2023-2024 CENTER STAGE Season

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A MESSAGE OF APPRECIATION

“We are grateful for your generous support of our team and our mission.”

About FTC ENIGMA 16265

Enigma 16265 is an 8yr First Tech Challenge Robotics team in Albuquerque, NM. We are a community team working out of the Manzano High School Teen Tech Center,

By the Numbers

27–10
Overall Match Record

3
New Mexico Winning Alliance Championships

2
Number-One Rankings

2nd
Trip to Worlds

241
Highest Regional Playoff Score

Under 12 Inches
Starting Robot Height

3
Articulated Arm Movements

3 in 1
Tuner-Hanging-LED

Connect with the team

Team Instagram: https://instagram.com/enigma.robotics
Team Facebook: https://www.facebook.com/enigma.robotics.program
Team YouTube: https://www.youtube.com/channel/UCziMRJj5j_hRYlwlJgXOjoQ
Team Website: https://enigmaftc.com/

Students

Callie W.

- Team Co-Captain
- Builder
- Wiring & Soldering
- Electronics
- Drive Team
- Human Player
- Assembly
- Outreach
- Fundraising
- Portfolio / Notebook

Davy G.

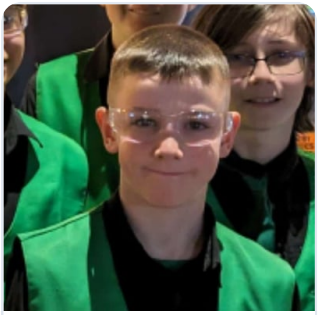
- Learning Java Code
- Skilled Java Coder
- Skilled Vision Coder
- Skilled Autonomous Pathing
- Outreach
- Fundraising
- Shop Manager

Dimitri C.

- Builder
- Electronics
- Wiring & Soldering
- Fabricator
- Skilled Bandsaw
- Outreach
- Assembly
- Learning Java Code
- Portfolio / Notebook

Elliott C.

- Drive Team
- Human Player
- Skilled Java Coder
- Skilled Autonomous Pathing
- Skilled Vision Coder
- Electronics
- Portfolio / Notebook
- Outreach
- Fundraising



Gabriel G.

- Builder
- Fabricator
- Driver Mechanisms
- Drive Team
- Wiring & Soldering
- Electronics
- Outreach
- Fundraising
- Skilled CNC Mill
- Skilled Bandsaw
- Assembly
- Learning Java Code
- Portfolio / Notebook
- Rookie Year

Gray S.

- Team Co-Captain
- CAD Designer
- Builder
- Drive Team
- Driver Chassis
- Skilled 3D Prints
- Wiring & Soldering
- Electronics
- Skilled CNC Mill
- Founding Member
- Team Spirit
- Skilled Bandsaw
- Design & Prototype
- Game Manual Expert
- Judging Awards
- Portfolio / Notebook
- Assembly
- Fabricator
- Alumni

Iriana V.

- Builder
- Graphic Designer
- Social Media
- Outreach
- Fundraising
- Assembly
- Team Spirit
- Team Media
- Judging Awards
- Portfolio / Notebook
- Game Manual Expert
- Design & Prototype
- Alumni

Jett S.

- Builder
- Fabricator
- Human Player
- Learning Java Code
- Skilled Blocks Coder
- Electronics
- Skilled Autonomous Pathing
- Portfolio / Notebook
- Outreach
- Fundraising

Kinsley S.

- Graphic Designer
- Team Photographer
- Team Spirit
- Team Media
- Social Media
- Founding Member

Luke C.

- Team Captain
- CAD Designer
- Builder
- Fabricator
- Drive Team
- Driver Chassis
- Drive Coach
- Assembly
- Wiring & Soldering
- Electronics
- Portfolio / Notebook
- Outreach
- Skilled Bandsaw
- Fundraising
- Driver Mechanisms
- Design & Prototype
- Team Spirit
- Game Manual Expert
- Judging Awards
- Skilled 3D Prints

Coaches and mentors

BLUE HALO

Gabriella C.
Grant Liaison
Grant Admin

FTC ENIGMA 16265

Russell M.
Coach #1
Shop Admin
Build & Fabrication
Java Programming
Wiring and Electronics
Quality Control
Machine Training
Systems Mentor
Design
Game Strategy
3D Prints Mentor
Media Production
Robotics Ambassador
CAD Training
Mechanical Engineering

Dan C.
Coach #2
Team Administrator
Safety Coordinator
Quality Control
Game Strategy
Robotics Ambassador
Media Production
Design
3D Prints Mentor

Renzo D.
Mentor
Systems Mentor
Electrical Engineering
Build & Fabrication
Wiring and Electronics
Quality Control
Robotics Ambassador
Game Strategy
Mechanical Engineering
Design
Robotics Control Systems

Felix M.

