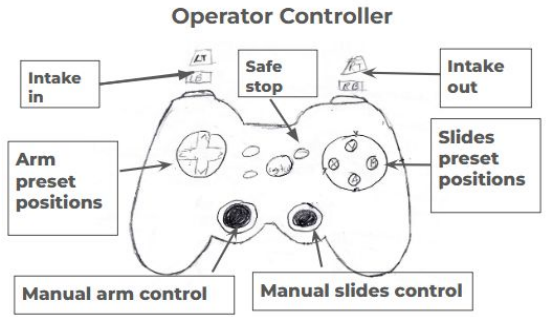
Build

One job per page. Give the page a heading that says its job.

4

Cut

Delete the pasted criteria, and anything that answers nothing.



If a page does not help a judging goal, **remove it!**

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Show the engineering process

Every strong page tells that story with proof.

Problem	Investigation	Solution
Describe what didn't work, in one sentence.	What you tried, and what each attempt taught you.	What you changed, and the evidence that proves it worked.

We encountered a great deal of problems when building our robot.

One problem we faced a lot was when we built parts of the robot and had to redo them. The first time we built our base, we did not have our special wheel and had to rebuild the base of the robot to add them. We learned that we should wait for parts to arrive before building.

We had a lot of plastic parts being bent and we had one extrusion damaged when building the lift. We learned that we should take care of our building materials and be careful how we use it.

The first prototype couldn't grab cones near the wall. After we made Gripper 2 we had to take it down again to make it more reliable. We learned the we have to test, improve a lot to get a final part.

Weak page

One wall of text, with repeated ideas.
No photos, no numbers, no headings.

Prototype 1	Prototype 2	Prototype 3
We tried using **2 green compliant** wheels mounted on a **servo**. We tested this with the wood shooter prototype and found that 2 wheels **squished** the artifacts **too much** and they wouldn't enter the shooter.	We switched to **one green compliant wheel**, a lower profile servo horn and a flat servo **bracket raised** on some standoffs for easier adjustment to contact the ball. It was still squishing the artifacts too much and **jammed** the shooter.	We switched to compliant wheels that had a **smaller diameter** and were softer. This fixed the jam but sometimes the balls **wouldn't go into the shooter**. So we added a layer of **neoprene tape** to squish the balls just a bit more. The tape needs to be **replaced** after every match but it works consistently.



Strong page

Three prototypes, what each one taught us, and the one that finally worked.

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FTC 21615

Your camera is an engineering tool

The portfolio is written in November from what you captured in September.

Take photos
Every build session

Capture failures
The broken part is the story

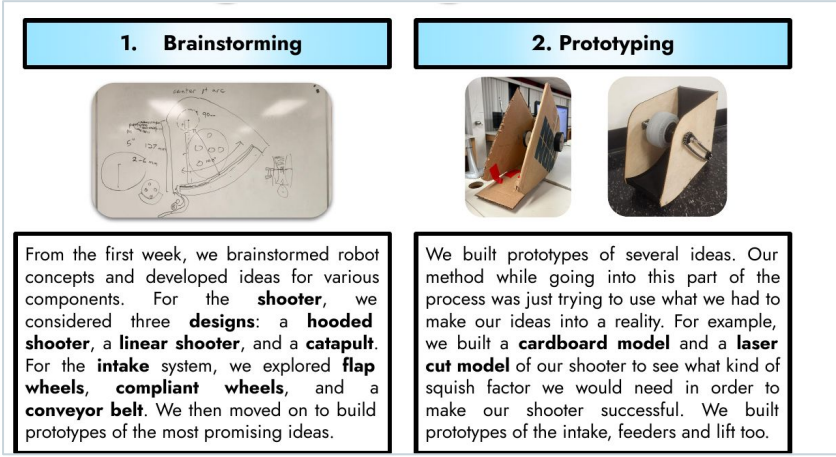
Record numbers
Measurements beat adjectives

Write down why
The reason you chose it

Save sketches
Whiteboards and CAD count

Work safely
Eye protection in build photos

You cannot recreate September's thinking in November.



