Team Albania's Engineering Notebook



Incheon, South Korea
2026

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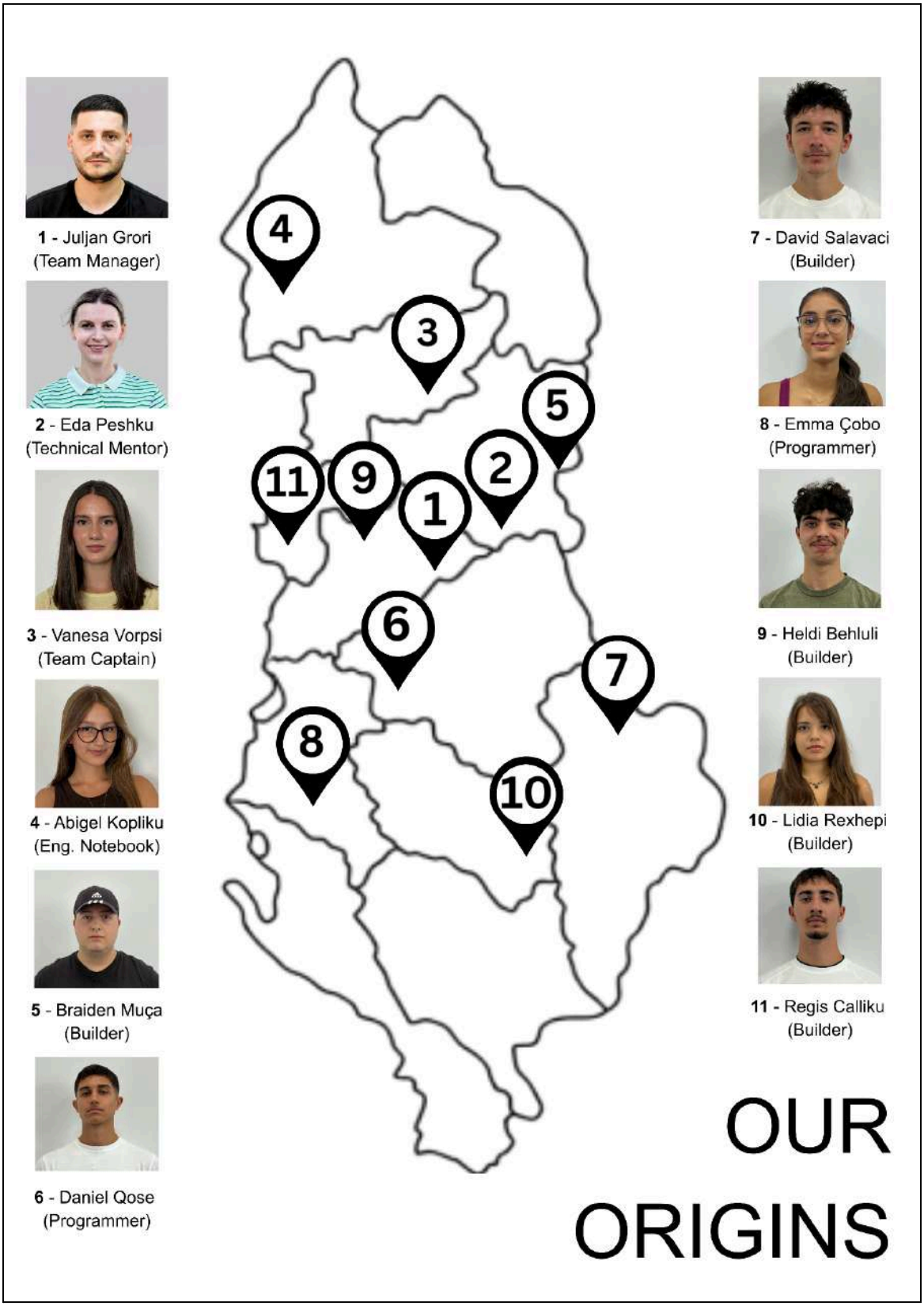


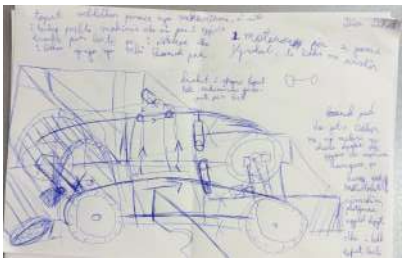
Team Summary | We are a team of students from Albania, each bringing something different to the robot and to the team behind it. Along the way, we have been guided by two mentors who have given their time, stayed late, answered endless questions, and taught us to treat mistakes as part of the process. This page takes you across Albania, showing the places our team members come from and the communities that stand behind our team.

Brainstorming and Work Progress

Phase 1 | Team Formation, Game Analysis & Initial Concepts

18 April - 9 May | 4 Meetings: The first weeks were dedicated to understanding the challenge before making any design decisions. We began by learning how the FIRST Global Challenge is structured and studying robots from previous seasons to better understand common design approaches and the level of engineering expected throughout the competition. To strengthen our teamwork and problem-solving skills, we completed a bridge-building challenge where two different solutions demonstrated the trade-offs between innovation, simplicity, and stability. Once the official teaser and game reveal were released, our attention shifted to analyzing the game manual, field layout, scoring system, and match objectives. From these discussions, we identified the robot's main priorities and began sketching different subsystem ideas, comparing possible mechanisms and strategies before selecting the concepts worth developing further. By the end of this phase, we had established a clear direction for the robot and a shared understanding of the engineering challenges ahead.

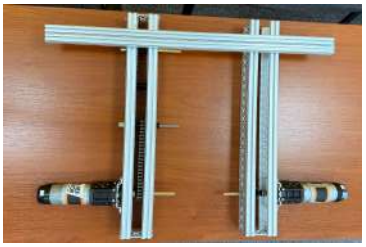






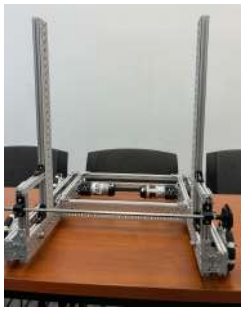
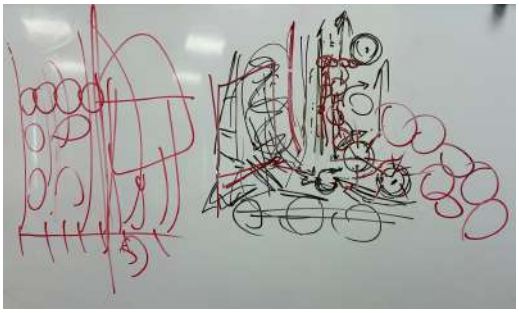

Phase 2 | Project Preparation, Resource Management & Chassis Development

16 May - 23 May | 2 Meetings: Before accelerating the build process, we focused on improving the team's organization. Every robot component was sorted, labeled, and stored systematically so that parts could be located quickly during assembly and future iterations. At the same time, construction of the robot's chassis began, providing the structural base that would later support all mechanical subsystems. While the mechanical group worked on the chassis, another group finalized the sponsorship presentation, prepared professional team photographs, and launched the first sponsor outreach campaign. These activities were not separate from the engineering process; securing external support early in the season was essential for obtaining the resources needed for manufacturing, testing, and future improvements. Dividing the team into specialized groups allowed technical development, project management, and outreach to progress simultaneously without slowing overall development.

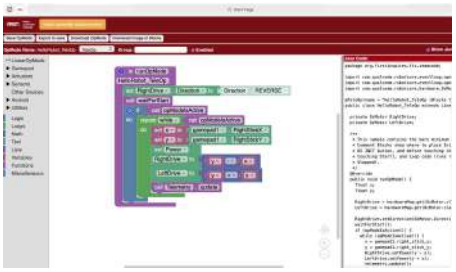

Phase 3 | Drivetrain Construction & Mechanism Development

30 May - 6 June | 2 Meetings: With the chassis established, attention shifted to building the robot's first functional systems. We assembled the drivetrain by installing the motors, chain transmission, and omni wheels, carefully aligning each component to achieve reliable and consistent movement. Since the drivetrain would support every future subsystem, we prioritized simplicity, durability, and ease of maintenance over unnecessary complexity. In parallel, we continued refining our game strategy by evaluating different methods of collecting game pieces. After comparing several concepts, we selected a high-speed intake design using flexible plastic tubing because it offered an effective balance between speed and adaptability. We also planned online meetings with other FIRST Global teams to exchange ideas and learn from different engineering approaches, while continuing to document our progress through photos and media for future outreach and notebook documentation.