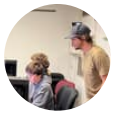
Mentor

- FIRST Alumni
- Mechanical Engineering
- Wiring and Electronics
- Build & Fabrication
- Quality Control
- Electrical Engineering
- Robotics Ambassador
- Game Strategy
- Robotics Control Systems
- Design
- Systems Mentor
- Machine Training

Isabel M.

Mentor

- Robot Driving
- Build & Fabrication
- Java Programming
- Quality Control
- Game Strategy
- Robotics Ambassador
- Robotics Control Systems
- Applied Mathematics
- Computer Science
- Systems Mentor
- Design
- FIRST Alumni



Jacob L.

Mentor

- Build & Fabrication
- CAD Training
- Wiring and Electronics
- Quality Control
- Mechanical Engineering
- Systems Mentor
- Design
- Game Strategy

Aaron M.

Mentor

- Build & Fabrication
- Quality Control
- Wiring and Electronics
- CAD Training
- Mechanical Engineering
- Systems Mentor
- Game Strategy
- Design

Dave C.

Mentor

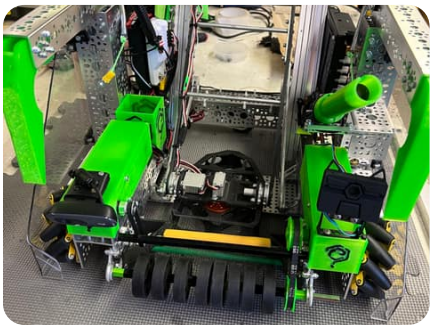
- Java Programming
- Game Strategy
- Computer Science
- Quality Control
- Applied Mathematics

Matt W.

Mentor

- Systems Mentor
- Quality Control
- Applied Mathematics
- Mechanical Engineering
- Game Strategy
- Design
- CAD Training
- Robotics Control Systems

Robot showcase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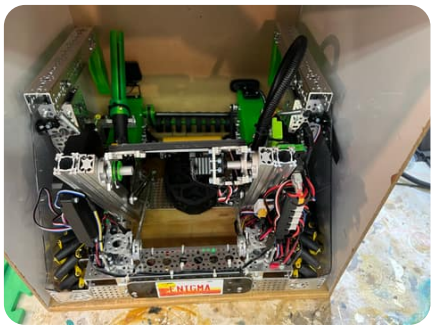
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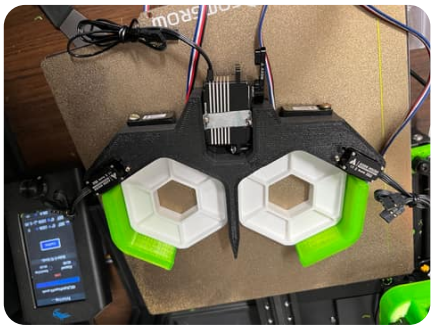
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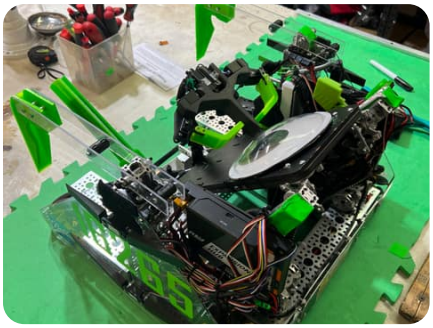
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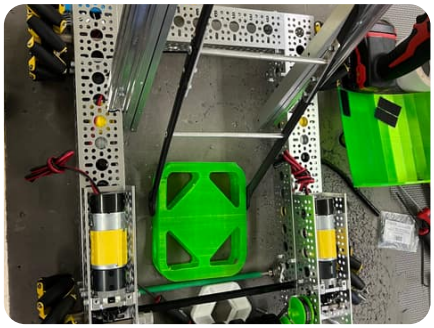
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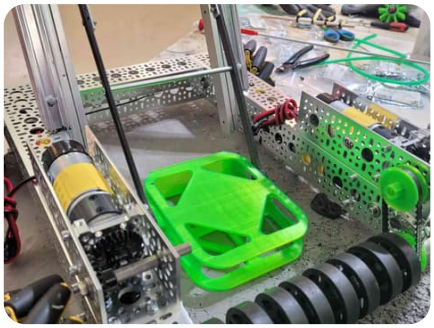
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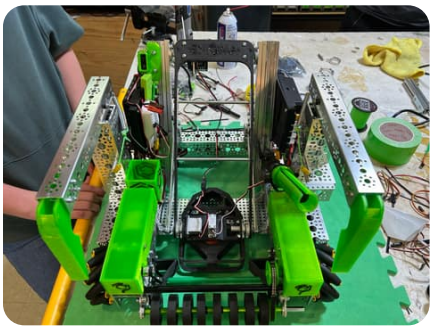
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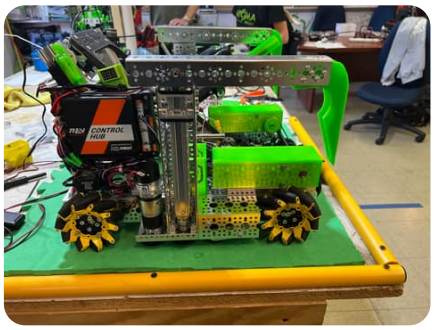
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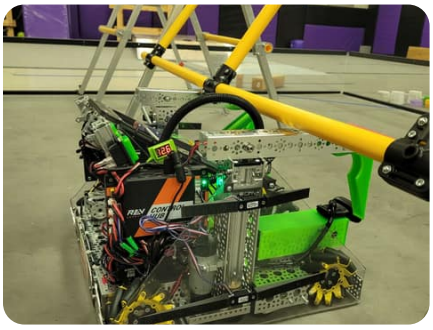
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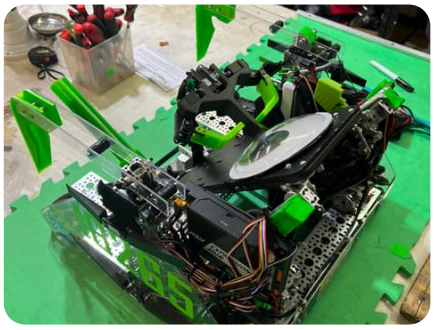
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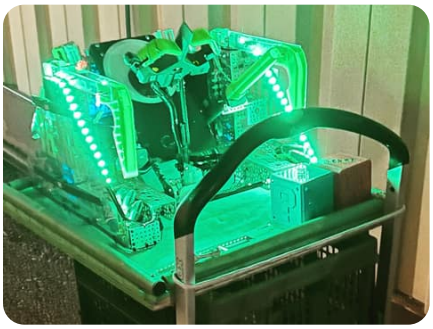