1. Brainstorming

From the first week, we brainstormed robot concepts and developed ideas for various components. For the **shooter**, we considered three **designs**: a **hooded shooter**, a **linear shooter**, and a **catapult**. For the **intake** system, we explored **flap wheels**, **compliant wheels**, and a **conveyor belt**. We then moved on to build prototypes of the most promising ideas.

2. Prototyping

We built prototypes of several ideas. Our method while going into this part of the process was just trying to use what we had to make our ideas into a reality. For example, we built a **cardboard model** and a **laser cut model** of our shooter to see what kind of squish factor we would need in order to make our shooter successful. We built prototypes of the intake, feeders and lift too.

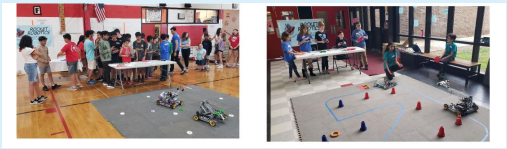
Week one: a whiteboard sketch and a cardboard shooter. Both ended up in the portfolio five months later.

Make judges say: “Oh! I get it.”

Four ways to show evidence. A strong portfolio uses all four.

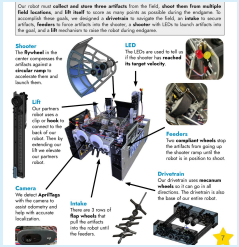
Photo

show it



Diagram

explain it



Table

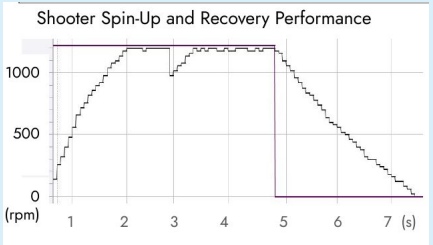
compare it

Programming Process: We use Java, Android Studio, and GitHub to build, test, and improve our robot code.

Component	What challenge it is solving	How it works
Drivetrain	Drive smoothly in **all directions** with controls that stay consistent no matter which way the robot faces.	IMU provides heading feedback for **field-centric driving**, rotating joystick inputs so the robot moves relative to the field, not the direction it's facing.
Shooter	Launch artifacts with **consistent** speed so that the shots land **reliably** in the target.	Flywheel motor uses encoder-based velocity **external feedback** feedback with a **custom PIDF controller** to reach and maintain target RPM quickly.
LEDs	Give **driver feedback** when the shooter is ready to fire.	A state machine lights "ready" only after shooter RPM is stable for 200 ms.
Intake and Feeders	**Reliably** pick up artifacts from the field floor and transfer them to the shooter.	A chain-driven motor powers multiple shafts, three continuous rotation **servos** that push artifacts to the shooter.
Lift	Raise our robot to **lift** another robot off the floor.	Dual **linear slides** each driven by a motor with a 60:1 gear ratio in position control mode.
Odometry	Track the robot's pose on the field in real time for **autonomous navigation**.	Two GoBilda **odometry pods** provide **external feedback** of x, h, heading 1500 times per second.
Camera	Determine **absolute position** of the robot on the field.	Detect **AprilTag** position as **external feedback**, combine with odometry to get perfect localization.
Color Sensor	Driver needs to know if an artifact is in the intake.	Distance in front of the sensor provides **external feedback** to turn on an LED for the driver.
Driver Assist	Align robot precisely for shooting in Tele-Op.	Press button to go to position on the field using odometry and camera for **position feedback**.

Graph

prove it



A picture is not evidence until it has arrows, labels, numbers, or a takeaway.

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Everyone on the team should know it

Judges can ask anyone. The portfolio belongs to the whole team, so the whole team has to participate in writing it.

"Why did you change the design?"

"What was the hardest code problem?"

"What impact did your outreach have?"

"What are your team goals?"

Answer → **Evidence** → **Why** → **Result**

say it in one sentence — point at the page — the reason you chose it — what changed, with a number

Practice answering questions based on your portfolio before competition.

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FTC 21615

Borrow layout, not content

Other teams have solved the layout problem already. Learn from them, then write your own.

Search

Find public FTC portfolios online. Notice which ones you understand fastest, and copy the structure, never the words.