Phase 4 | Control System Integration & Early Robot Validation

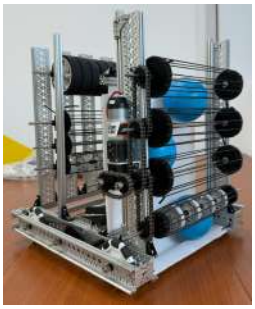
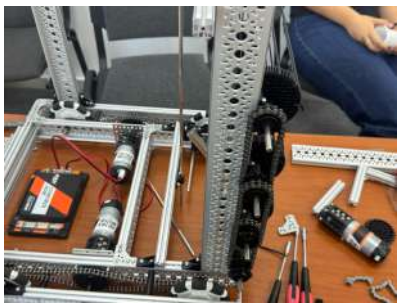
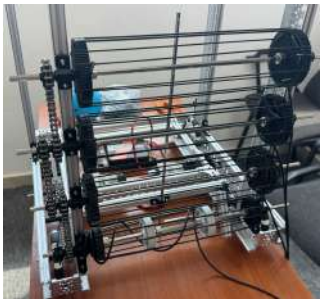
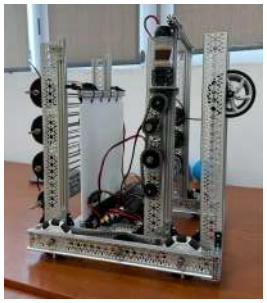
13 June - 20 June | 2 Meetings: After completing the robot's primary mechanical structure, we began integrating its electrical and software systems. The Driver Hub, Control Hub, and gamepad were configured before programming the robot's basic driving functions, allowing us to verify communication between hardware and software and confirm that the drivetrain responded consistently to driver input. Mechanical work continued alongside programming as we refined the chassis and further developed the intake subsystem based on the progress achieved during previous meetings. At the same time, sponsor communication remained active through promotional content, outreach campaigns, and documentation of the team's engineering activities. Maintaining this balance between technical development and project sustainability allowed the team to continue advancing the robot while securing the support needed for future testing, subsystem integration, and iterative improvement.



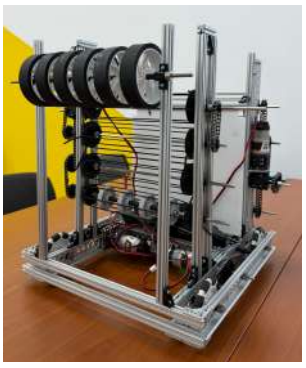

Phase 5 | Establishing the Game Piece Transfer System

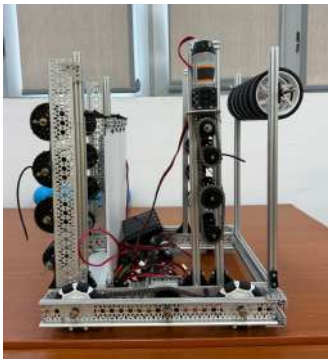
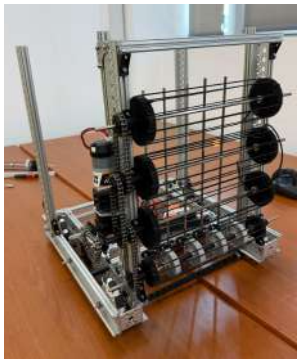
24 June - 3 July | 5 Meetings: As the drivetrain was completed, our attention turned to the path that game pieces would follow inside the robot. The intake became the team's main priority, with several iterations aimed at achieving consistent collection while keeping the structure simple and rigid. Instead of changing isolated parts, we focused on how rollers, guide walls, and supporting elements worked together to control the movement of the balls. Once the intake operated reliably, we extended the transfer path by defining the basket dimensions and assembling the first shooter components, allowing both subsystems to be designed around the same geometry. At the same time, the intake motor was connected and programmed to validate intake and outtake control before additional mechanisms were added. By the end of this stage, the robot had a continuous mechanical path that could collect, transfer, and position game pieces for shooting, making it possible to begin integrating the complete scoring system.

Phase 6 | Connecting Mechanical and Electrical Systems

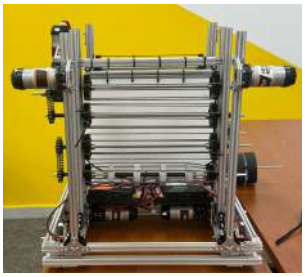
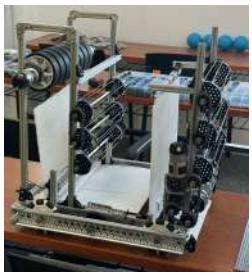
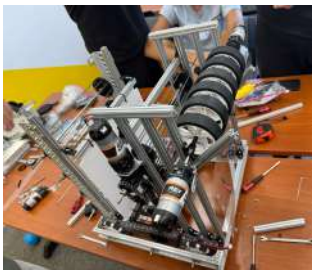
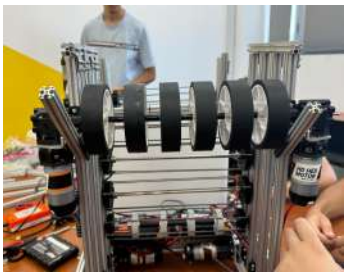
8 July - 11 July | 2 Meetings: The next stage focused on turning separate assemblies into a coordinated robot. The transroller mechanism was connected through its drive system and integrated with the electrical hardware, including the addition of an Expansion Hub to support the growing number of devices. At the same time, the shooter was assembled by installing both motors and adjusting the wheel spacing before checking wheel speed and overall operation. As more systems became active, the internal wiring was reorganized to improve accessibility and reduce unnecessary cable routing, making future maintenance easier as the robot became more complex. These changes were less about adding new mechanisms and more about ensuring that existing ones could operate together reliably. At this point, the intake, transfer system, and shooter were mechanically connected and supported by a functioning electrical and control architecture.



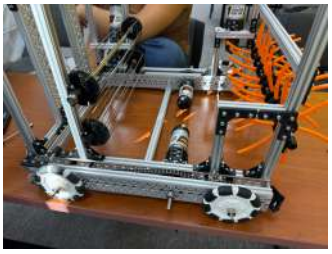
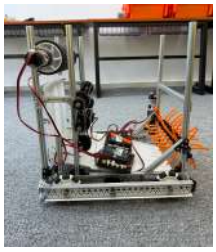
Phase 7 | Iterating the Scoring System

15 July - 18 Jul | 3 Meetings: Once the complete scoring system was assembled, the focus shifted to refining how efficiently it handled game pieces. Several iterations targeted the shooter, where changes to the drive system and wheel arrangement increased launch speed while simplifying the mechanical layout. The transfer path was then revisited to create more clearance between the intake, transrollers, and shooter, allowing game pieces to move through the robot with fewer interruptions. At the same time, the overall packaging of the robot was reconsidered. Heavy components were relocated lower in the chassis to improve balance, while the intake structure and supporting elements were rearranged to reduce weight and remain within the competition size constraints. The basket was also reshaped so that collected game pieces entered the shooter more consistently. By the conclusion of this phase, the robot featured a fully assembled and mechanically refined scoring system that was ready for extensive testing and further performance-based iteration.

Phase 8 | Reconfiguring the Robot Architecture

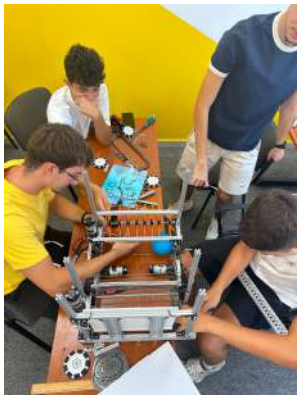
22 July – 29 July | 4 Meetings: As testing continued, several limitations in the robot's packaging became apparent. Space inside the robot was becoming increasingly constrained as the intake, basket, and shooter systems evolved, making future modifications more difficult. Rather than continuing to adjust individual mechanisms, we revisited the overall architecture of the robot. The intake was redesigned with a simpler layout that occupied less space, while the shooter assembly was repositioned and reinforced to better support the loads generated during operation. Changes to the internal arrangement also allowed the basket capacity to increase and helped lower the robot's center of gravity. These observations eventually led to a larger decision regarding the drivetrain itself. After encountering layout constraints, we redesigned the drivetrain, updated the CAD model, and explored both wider and narrower configurations to evaluate accessibility, balance, and future serviceability. By the end of this phase, the robot's overall structure had been reorganized around a new drivetrain concept that provided significantly more flexibility for future mechanism development.



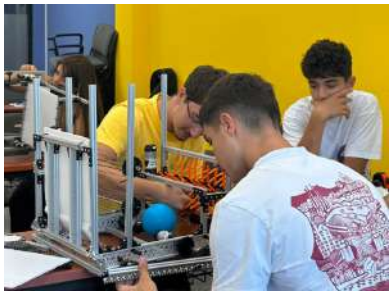
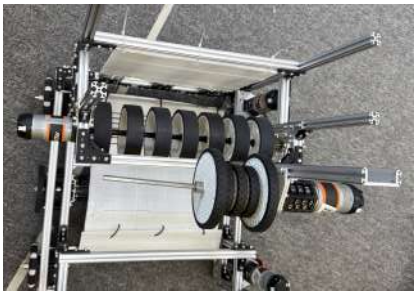
Phase 9 | Simplifying the Scoring System

31 July - 7 August 2026 | 4 Meetings: With the new chassis layout taking shape, attention turned to reducing unnecessary complexity within the scoring system. Earlier designs relied on multiple transrollers, additional shooter components, and more drive elements than were ultimately required. Through repeated evaluation of how game pieces moved through the robot, we found opportunities to simplify the transfer path while maintaining the required functionality. The shooter was reduced to a lighter configuration, the feeder system was progressively simplified, and the intake geometry was revised to provide a more direct route into the basket. At the same time, structural reinforcements were added where needed to ensure that simplification did not compromise durability. This period also marked the beginning of climber development, with the first prototype designed, assembled, and evaluated alongside the existing scoring mechanisms. By the conclusion of this phase, the robot used fewer components to accomplish the same scoring tasks and included the first functional climbing prototype ready for further refinement.