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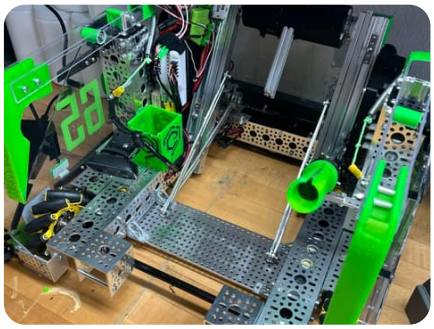

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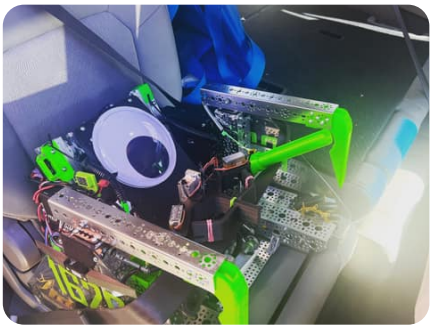

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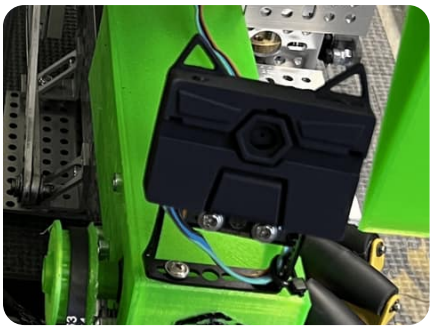

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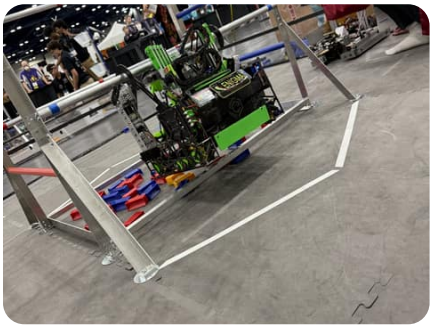