Binder

Sheet protectors make a printed copy easy for judges to review. Keep a copy of the portfolio at your pit table.

Pit display

Extra material that will not fit? Put it on a poster in your pit instead of squeezing it in.

Mock questions

Ask an AI to write judge questions from your own portfolio, then practice answering them.

Evidence a judge must see still belongs inside the portfolio.

A 60-second final check

Run this as a team before every competition. Different students can own different lines.

- ✓ **Rules checked**
- ✓ **Awards covered**
- ✓ **Why and data shown**
- ✓ **Pictures labeled**
- ✓ **Easy to read**
- ✓ **No critical links**
- ✓ **Names protected**
- ✓ **Everyone has read it**
- ✓ **Mock judging practiced**

Start now. Future you will be very grateful.

Rocket Robotics
FTC 21615

Learn from judges feedback

FIRST TECH CHALLENGE

Structured Interview Feedback Form

Team Number: 21615

Team Name: Rocket Robotics

☑ Team Submitted a Portfolio (Check if Submitted)

		Connect Award	N/A	Beginning	Developing	Accomplished	Exemplary
Required	1	Team must describe, display, or document a team plan that covers all of the following: A. The team's goals for the development of team member skills, and B. The steps the team has taken or will take to reach those goals	☐	☐	☐	☐	☒
Encouraged	2	Provide examples of developing in person or virtual connections with individuals in the engineering, science, or technology community.	☐	☐	☐	☐	☒
	3	Provide examples of how it actively engages with the engineering community.	☐	☐	☐	☐	☒

		Reach Award	N/A	Beginning	Developing	Accomplished	Exemplary
Required	1	Team must discuss, describe, display, or document their outreach objectives and how their outreach activities support the *FIRST* community.	☐	☐	☐	☐	☒
	2	Team must discuss, describe, display, or document their successful recruitment of new teams, coaches, or mentors and/or volunteers who are not otherwise active within the *FIRST* community.	☐	☐	☐	☐	☒
Encouraged	3	Is an ambassador for *FIRST* programs in a way that makes *FIRST* loud.	☐	☐	☐	☐	☒
	4	Has a creative and evolving approach to outreach materials that market their team and *FIRST*.	☐	☐	☐	☐	☒

		Sustain Award	N/A	Beginning	Developing	Accomplished	Exemplary
Required	1	Team must discuss, describe, display, or document their plan(s) which includes at least one of the following: A. Finances and financial sustainability plan, B. Season project planning, and/or C. Team sustainability plans and/or objectives.	☐	☐	☐	☐	☒
	2	Team must discuss, describe, display, or document how the team tracks their progress towards their plan(s) listed above.	☐	☐	☐	☐	☒
Encouraged	3	Team has clear team roles for all members of the team and a process for developing leadership.	☐	☐	☐	☐	☒
	4	Team can discuss, describe, display, or document how they manage the team's constraints and/or risks.	☐	☐	☐	☐	☒

Items highlighted in gray are not generally a part of the Structured Interview process. Judging Feedback covers only content shared during the Structured Interview process, and does not include content from the Portfolio, Pit Interviews, or performance observed in matches.

Revision 25-26.1

At the end of each event you get a judges' feedback form. Use it to modify your presentation and portfolio before the next event

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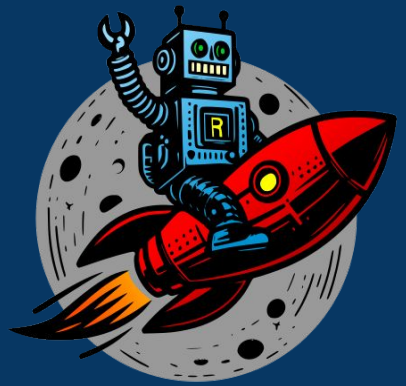

Good Luck!

Document → Match → Visualize → Practice

- **This presentation** and our 2025 portfolio
- **gm0.org** Game Manual 0, portfolio and awards guidance
- **ftc-resources.firstinspires.org** the competition manual and award criteria
- **pccsrocketrobotics.com** our code, CAD and past portfolios

Nadiya Rudomino and Caroline · Rocket Robotics 21615 · 2026 FTC Kickoff