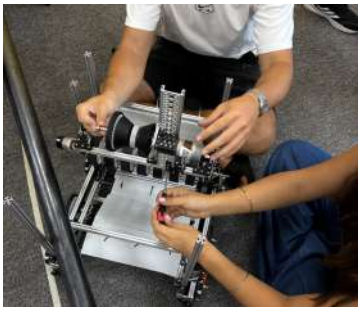

Phase 10 | Climber Validation & Driver Testing

12 August - 14 August 2026 | 2 Meetings: The new climber was installed on the robot and tested together with the other mechanisms in simulated gameplay and climbing situations. These tests gave us an opportunity to check how the robot behaved when several systems were being used rather than evaluating the climber separately. We also continued strengthening the intake, adding support brackets and later using two extrusions to create a 90-degree support structure. This increased the rigidity of the intake while giving us enough space to widen the basket. At the same time, we started working on another shooter concept with the aim of making launches more consistent, while the climber continued to be tested. To make testing more useful, we built a practice version of the game field that could be used for driver training and repeated system checks. By the end of this phase, the robot had an installed climber, a more rigid intake and basket structure, and a dedicated practice setup for continued testing.

Phase 11 | Climber & Shooter Refinement

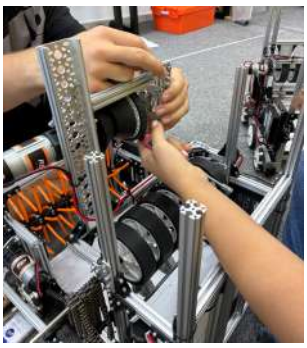
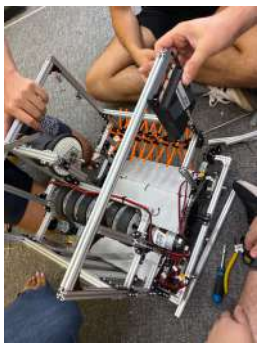
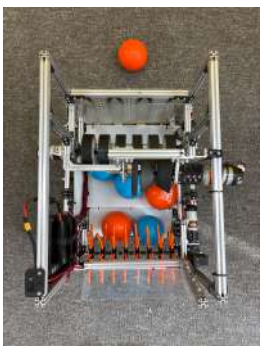
17 August - 18 August 2026 | 2 Meetings: Work during these meetings concentrated on making the climber and shooter more suitable for operation within the robot's final dimensions. We built the climber arm using cone wheels and adjusted its position so that the driver could align it with the pole more easily. The shooter wheels were moved to the inside of the robot to keep the mechanism within the permitted building dimensions. We also changed how much the wildfire units were compressed before launching, since excessive compression could affect the shape of the shooter over time. After testing, additional supports were added to the shooter and climber arm to make both mechanisms more stable. These changes were made while continuing to check how the mechanisms fitted within the available space rather than treating each subsystem independently. By the end of this phase, the climber and shooter had been adapted to the robot's dimensional constraints and reinforced for more reliable operation.



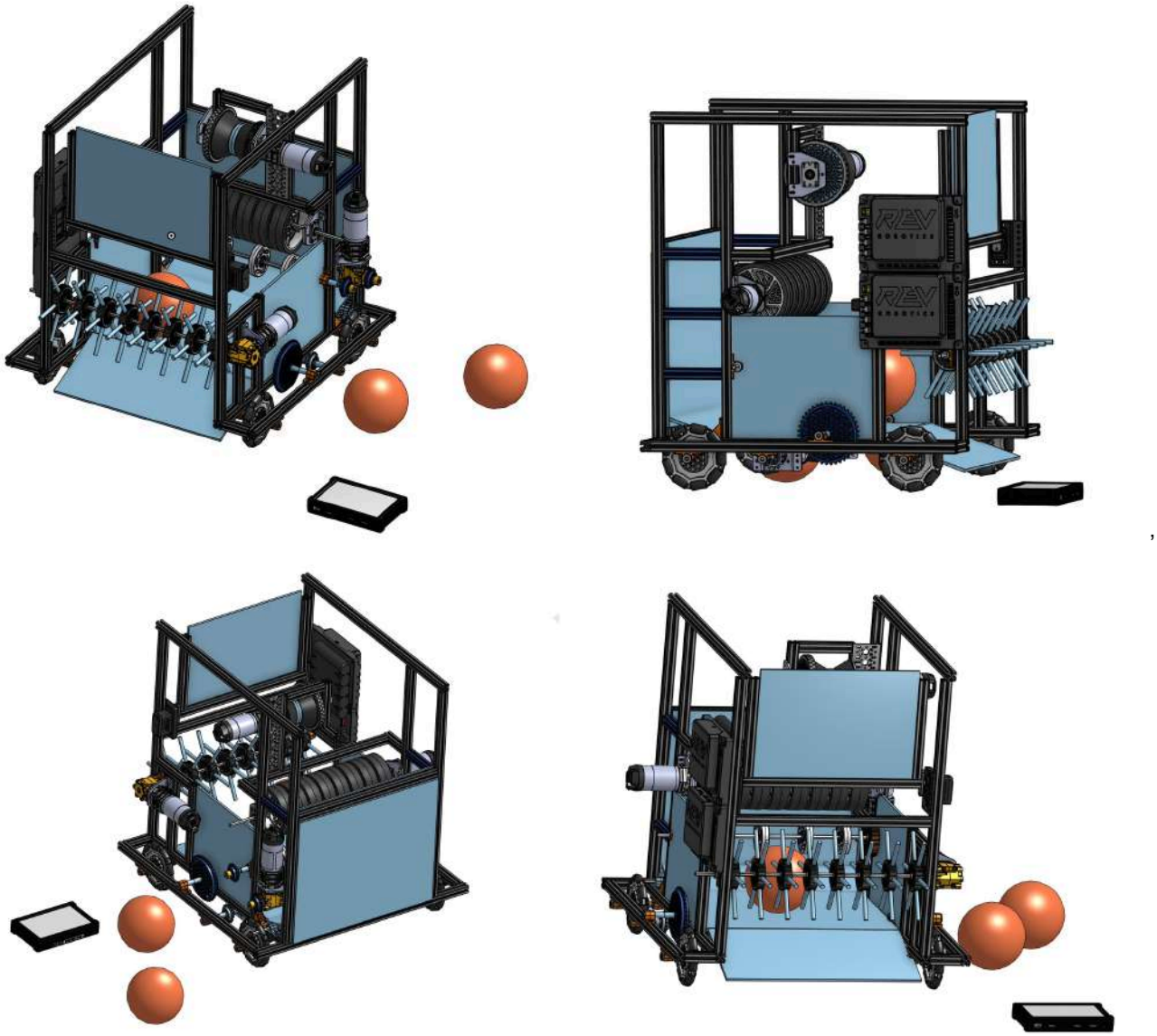


Phase 12 | Feeder Reliability & Structural Refinement

19 August – 29 August 2026 | 4 Meetings: During this period, we focused on improving the robot's reliability, internal organisation, and final structure. The unreliable rubber-band feeder was replaced with a smaller transroller made from rubber wheels, while plastic side pieces were added to protect the feeder gears. The Control Hub and Expansion Hub were securely mounted and later repositioned toward the front for easier access, with cable management keeping the wiring away from moving parts. We also shortened unnecessary rods, replaced poorly fitting cardboard panels, and added supports around the shooter and sides to improve rigidity. The climber was lowered to fit the structure better, while rear, side, and front panels were installed to protect the internal mechanisms. When the front panel interfered with the climber, it was connected to a servo so it could move out of the way when needed. By the end of these meetings, the robot had a more reliable feeder, stronger structure, better-organised electronics, and protective panels that worked alongside its moving mechanisms.

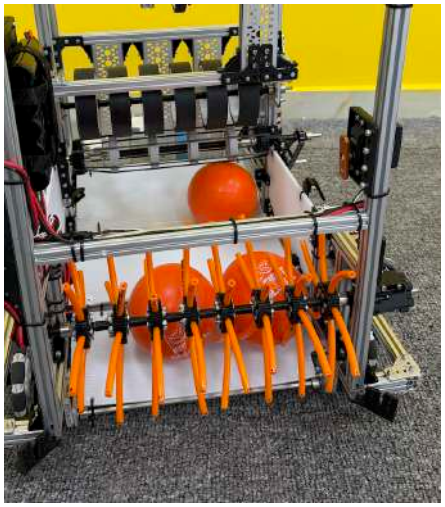




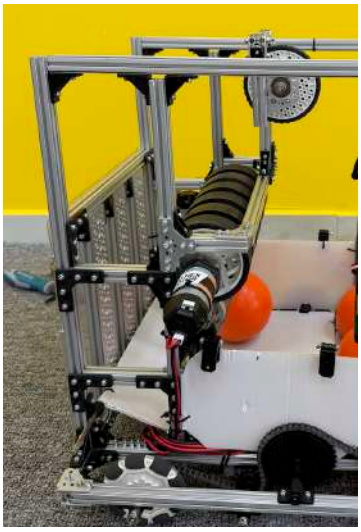
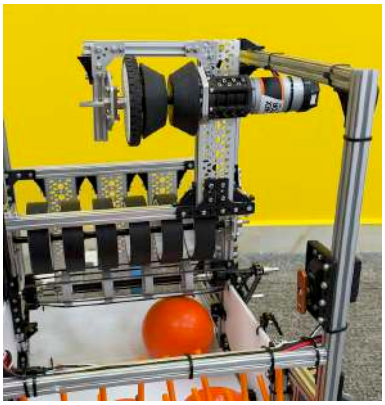

CAD Drawings



For the CAD documentation of our robot, we modelled the entire build in Onshape using parts from the official FTC library. Creating a complete digital version of the robot allowed us to examine the design from different angles and understand how the individual mechanisms would fit together before physically assembling them. The different views were particularly useful for checking the positioning of the feeder, intake, shooter, drivetrain and climbing mechanism, as well as identifying potential interference between moving parts. The CAD model also allowed us to check dimensions and clearances against the size restrictions of the competition. We could test the placement of mechanisms, estimate the space available for wiring and structural components, and make adjustments before committing to a physical design. This was especially useful when integrating mechanisms that needed to move or operate in the same area, such as the climbing mechanism and servo mounted wall. Instead of repeatedly measuring, cutting, and adjusting pieces through trial and error, we could use the CAD model as a reference and prepare the required parts in advance. This reduced mistakes, saved build time, and made the transition from our designs to the physical robot much more efficient.