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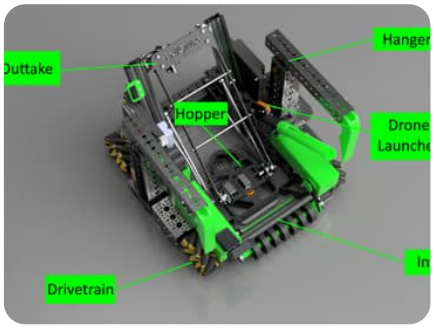

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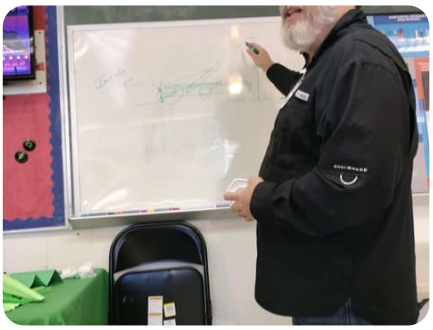

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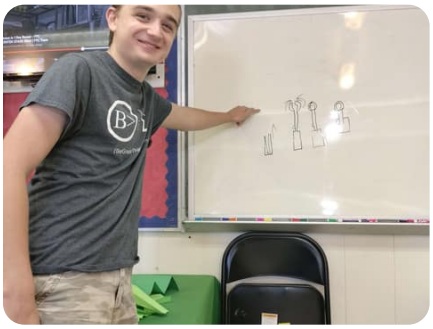
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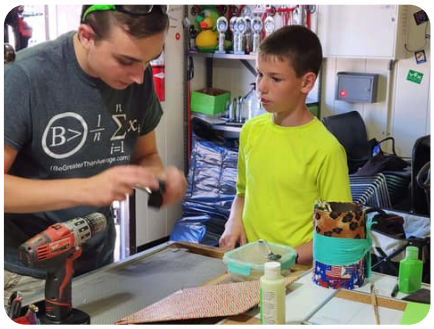
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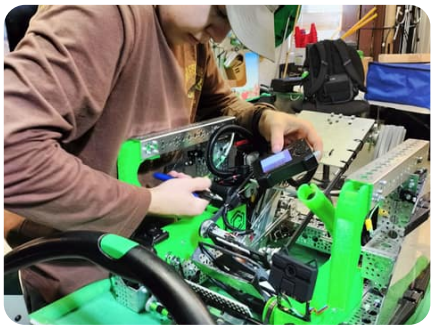
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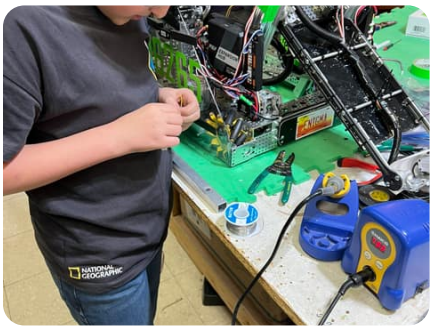
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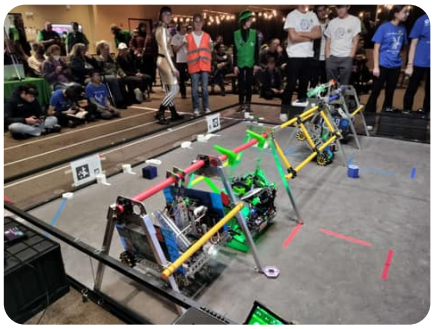
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Year in review

CENTERSTAGE · Robot: Link

Total hours invested: 2,800

OUR SEASON

The 2023–2024 CENTERSTAGE season challenged teams to collect colored pixels, place them on a vertical backdrop, create mosaics, launch a paper airplane, and suspend their robot from the field rigging during the endgame.

ENIGMA approached the season with an ambitious design goal: create a compact robot that could move easily through the crowded field, intake pixels efficiently, extend high enough to reach the backdrop, complete every endgame task, and remain adaptable to changing strategy.

The resulting robot was named Mantis.

Mantis was designed to begin each match at less than 12 inches tall. This low profile gave the robot room to unfold upward and outward while preserving stability and making it easier to maneuver beneath and around field structures.

The robot's scoring system centered on a Virtual Four-Bar arm. Rather than simply raising a bucket vertically, the mechanism moved through a carefully designed path that allowed the scoring assembly to extend toward the backdrop while maintaining a useful orientation.

Students analyzed the geometry of the mechanism and considered how the rotating joints affected the location and angle of the end effector. The arm's movement was designed to resemble a true robotic limb, with motions comparable to a shoulder, elbow, and wrist working together.

Mantis's intake collected pixels against the field wall, allowing the drive team to acquire two game pieces at once. The pixels traveled through a transfer system into a hopper before being delivered to the scoring mechanism.

The outtake used linear slides and the Virtual Four-Bar arm to reach the backdrop. Mantis's structure allowed the team to score on multiple levels while remaining compact during travel.

Mantis also included a paper-airplane launcher positioned to score consistently from the designated launch area. By the end of the season, the robot could complete all major endgame tasks reliably.
A New Programming FoundationCENTERSTAGE was especially important because it introduced state-machine programming into ENIGMA's robot code.

With Mantis, the students began organizing the robot around defined operating states. The code could track whether the robot was ready to intake, collecting pixels, holding game pieces, transferring, preparing to score, extending toward the backdrop, releasing pixels, returning to a safe position, or preparing to hang.

This structure allowed multiple mechanisms to work together rather than acting as unrelated motors and servos.

A single driver command could begin a coordinated sequence in which the slides, shoulder, elbow, wrist, hopper, and claw moved in the correct order. This reduced driver workload and helped prevent mechanisms from colliding with one another.

The code could track whether the robot was:
Ready to intake
Intaking pixels
Holding a game piece
Transferring pixels
Preparing to score
Extending the arm
Releasing pixels
Returning to a safe position
Preparing to hang
Recovering from an interrupted sequence
This structure allowed multiple mechanisms to work together rather than acting as unrelated motors and servos.

A single driver command could begin a coordinated sequence in which the slides, shoulder, elbow, wrist, hopper, and claw moved in the correct order. This reduced driver workload and helped prevent mechanisms from colliding with one another.

The team used premium FTC-legal programmable servos, including REEFS servos, in areas where speed, torque, travel range, and positional control were especially important.

Students compared servo performance from several manufacturers rather than assuming that every legal servo offered the same capability. They studied speed, torque, reliability, and application requirements before choosing the final hardware.

Each servo then required careful tuning. Mechanical range, safe software limits, direction, center position, speed, and timing all affected how smoothly the articulated arm moved.
McMuffin Servo-Tuning UtilityThe team developed a specialized tele-operated development utility humorously named McMuffin.

McMuffin was not Mantis’s normal competition tele-op mode. It was used to adjust the robot’s individual servo positions precisely while students developed and calibrated its mechanisms.

Students could select a servo, move it in small increments, observe the physical mechanism, determine safe limits, and record the positions needed for intake, transfer, travel, scoring, release, and reset.

Those calibrated values were then transferred into Mantis’s main state-machine and competition code.

The unusual name reflected the team’s sense of humor, but McMuffin served a serious engineering purpose. It made servo calibration faster, safer, and more repeatable.
Sensors and Driver FeedbackMantis also used sensors and lighting to communicate with the drive team.

LEDs indicated whether the robot had successfully acquired a game piece. This gave the drivers immediate confirmation without forcing them to look inside the machine or rely only on camera angles and guesswork.

The lighting system turned Mantis into an active participant in drive-team communication. A visible signal could tell the operator whether the robot was empty, attempting to collect pixels, or holding them securely.

The control system also used magnetic limit switches to identify mechanism limits and protect the hanging and arm systems from moving beyond their safe range.

Odometry wheels allowed the robot to estimate its movement and position during autonomous. Students used the encoder data to improve repeatability and reduce the drift that can occur when autonomous movement relies only on powered drivetrain encoders.

The team also developed custom code for tuning servo positions. This tuning utility made it possible to adjust a mechanism's target position efficiently without repeatedly rewriting and redeploying the full robot program.
Alamogordo QualifierENIGMA's first official event was the NM FTC Alamogordo Qualifier, held November 17–18, 2023.

Link finished qualification matches ranked fourth out of 12 teams. ENIGMA was selected by Team 7813, Alpha Hawks, as the first partner on the top alliance.

The alliance went undefeated through the playoffs and won the tournament. ENIGMA finished the event as a member of the Winning Alliance.

The team also earned the Think Award, recognizing its engineering process, portfolio, calculations, iterations, and ability to explain how Link developed from initial concepts into the final robot.

ENIGMA also received second-place Inspire Award recognition, demonstrating strength across robot performance, engineering, outreach, teamwork, and presentation.
Albuquerque QualifierAt the NM FTC Albuquerque Qualifier on December 15–16, Link and the team delivered an even stronger performance.

ENIGMA completed qualification matches undefeated and ranked first out of 14 teams.

As the first-ranked alliance captain, ENIGMA selected Alpha Hawks as its partner. The alliance remained undefeated through all four playoff matches and won the tournament.

ENIGMA became the Winning Alliance Captain, earned the Connect Award, and received third-place Inspire Award recognition.