Analysis of Mechanisms

Drivetrain: Our drivetrain is built on a lightweight chassis and uses motors with a combined 20:1 gear reduction (4:1 × 5:1). Power is transferred through the central gearing to the wheel shafts using chain loops. We chose the 20:1 reduction because it gives us a good balance between speed and torque. The omni-wheels are mounted inside extrusions, which helps protect the drivetrain from impacts and also makes the frame structurally sound.. This drivetrain allows the robot to change direction quickly and maintain stable movement. Keeping the drivetrain lightweight also helps reduce inertia, making it easier to position the robot accurately.	
Intake System: The intake is powered by a dedicated motor with a 20:1 gear reduction (4:1 × 5:1). The intake extends slightly beyond the main frame, allowing us to collect balls even when they are outside the robot's footprint. We used flexible plastic surgical tubes to keep consistent pressure against the balls as they entered the intake. This helps pull the balls into the robot smoothly and transfer them directly into the basket without needing an additional lifting stage. The intake collects balls quickly as soon as they make contact with the rollers. The design also helps prevent jams when several balls are being collected at once, while continuously moving them in the basket and freeing space for the next balls.	
Servo Wall: This servo-mounted wall acts as a movable barrier. It is controlled by a servo and can move between an upright and lowered position. During the collection phase, the wall stays raised to increase the storage capacity of the basket and prevent balls from falling out. Near the end of the match, the wall is lowered to create a path for the climbing mechanism and allow the pole to pass through the robot.	

Feeder System: Our feeder uses a single transroller fitted with high-friction rubber wheels and rubber bands. It is powered through a chain connected to a motor with a 20:1 gear reduction (4:1 × 5:1). We selected the 20:1 reduction because the feeder needs enough torque to start moving when multiple balls are pressing against the roller. Instead of using several rollers, we simplified the system to a single roller. This reduced the number of moving parts, lowered the center of gravity and left more space for the mechanisms above it.	
Flywheel Shooter: Our shooter uses six wheels powered directly by a high-speed motor with a 1:1 gear ratio. The flywheel can reach speeds of approximately 1400 RPM. The spacing between the wheels and the wall creates 2 cm of compression as the ball passes through the shooter. This compression helps transfer the flywheel's kinetic energy to the ball and gives us a more consistent launch velocity. During testing, the shooter was capable of reaching launch heights of up to 2 meters.	
Climber Mechanism: The climbing mechanism uses a 100:1 gear reduction (5:1 × 5:1 × 4:1).The climber needs high torque to lift the entire robot so we prioritized torque over speed. We chose hard wheels because they performed best during our training tests and provided the best contact with the climbing pole. We also added an extra wheel at the end of the mechanism to help maintain the robot's direction and stability while climbing. The climber is mounted in the center of the robot to keep the weight distribution balanced. The structure was reinforced with multiple connections so that it could support the full weight of the robot. Its central position also provides enough space for the climbing pole without interfering with the other mechanisms.	

Prototypes

The Feeder System: This was the first prototype for the feeder system. The bottom-most transroller had rubber wheels in addition to the rubber bands. We realised these wheels were hard to squish, making the design space inefficient and putting strain on the base of the basket (Fig. 1). To solve this, we changed the design so that all the transrollers were the same, while the bottom transroller only had rubber bands to gently guide the units up the system. The system also sat lower, giving us more usable space inside the robot (Fig. 2). We lowered the system even further to make space for the climbing mechanisms and minimise the risk of balls becoming jammed between the feeder and basket (Fig. 3). After further testing, we noticed that the rubber bands began to wear and tear from repeated contact with the units. This made the feeder less reliable over time, so we returned to the idea of using rubber wheels, similar to our first prototype. The final rubber-wheel transroller provided more consistent contact with the units and made feeding them into the shooter significantly easier (Fig. 4). This iteration showed us that although the rubber bands were gentler and more compact, the rubber wheels were more durable and reliable for continuous use.



Fig 1



Fig 2

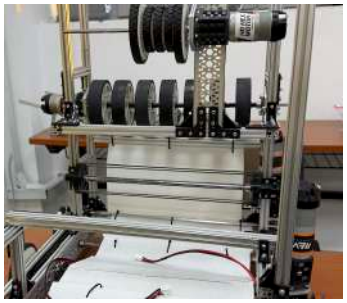


Fig 3

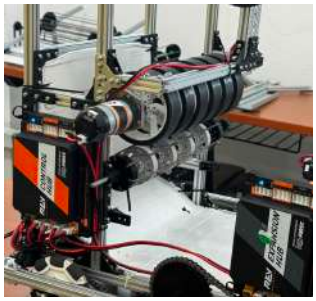


Fig 4

The Shooter: Our first shooter prototype had less wheels in an effort to save weight, but this could introduce inconsistencies when launching the units. Also, the mounting mechanism was too impractical and unstable. Having the shooter extend out the back also extended the robot beyond the allowed 50 cm length (Fig 5 & 6.) By mounting the shooter on the inside as shown in this prototype, we could stay within the 50 cm length limit. Though the mounting mechanism of the shooter was also improved, its integration with the transroller of the shooter system could be better. By pushing back the shooter system wall (made of cardboard in this prototype) and the transrollers, we could free up more space in the basket (Fig 7.) We finalized the setup of the system by mounting the shooter inside and placing a solid wall on the back side. This made the shooter trajectory more consistent and also allowed us to lower the whole system, therefore lowering the robot's center of gravity for better balance (Fig 8.)

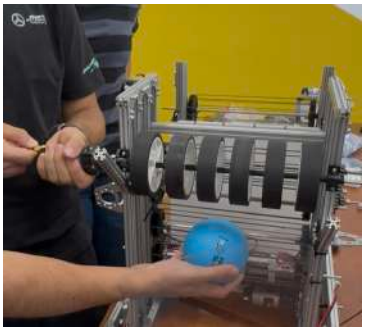


Fig 5

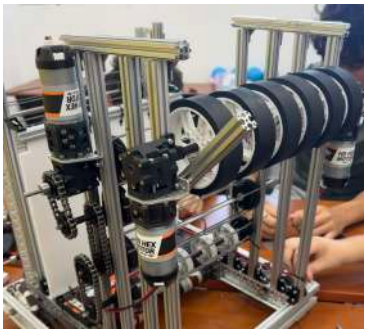


Fig 6



Fig 7



Fig 8

The Intake:

Our first iteration of the intake had a small transroller that initially made contact with the units. The rubber wheels provided enough friction to pull the units into the intake, where they travelled upwards before dropping into the basket (Fig. 9). However, testing showed that making the units travel upwards first was unnecessary and used valuable space inside the robot. We therefore developed a smaller intake that inserted the units into the basket from below, allowing the basket to expand into the space previously occupied by the transrollers and intake wall (Fig. 10). The design was then extended further to ensure that the intake was the first point of contact with the units. It also maintained contact with the units after they entered the basket, keeping them moving and preventing collected units from blocking the entrance for new ones (Fig. 11). This allowed us to collect units more continuously instead of having to stop when the basket became crowded near the intake. The additional space above the intake also allowed the basket to expand forwards, increasing our carrying capacity without significantly changing the overall footprint of the robot.

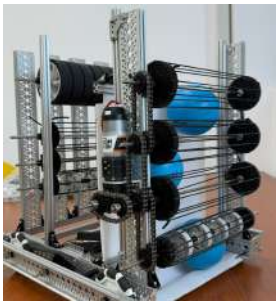


Fig 9

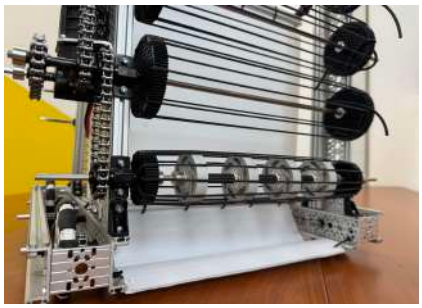


Fig 10



Fig 11

The Drivetrain:

Our first prototype had the UltraPlanetary Hex motors directly connected to the rear wheels, with power transmitted to the front wheels using a chain. All wheels were mounted on the outside of the C-channels using omni wheels, which left them exposed to impacts and made the drivetrain wider than necessary (Fig. 12). We redesigned the drivetrain so that the motors moved a central gear mounted in the middle of the chassis, which transmitted power to the wheels through a chain. We also reversed the C-channels to create enough room to mount the wheels on the inside. This protected the wheels from impacts, reduced the overall width of the drivetrain and improved its consistency during driving (Fig. 13). However, we wanted to increase the robot's speed without making it difficult to control, so the drivetrain was redesigned again. This version used a lightweight structure made from extrusions, with UltraPlanetary Hex motors mounted to gears (Fig. 14). Testing showed that this design was faster, easier to turn and more responsive to driver input. The reduction in weight also made the robot easier to control while allowing us to maintain the strength needed for competition.

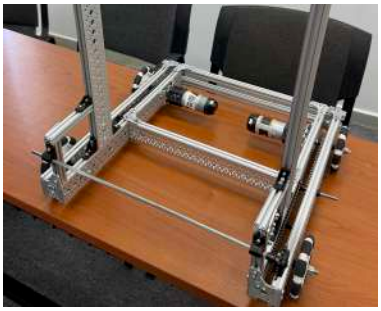


Fig 12

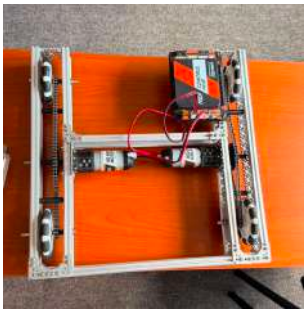


Fig 13

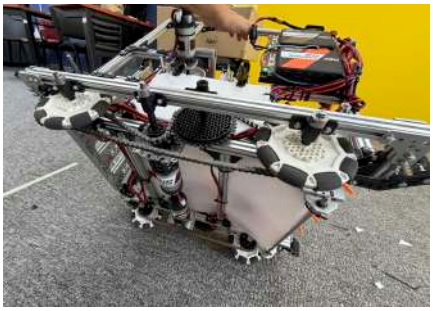


Fig 14

Servo-Mounted Wall:

We designed a servo-mounted wall to increase the capacity of our ball basket while still allowing us to use the climber after completing the ball-collection process. The wall acts as a barrier during the collection phase, allowing us to use more of the available basket space without letting the units interfere with the climbing mechanism. During the endgame, the wall is lowered using a servo, creating enough clearance for the pole to pass through the robot without interfering with or damaging the mechanism (Fig. 15 & 16). This means that the wall does not need to be manually removed or adjusted before climbing. The servo also allows the change between the two configurations to be controlled directly from the robot. This design therefore allowed us to combine increased carrying capacity with the requirements of the climbing mechanism without having to sacrifice either function.

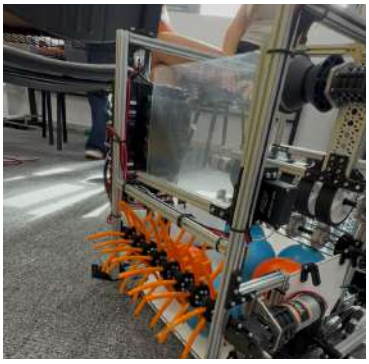


Fig 15

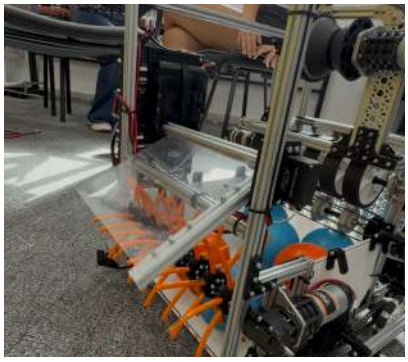


Fig 16

Climbing Mechanism:

The climbing mechanism was positioned in the centre of the robot to maintain balance and provide enough clearance for the pole to move without interfering with other mechanisms. Positioning it centrally also helped distribute the load more evenly across the drivetrain and chassis during the climb. The structure was reinforced with multiple connections to ensure that it could support the entire weight of the robot without excessive movement or deformation. We chose hard wheels after testing different options during training, as they provided the best performance when engaging with the climbing structure. An additional wheel was added at the end of the mechanism to help maintain the robot's direction and keep the climb stable (Fig. 17 & 18). During testing, this additional support helped reduce unwanted sideways movement and made the climbing motion more controlled. The final mechanism therefore prioritised both structural strength and stability, since any instability during the climb could affect the entire robot.

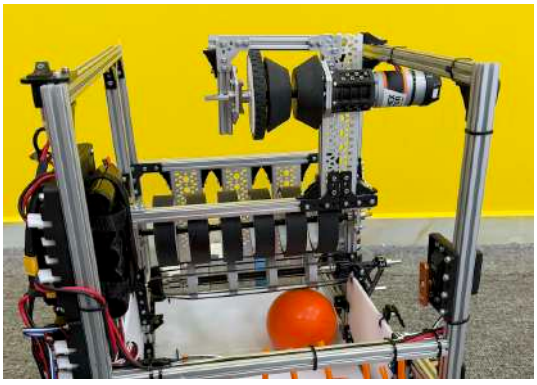


Fig 17

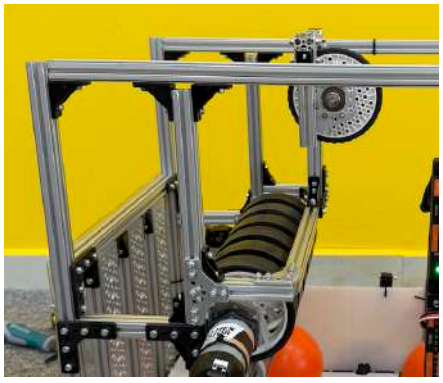


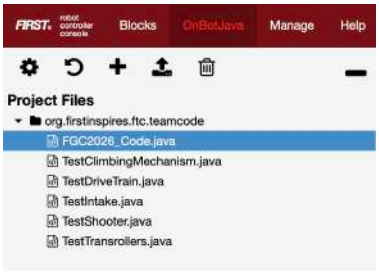
Fig 18

Programming

Programming Process Structure:

We built our software one subsystem at a time rather than programming the entire robot at once. Each mechanism was first tested in its own Java file before being added to the main robot program. This approach made debugging much more efficient, allowing us to identify whether an issue came from the software or the mechanical design before combining all systems together. For our programming team, this was our first experience developing software for a FIRST Global Challenge robot. We began with REV Blocks to understand how the hardware responded to different commands and to quickly test new ideas. As the robot evolved, we transitioned to Java, which gave us better code organization and made future updates and debugging much easier. Each major subsystem was developed and tested in its own Java file before being integrated into the main robot program.

- TestClimbingMechanism.java - endgame climbing mechanism
- TestDriveTrain.java - drivetrain movement and steering
- TestIntake.java - intake operation and ball collection
- TestShooter.java - shooter speed and launching consistency
- TestTransrollers.java - rollers feeding balls into the shooter



Developing each subsystem independently allowed us to verify its performance, make adjustments more efficiently and solve problems before integrating it with the rest of the robot. This reduced debugging time and helped us build a more reliable final program.

Continuous Improvement: Throughout the build season, every practice session generated feedback from both the drivers and the mechanical team. Small adjustments were regularly made to improve controls and increase reliability. We continuously adjusted parameters such as motor power and control layouts until the robot felt natural to drive.

Drivetrain Control: The drivetrain was designed to give the driver smooth and predictable control. The left joystick controls robot translation, while the right joystick controls rotation, allowing both movements to happen at the same time. This makes it easier to line up with scoring locations, navigate around field elements and maintain control during fast movements. Small joystick deadzones were implemented to reduce unintended movement. In addition, we limited drivetrain power to provide smoother acceleration and improve control over the robot.

Intake and Feeder System: The intake and feeder mechanisms were tested to determine the most reliable configuration. We experimented with several motor power levels before deciding to run both systems at 100% motor power. Since these mechanisms only need to collect and move balls toward the shooter, maximum power proved to be the most effective and reliable solution. The feeder rollers are only allowed to feed balls to the shooter once it has reached the target RPM. This prevents balls from entering the shooter before it is fully spun up and results in inaccurate shots.

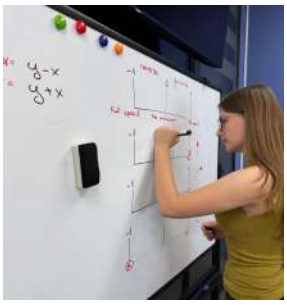
Shooter Development: The shooter required the most testing of any subsystem. Different flywheel speeds were evaluated to find the best balance between shooting distance and consistency. The relationship between flywheel RPM and launch speed can be analyzed using:

$$\omega = \frac{2\pi \cdot RPM}{60}$$

$$v = \omega r$$

*where **ω** is the angular velocity, **v** is the wheel surface velocity and **r** is the flywheel radius.*

These calculations help us understand how motor speed and flywheel design affect shooting performance. We implemented encoder-based velocity control, this way the software continuously controls the flywheels speed to reach a target RPM. To improve performance, the target RPM is selected based on the measured distance to the scoring basket using AprilTags, this allows the shooter to make minor adaptations to different positions without manual adjustments.



Climbing Mechanism: The climbing mechanism is controlled using the D-pad, allowing the driver to move the robot along the pole during the endgame. We implemented brake mode on the motor to help maintain its position even after the driver releases the buttons. During practices we also noticed that the robot started swinging when the motor was initiated so we implemented power ramping to make it as stable as possible.

AprilTags: We integrated computer vision into the robot using AprilTags. The robot can detect these tags and determine its position relative to the scoring baskets. This information is used to help the driver align the robot. Once the robot detects an AprilTag within 15 cm, a single button press automatically aligns the robot to the preconfigured optimal shooting location. If alignment is not completed within 2 seconds, the process terminates and returns control to the driver, preventing time loss.