The Connect Award reflected the team's work with professional engineers, alumni mentors, community partners, schools, FIRST programs, and STEM organizations.
New Mexico Regional ChampionshipThe New Mexico FTC Regional Championship was held January 19–20, 2024.

ENIGMA again completed qualification matches undefeated and ranked first, this time among 16 championship teams.

As captain of the first alliance, ENIGMA selected Team 23974, A.S.T.R.O. Vikings. The alliance won every playoff match and defeated the finalist alliance in two championship matches.

ENIGMA became the New Mexico Winning Alliance Captain and advanced to the FIRST Championship.

The team also earned the Control Award, recognizing its state-machine architecture, advanced servo control, odometry, sensors, mechanism protection, driver-assistance features, and overall integration of hardware and software.

ENIGMA received second-place Inspire Award recognition as well.

The championship completed an extraordinary New Mexico season. ENIGMA had won the robot competition at every event it attended within the region and completed all 12 regional playoff matches without a loss.
Second Trip to WorldsThe New Mexico Championship sent ENIGMA to the FIRST Championship in Houston for the second time in team history.

The team competed in the Ochoa Division against programs from throughout the United States and around the world.

Worlds presented a much higher level of performance than the team had faced regionally. Robots cycled pixels faster, autonomous routines were more complex, backdrop strategies were highly refined, and small reliability issues had a much greater effect on rankings.

ENIGMA finished qualifications ranked 48th out of 56 teams in the division.

Although the results did not reflect the dominance of the regional season, Worlds gave the students an important comparison between being one of the strongest teams in New Mexico and competing among the strongest programs internationally.

CENTERSTAGE became one of ENIGMA’s most successful seasons. Link was not simply a capable scoring robot; it represented a new stage in how the students approached software, actuation, sensors, mechanical sequencing, and human-machine interaction.

GOALS

ENIGMA’s CENTERSTAGE goals were organized around competitive performance, engineering development, community impact, and student growth.
Build a Competitive and Adaptable RobotThe team wanted Mantis to complete every major area of CENTERSTAGE.

The robot needed to intake pixels quickly, collect two pixels when possible, transfer them reliably, score at several backdrop heights, contribute to mosaics, launch the paper airplane, suspend itself from the rigging, operate effectively with different alliance partners, and complete dependable autonomous tasks.

The robot needed to:
Intake pixels quickly

Collect two pixels when possible
Transfer them reliably
Score at several backdrop heights
Contribute to mosaics
Launch the paper airplane
Suspend itself from the rigging
Operate effectively with different alliance partners
Complete dependable autonomous tasks
The team plan emphasized staying under 12 inches at the start of the match, cycling pixels efficiently, completing all scoring tasks, and maximizing endgame points.
Reduce Driver WorkloadA major programming goal was to make Mantis's complex movements easier for the drive team.

Rather than requiring the operator to remember the exact position of every joint, state-machine programming guided the mechanisms through repeatable positions and transitions.

The driver would still control strategy and timing, but the robot would manage the internal sequence needed to carry out the selected action.
Create Real Robotic Arm MovementStudents wanted Mantis's scoring system to behave more like an articulated industrial robot.

The shoulder, elbow, and wrist needed to work together to move pixels safely through the robot and position them accurately on the backdrop.

This required the programming and mechanical teams to develop the arm as one coordinated system rather than as several unrelated servo mechanisms.
Use Premium Actuators EffectivelyThe goal was not merely to purchase stronger or faster servos.

Students needed to understand which applications required additional torque, which benefited from speed, and where precise programmable positioning would produce a competitive advantage.

The team compared servo performance data and selected hardware based on the actual demands of each joint.
Improve Driver FeedbackThe team wanted Mantis to communicate its condition clearly.

LED possession indicators allowed the drivers to see whether the robot had successfully captured a pixel. This reduced wasted time, repeated intake attempts, and uncertainty during matches.
Develop Reliable Autonomous ControlENIGMA wanted autonomous routines that could operate consistently under real competition conditions.

Odometry, sensors, calibrated servo positions, structured code, and mechanism sequencing were all intended to improve Mantis's repeatability.

The team's autonomous goals included recognizing field conditions, scoring initial game pieces, and positioning the robot effectively for tele-operated play.

Win the Regional Championship and Return to WorldsAfter prior success in New Mexico, the team set a goal of winning the Regional Championship and returning to the FIRST Championship.

ENIGMA achieved that objective by ranking first, captaining the Winning Alliance, earning the Control Award, and advancing to Houston.
Expand FIRST and Serve the CommunityThe team's goals extended beyond the robot.