Driver Controls:

Controller Input	Robot Function
Left Joystick	Robot right/left
Right Joystick	Robot forward/backward
R2	Intake forward
R1	Intake reverse
L2	Shooter forward
L1	Shooter reverse
X	Feeder rollers reverse
O	Feeder rollers forward
△	Auto Alignment
□	Open/Close servo wall
D-Pad Left	Move climbing mechanism up the pole
D-Pad Right	Move climbing mechanism down the pole

**The controller layout was updated several times throughout development based on driver feedback. Frequently used functions were placed in positions that reduced hand movement and made the robot easier to operate during matches.*

Conclusion: Throughout the season, our software grew together with the robot. As new mechanisms were designed and existing ones were improved, the code evolved to support them. This constant interaction between programming, testing and mechanical development allowed us to build a control system that is both reliable today and flexible enough to continue improving as the season progresses.

Trials and Error

RPM	Shots Attempted	Successful	Accuracy
1500	11	4	36%
1700	11	6	55%
1850	11	8	73%
2050	11	10	91%
2200	11	7	64%

To determine the most effective flywheel speed for the shooter, we tested five different RPM values and attempted 11 shots at each speed. The results show that shooting accuracy increased from 36% at 1500 RPM to 91% at 2050 RPM, where 10 out of 11 shots were successful. However, when the flywheel speed was increased further to 2200 RPM, accuracy decreased to 64%, indicating that a higher speed did not necessarily produce better performance. Therefore, based on these tests, 2050 RPM was selected as the optimal flywheel speed, as it produced the highest measured accuracy and the most consistent shooting performance under the tested conditions.

Problem	Initial Design	Observation	Modification	Result
Drivetrain's speed was too low	Version 1 and 2 of the drivetrain	The weight and friction of the drivetrain caused low speed	We substituted the C-Channels for extrusions	A lightweight and minimalistic design, simple to fix and build.
Intake could not be used to outtake balls	Version 1 of the intake	Having the balls travel up proved to not be worth it. Apart from it being space inefficient , the consistency was not good either and we were not able to outtake balls .	We created a smaller intake that makes contact with the balls first by using surgical plastic tubules.	A better intake that also allowed us to expand our basket and move balls in either direction.
Space inefficient feeder system design	Version 1 and 2 of the feeder	By using many transrollers, the balls had to travel much further to reach the shooter. This also proved to be a problem for the placement of the climbing mechanism	We removed 2 of the transrollers making the climb towards the shooter more direct .	A lower, space-efficient shooting system that allowed for a better placement for the climbing mechanism
Shooter's shaft kept getting deformed and causing resonance	Version 1 and 2 of the shooter	Over time we observed that the shooting mechanism kept getting deformed by the compression force the balls applied to it	We went from a 4 cm compression to a 2 cm compression and changed the way the shaft was mounted. Also we lowered the amount of wheels used in the shooter from 6 to 5	By changing the mounting method and lowering the weight of the shooting mechanism we achieved a much stabler and consistent shooter.

Game Strategy | Analysis and Evaluation

Our strategy is to rely primarily on our own robot rather than assuming that our alliance partners will be able to perform every scoring task. Since our shooter is one of our strongest mechanisms and we have developed the robot so that its mechanisms can operate independently, our primary objective will be to collect as many wildfire units as efficiently as possible and continuously convert them into scoring opportunities. If our alliance partners have limited shooting capabilities, our robot will take greater responsibility for scoring, while the other alliance robots will be instructed to focus on collecting, positioning, or blocking opposing robots so that they do not interfere with our shooting and collection cycles. If an alliance partner has a malfunction during the match, we will adapt by taking over as many of its scoring or collection responsibilities as our robot can physically perform, while the functioning alliance robot can focus on defensive positioning or another available task. Our expandable basket is a major part of this strategy because it allows us to collect and temporarily store multiple wildfire units rather than being forced to score each unit immediately.

As the basket fills, it can expand to accommodate the additional units, allowing the robot to continue collecting without repeatedly returning to a scoring location. Once the basket reaches its expanded capacity and is sufficiently full, we will decide whether to offload the wildfire units into the human player zone or shoot them, depending on the capabilities and current condition of our alliance. If our alliance already has sufficient shooting capacity, transferring the collected units may allow our robot to return to collecting more quickly, whereas if our alliance lacks another reliable shooter, we will prioritise using our own shooter to convert the collected units into points. During collection and scoring, the drivers will continuously monitor the robot for mechanical or operational problems. If the drivetrain experiences a malfunction, the robot may no longer be able to reach collection or scoring locations efficiently, so one of our team members will prioritise any mechanism that can still contribute to the scoring while the driver attempts to reposition the robot or communicate the problem to the alliance.

If the shooter jams, loses alignment, or otherwise becomes unusable, the strategy will immediately shift away from depending on shooting and toward collecting, storing, or transferring wildfire units if those mechanisms remain functional. If the lift malfunctions, the team will avoid wasting match time repeatedly attempting an unreliable movement and instead prioritise the mechanisms that remain operational. Similarly, if the basket does not expand, retract, or hold its intended position correctly, the team will reduce the number of units collected at once and adapt the collection cycle rather than allowing the basket malfunction to prevent the entire robot from contributing.

If an opposing robot interferes with our route, we will adjust our positioning and collection path while attempting to preserve access to the areas required for shooting and scoring. We will not depend on our alliance partners to physically support our robot, and our robot is not designed to attach to another robot or assist another robot with climbing. Throughout the match, communication between our two members and the alliance partners will therefore be essential, particularly when a mechanism fails, an opponent changes position, or an alliance robot becomes unavailable.

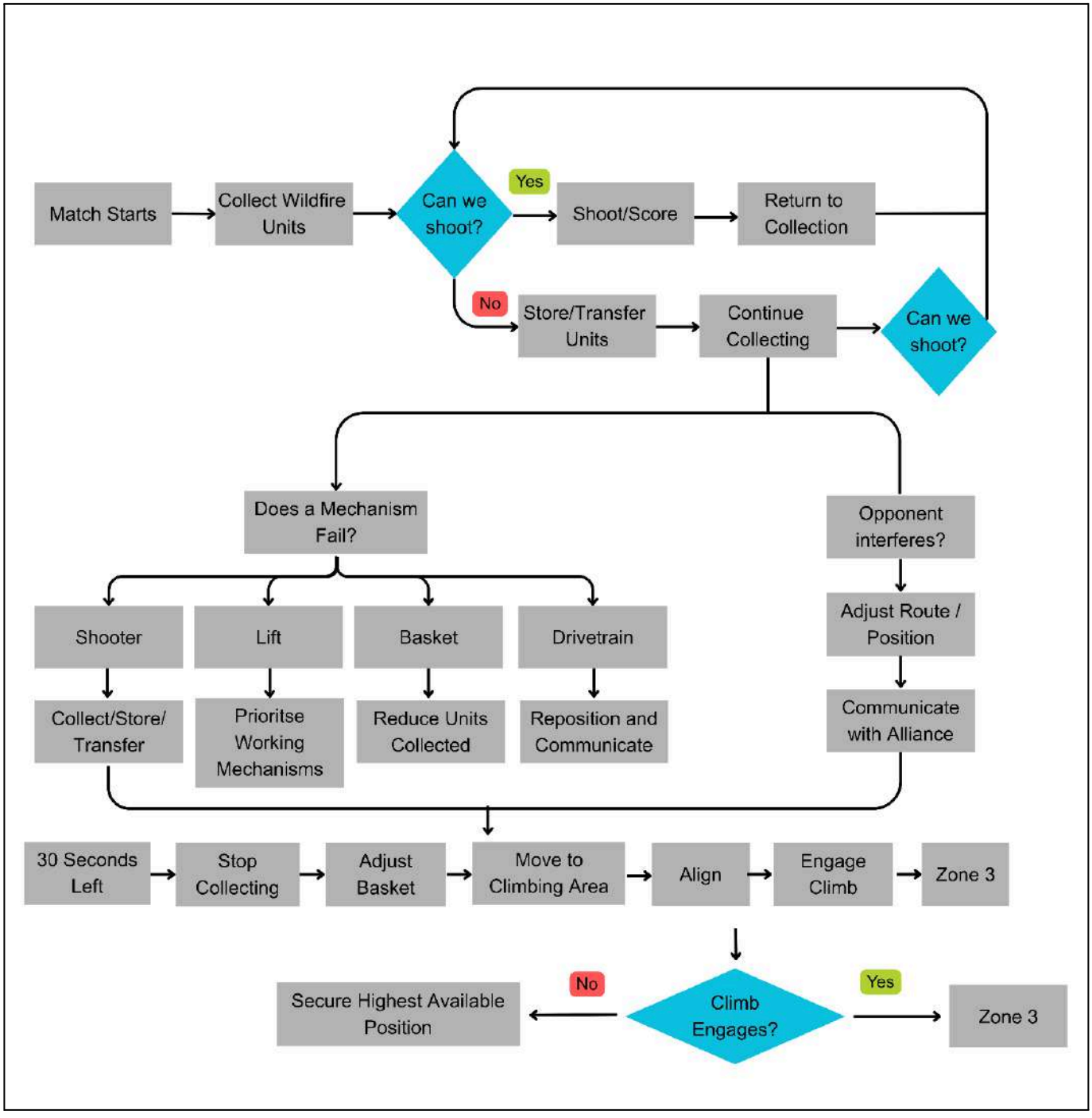
Approximately 30 seconds before the end of the match, we will begin transitioning from our normal scoring strategy to the endgame climbing sequence. This timing provides sufficient time to stop collecting, position the robot correctly, modify the basket so that the climbing pole can pass through it, align the robot with the climbing structure, and begin the climb without leaving the procedure until the final seconds.