ENIGMA planned to:
Mentor FLL and FTC teams
Teach robotics classes
Host camps
Host an FLL qualifier
Recruit new students and mentors
Share technical resources
Participate in community STEM events
Strengthen professional engineering relationships
Build a long-term pipeline of students and alumni mentors
Develop Students at Every Experience LevelThe team used a structured development plan.

First-year students shadowed experienced members. Second-year students specialized while observing leadership roles. Third-year students began mentoring younger teammates. Fourth-year students took greater leadership responsibility and worked to master their chosen area.

This structure was intended to preserve knowledge and prepare the next generation of team leaders.

Most importantly, ENIGMA wanted students to discover what they enjoyed and develop the confidence to pursue it.

Lessons learned

CENTERSTAGE taught the team important lessons about advanced robot control, engineering focus, teamwork, and preparation.
Focus on the Most Important ProblemsOne student summarized a major lesson simply: the team needed to focus on what was important and avoid being distracted by smaller issues.

CENTERSTAGE offered many possible mechanisms and scoring objectives. Students learned to prioritize the systems that most directly affected match performance.
State Machines Require StructureState-machine programming improved Mantis's operation, but every state and transition needed to be clearly defined.

The code needed to know where Mantis was in the sequence, which movement was allowed next, whether the mechanism had reached its target, and how the robot should recover from an interrupted action.

The code needed to know:
Where the robot currently was in the sequence
Which movement was allowed next

Whether a mechanism had reached its target
How to react to an interrupted cycle
How to return to a safe configuration
How to permit manual recovery
Students learned that automation without error handling can make a robot harder rather than easier to operate.
Mechanical and Software Design Must Develop TogetherMantis's shoulder, elbow, wrist, slides, hopper, and intake could not be programmed independently.

The path of one mechanism affected the safe movement of the others. Mechanical clearances, servo limits, timing, and software states all needed to be designed together.
Premium Servos Still Require EngineeringMore capable servos did not eliminate the need for careful design.

Students still needed to calculate loads, evaluate lever arms, select appropriate speed and torque, configure limits, support joints, and prevent binding.

A premium servo could still fail if the mechanism placed it under the wrong load or forced it against a hard stop.
Visual Feedback Improves DrivingMantis's possession LEDs reduced uncertainty during matches.

Students learned that communication between the robot and its operators can be as valuable as mechanical speed.

The possession LEDs reduced uncertainty during matches.

Students learned that communication between the robot and its operators can be as important as mechanical speed.
A driver who immediately knows the robot's state can make faster and better decisions.
Modularity Supports IterationThe team repeatedly modified Mantis's intake and transfer system.

Its modular design made it easier to replace prototypes, reposition components, alter ramps, and improve the transfer path without rebuilding the entire robot.
Slow-Motion Video Is an Engineering ToolWhen Mantis's intake struggled to collect pixels, students recorded slow-motion footage.

The video showed where game pieces were catching and helped the team identify geometry that was difficult to observe at full speed.

This led to a more compact intake using horizontal compliant wheels and a lower ramp, improving both consistency and cycle speed.
Stress Testing Reveals WeaknessesThe redesigned intake was deliberately struck against walls and exposed to forces similar to contact with another robot.

Testing showed where supports needed reinforcement, where printed infill needed to increase, and where the mechanism needed greater width.

Students learned that testing should intentionally search for failure rather than merely confirm success.
Adaptability Is EssentialAs one student observed, there will always be something that changes.

Competition conditions, alliance strategy, damaged parts, field variation, and game-piece placement all required the team to adapt rather than depend on one perfect scenario.
Fundraising Must Begin EarlyThe season reinforced the importance of beginning fundraising before major travel and competition expenses arrive.

Preparing for Worlds required registration, transportation, lodging, food, and replacement parts. Waiting until qualification would leave too little time.
Team Organization MattersStudents learned that technical talent alone is not enough.

The team needed schedules, role assignments, preparation lists, documentation, fundraising plans, inspection routines, scouting, and communication.
Regional Success and World-Level Success Are DifferentENIGMA dominated the New Mexico playoff season but faced much tougher results in Houston.

Students learned that the performance standard at Worlds is significantly higher. Regional success should be celebrated, but it should also be used as a platform for identifying what must improve next.

Skills and growth

CENTERSTAGE developed ENIGMA's abilities in programming architecture, robotics motion, mechanical design, actuation, sensors, CAD, outreach, and leadership.
State-Machine ProgrammingStudents learned to organize Mantis's behavior into defined states rather than a collection of unrelated commands.

This made it possible to coordinate complete actions such as intake, transfer, scoring, reset, and hanging.
Java DevelopmentThe programming team refined its Java skills and learned better habits for organizing variables, methods, subsystem logic, and reusable code.