Our objective is to climb to zone three, so positioning before the climb is critical; the driver will control the drivetrain and alignment while one of us operates the lift or other climbing related mechanisms. If the climbing mechanism does not engage correctly, the team will prioritise securing the highest achievable position rather than repeatedly attempting failed procedure and risking losing the robot's final position.

Overall, our strategy is therefore based on independent scoring capability, high volume wildfire collection, efficient use of the expandable basket, flexible cooperation with alliance partners, rapid adaptation to mechanical failures, and a planned transition into the zone three climb, allowing the robot to remain useful even when part of the alliance or one of our own mechanisms is not functioning as expected.

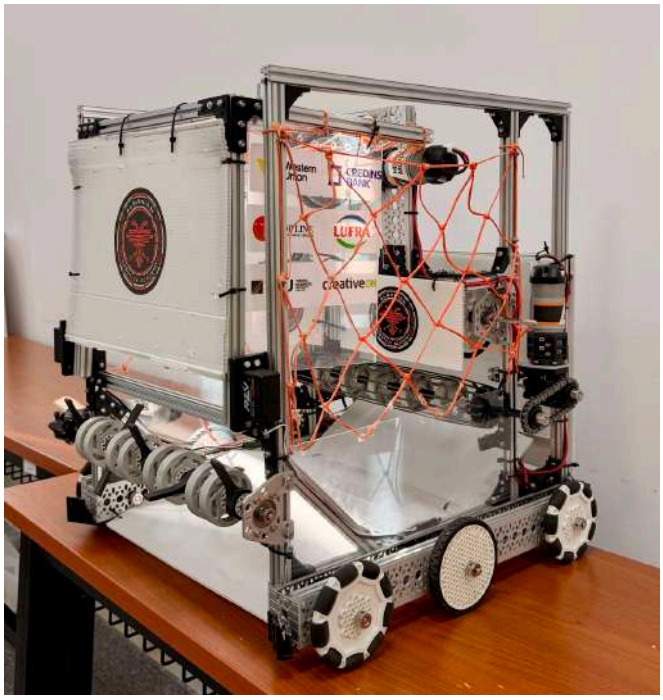
An equally important part of our strategy is maintaining positive communication with our alliance partners and with each other. Even under pressure, we will remain calm, communicate, and talk through problems together rather than becoming stressed or blaming one another. We believe that staying respectful and positive will help us make better decisions and adapt quickly when unexpected situations occur.

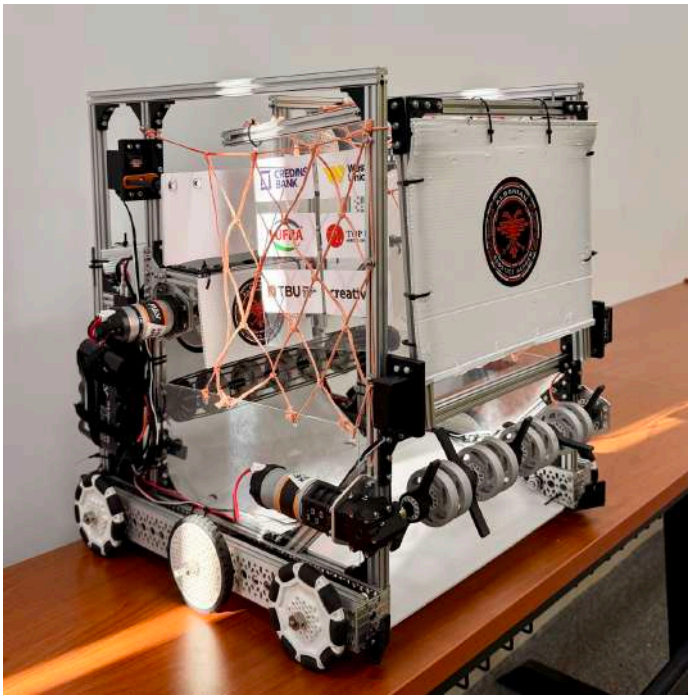
Game Strategy | Decision Tree

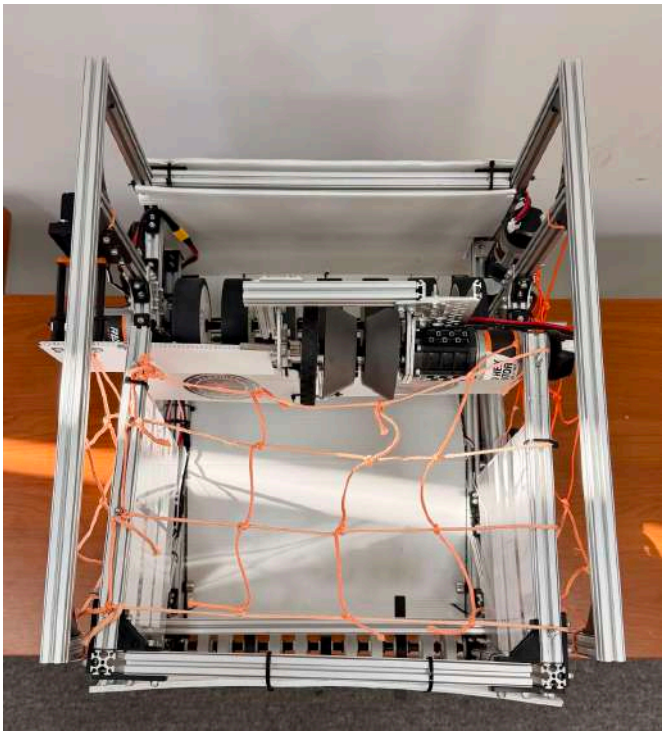


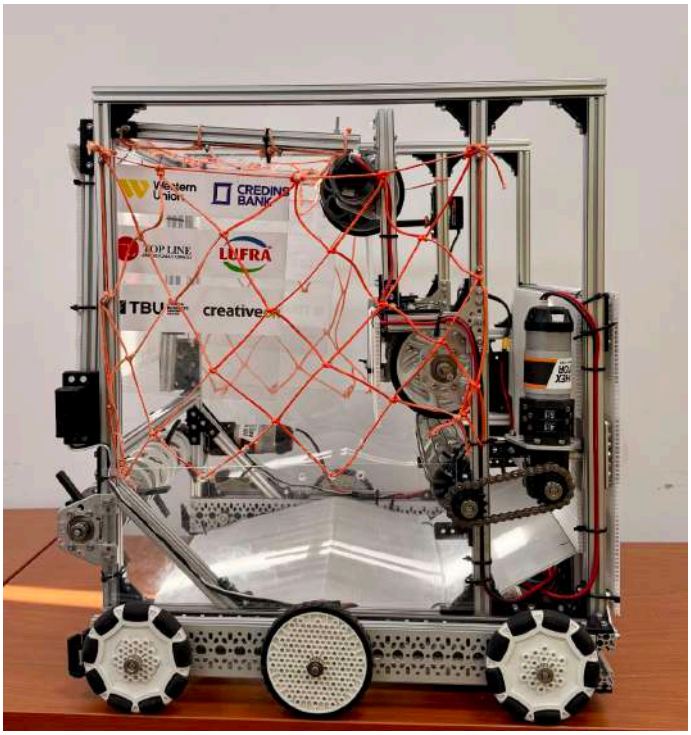
This diagram depicts the game strategy decision tree that we will use as a guide during matches. It outlines the main decisions our drivers may need to make, from collecting wildfire units and deciding whether to shoot or store them, to responding to mechanical failures and interference from opposing robots. The strategy is designed to keep our robot contributing even when one mechanism or part of the alliance is not functioning as expected. The final section shows our transition from normal scoring to the endgame climbing and our goal of reaching Zone 3. Our decisions will depend not only on the condition of our own robot, but also on the capabilities and actions of our alliance partners (as mentioned before).

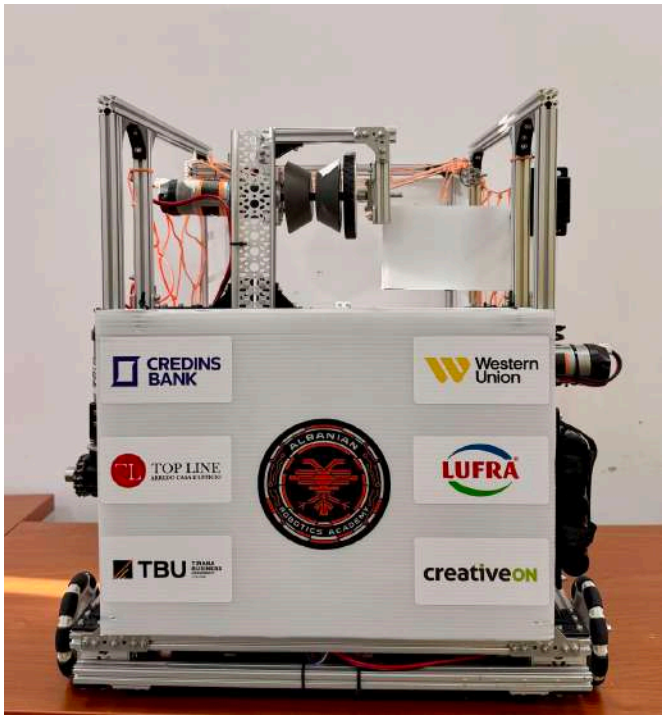
Final Robot

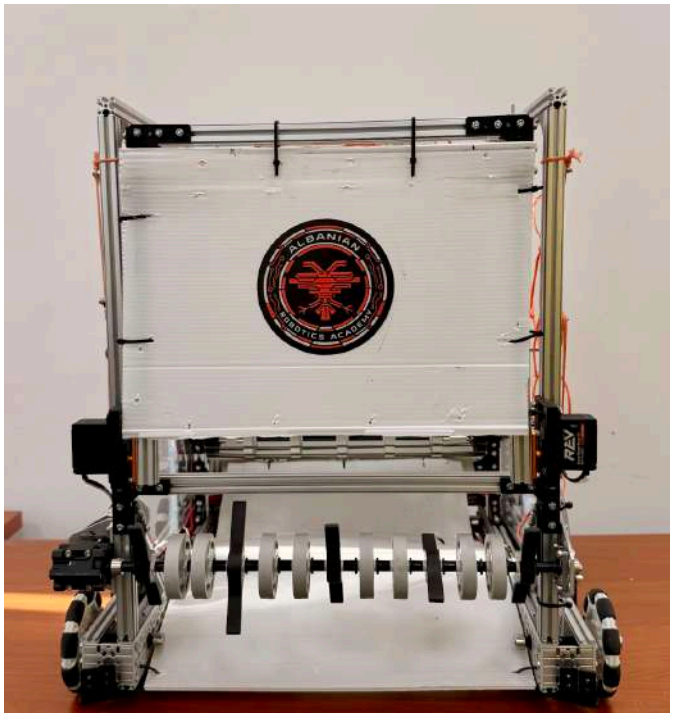












Looking at these pictures of our robot, we got reminded of the fact that none of this would have been possible without the people who have supported us throughout the years. Since Albania first joined FIRST Global, the support of companies, organisations, mentors, families, and individuals has helped keep this journey going and has given people in Albania the opportunity to take part in robotics. Reaching out to companies and securing sponsors was challenging, especially because robotics is still developing in Albania.

We contacted over 50 companies, and because of the 25 page limit, we chose not to include this process in our Engineering Notebook, as we wanted to focus primarily on the building, programming, testing, and the development of our robot. However, this part is just as important. The companies show that more and more people are recognising robotics as an important opportunity for the youth in Albania and as a field worth investing in.

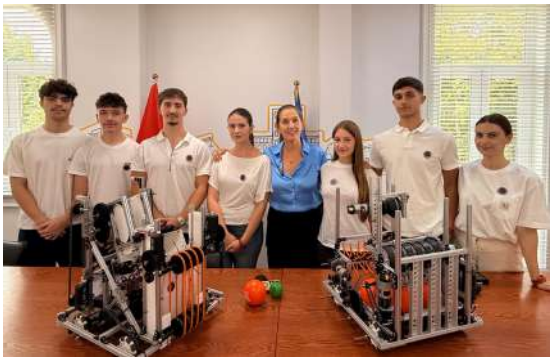
To finish, we would like to thank:

- Tirana Business University - *University and Masters*
- Western Union - *Financial Services*
- Credins Bank - *Banking*
- Topline - *Interior Design Studio*
- Lufra - *Dairy Products Company*
- Procreative - *Creative Marketing Agency*
- Boson Electronics - *Electronics and Robotics*

, as well as everyone else who supported us throughout the season. Without them, none of this would have been possible.

Outreach

Official Meeting with the Minister of Education of Albania: On 28 September 2026, our Engineering Lead organized an official meeting with the Minister of Education of Albania, Mirela Kumbaro. The Albanian National Robotics Team presented its participation in the FIRST Global Challenge 2026, including our competition robot, the wildfire focused challenge and our New Technology Experience (NTE), Canopy Watch. The meeting highlighted the importance of robotics and STEM education in developing young innovators, strengthening practical problem-solving and encouraging students to apply technology to real-world challenges. It also provided an opportunity to represent Albania's young engineering community and discuss the value of youth participation, innovation and technology driven education.





Youth Dialogue Platform on Early Warning Systems & Disaster Risk Reduction: On 11 September 2026, Abigel Kopliku and Daniel Qose, together with our mentor Eda Peshku, represented the Albanian National Robotics Team at the Youth Dialogue Platform on Early Warning Systems and Disaster Risk Reduction in Albania, held at Europe House. The dialogue was organized around Early Warning Systems, disaster risk reduction, youth engagement, education, skills and innovation, giving young people a formal platform to present concrete recommendations and innovative solutions.

Our team presented its wildfire early detection approach and contributed to the discussion on how youth-led technology can support prevention, preparedness and resilience. The event brought together Kamal Kishore, Special Representative of the UN Secretary-General for Disaster Risk Reduction; Haki Çako, Director General of the National Agency of Civil Protection; Sara Bodo, Director General of the National Youth Agency; Letizia Fishioni, Deputy Head of AICS Tirana; Ingrid Macdonald, UN Resident Coordinator in Albania; Edina Kozma, Deputy Representative of UNICEF Albania; and Jean-Noel Gangloff, Programme Manager at the EU Delegation to Albania.

Our participation placed the team among the young innovators presenting practical responses to disaster-risk challenges. The official discussion emphasized the importance of youth participation in early warning systems and disaster risk policy, while our wildfire robotics solution was specifically recognized as one of the innovative approaches presented. Kamal Kishore later highlighted that he was impressed by the innovations shared by young people, including robotics solutions exploring new approaches to wildfire prevention.





Robot Reveal

On the 26th of September, we organised a Robot Reveal at TBU (Tirana Business University), where we invited our friends, family, and sponsors. We organised this in order for them to see what we had been working on during the summer and get a better understanding of what being a part of our team actually involves.

Our team captain started it off by welcoming everyone and thanking them for coming. She also told them a little bit about our process and how we had prepared for this year's competition. We then showed them a video of this year's challenge so that everyone could get an idea of what our robot needs to do at the competition. After that, we had one of our builders talk about the building process, from the very beginning all the way to the final robot. Once he finished, one of our programmers talked about the programming side of the robot, going through the code and explaining how it works. We then had another team member talk about our social media work and some of the opportunities we had this year, including our meetings with the Minister of Education and UNICEF.

Afterwards, we opened the floor for everyone to ask questions. They asked us what the best part of being on the team was, and we all agreed that it was definitely working together as a team. Finally, we got to the part everyone had been waiting for: the robot demonstration. We showed them what our robot could do and how it corresponded with the challenge. Everyone seemed impressed with how much work had gone into the project. At the end, our mentors also left some time for the parents whose children will be travelling to South Korea to ask questions regarding the trip and everything they needed to know.

Finally, we also revealed the five students who will be travelling to South Korea to represent Team Albania at the competition: Vanesa Vorpsi (Team Captain), Regis Çalliku (Builder), Daniel Qose (Programmer), Heldi Behluli (Builder), and Braiden Muça (Builder. It was a special moment for the team, as we were able to officially share this information with our friends, families, sponsors, and supporters. Overall, it was a great event, and we have to admit, one of the best Robot Reveals we've had.













Conclusion

Our Team

This season has been one of the most successful for Team Albania not just because of the robot we built, but because of how we worked together throughout the entire process. At the beginning, we divided ourselves into different areas such as building, programming and social media. However, these categories did not limit anyone. Builders contributed to the Engineering Notebook, programmers helped with social media, and members from different groups stepped in when they were needed. This notebook is precisely a reflection of this.

One of the things we are most proud of is the commitment shown by our teammates. Two of our members do not live in Tirana (where our sessions take place), and had to make additional sacrifices to attend meetings and remain involved throughout the season. Other teammates were so dedicated that they came to work on the robot outside of scheduled meetings. Their commitment made a real difference to the progress of our robot.

Our mentors were also a really important part of this process. Our technical mentor continued to give us her time and support while balancing the responsibilities of being a mother of two. She stayed involved when we needed help and managed to create a comfortable environment for everyone to ask questions and learn from their mistakes. Our team manager has also been volunteering with the team for many years. He first joined as a student himself, and now he gives his time to support and mentor students who are going through the same experience as he once did. Having mentors who understand the team both from a student's perspective and from years of experience has been a really valuable part of our journey.

I think we can all say that organisation was one of our greatest strengths this year. We kept track of our components, documented our prototypes and our failures, tested mechanisms repeatedly, and so on. Each iteration taught us something that influenced the next one. We created a lot of to-do lists to keep track of our social media challenges and make sure everything was completed on time, we kept a record of who attended practices, and overall our shared drive became the place where we kept everything together, from robot designs and documentation to sponsor information, social media, photos, etc. This helped us know what had been done, what needed to be done, and where to find the information needed.

Our progress extends beyond the robot. This year, our media presence has been at its strongest. We have completed all the social media challenges (so far) and our work was even featured in the FIRST Global newsletter. We represented our team at UNICEF, and we also met with the Minister of Education of Albania. This gave us the opportunity to discuss robotics, wildfire prevention, and innovation outside of the competition. The most important thing is that we created a positive working environment. We worked hard but we also enjoyed working together. We did not always agree on everything, but we learned to discuss problems and take responsibility when we made mistakes. We never looked back and we kept moving forward. Even though we're from different schools, cities, and backgrounds, that doesn't divide us. It only gives us even more perspectives to work with.

Game Challenge

This year's game challenge also felt particularly relevant to us as representatives of Albania. With the wildfires that affected different parts of our country, the issue of wildfire prevention was not something that felt distant or purely theoretical. It was something we could see happening in our own country, which made the challenge even more meaningful. It motivated us to think beyond the competition itself and consider how the skills and ideas we developed could have a real impact here. Through our NTE project, we explored the possibility of using technology and data to support better wildfire prevention and awareness. Robotics was able to give us the tools to identify problems in our own community and develop solutions that genuinely contribute to real change.