Students worked with enumerations, static values, debugging, and clearer structure.
McMuffin Servo-Tuning UtilityStudents created McMuffin as a dedicated tele-op mode for precise servo calibration.

The utility allowed the team to select a servo, move it gradually, observe Mantis's physical mechanism, identify safe mechanical limits, determine repeatable positions, and transfer those values into the primary competition code.
Programmable Servo TuningStudents compared servo specifications and learned how to configure travel, center position, speed, direction, and safe limits.

They also learned that different joints require different combinations of torque and speed.
Shoulder, Elbow, and Wrist CoordinationMantis's articulated scoring mechanism introduced students to multi-joint robotic movement.

Students learned that moving one joint changes the position and angle of every joint beyond it. Safe and useful positions required coordination among the entire arm.
Virtual Four-Bar GeometryThe team studied how Mantis's Virtual Four-Bar mechanism controlled the path and orientation of the scoring assembly.

Students considered arm lengths, pivot locations, angular relationships, and how the end of the mechanism moved through space.
Linear SlidesMantis's slides allowed the robot to reach backdrop heights while remaining compact.

Students developed skills in stringing, alignment, tension, friction reduction, motor loading, and preventing overtravel.
Intake DevelopmentMantis's intake progressed through several concepts.

Students compared surgical tubing, boot wheels, ramps, conveyors, and horizontal compliant wheels. Testing showed that a smaller and simpler intake without a large lower lip collected pixels more quickly and reliably.
Slow-Motion AnalysisHigh-frame-rate video became a diagnostic tool.

Students used footage to identify where pixels struck the intake, changed angle, slowed down, or failed to cross an edge.
Stress Testing and 3D PrintingThe team simulated collisions and wall impacts to evaluate the intake.

Based on the results, students increased print infill, widened critical sections, and improved structural support.
CAD and PrototypingStudents moved from whiteboard concepts and cardboard mockups to TinkerCAD and Fusion 360 models.

CAD allowed the team to test dimensions, identify interference, create printed parts, and manufacture components before final assembly.
Odometry and SensorsMantis used odometry pods, magnetic limit switches, possession sensing, and LEDs to improve autonomous accuracy, protect mechanisms, and provide feedback to the drive team.
Hanging Mechanism DesignMantis's lead-screw hanging system introduced students to mechanical advantage, screw motion, load support, springs, hooks, and compact deployment.
Sensor IntegrationSensors allowed the code to respond to the robot's physical condition rather than relying only on time delays.

Students learned how sensor placement, thresholds, noise, and calibration affect reliability.
LED CommunicationLEDs were used as functional indicators rather than decoration.

They allowed the robot to communicate possession status to the drive team and reduced uncertainty during fast scoring cycles.
Hanging Mechanism DesignThe lead-screw hanging system introduced students to mechanical advantage, screw motion, load support, hooks, springs, and compact deployment.

The mechanism needed to remain legal at the beginning of the match and still extend far enough to reach the rigging.
Drone LauncherStudents developed a launcher capable of sending the paper airplane into the scoring zone consistently.

The mechanism required attention to angle, repeatability, packaging, and safe activation.
Judging and PresentationStudents explained Link's design, code, iterations, outreach, and goals to judges.

They learned to communicate complicated technical ideas in a limited amount of time and answer follow-up questions clearly.
Leadership and MentoringOlder students mentored younger members, while newer students shadowed experienced builders, coders, presenters, and drive-team members.

The team’s development structure encouraged every student to progress toward future leadership.
Growth Beyond the RobotThe greatest growth came from seeing Mantis as an integrated system.

Students were no longer asking only how to move one servo or motor. They were asking what state the robot was in, what should move next, whether the action was safe, what information the driver needed, and how the complete sequence could recover from an interruption. They were asking:
What state is the robot in?
What should move next?
Is the movement safe?
What information does the driver need?
How does the robot confirm possession?
How can the sequence recover?
How does one joint affect the others?
How can we test the mechanism to failure?
How can we make the system easier to service?
Those questions moved ENIGMA closer to the thinking used in professional robotics.

Competitions

NM FTC Alamogordo Qualifier

Nov 18, 2023 · Alamogordo High School, Alamogordo, New Mexico

Winning Alliance 1st Pick, Think Award, 2nd Place Inspire Award

The Alamogordo Qualifier was ENIGMA 16265's first official competition of the CENTERSTAGE season and Mantis's first opportunity to compete in a full tournament environment. Twelve teams participated, and ENIGMA finished qualification matches ranked fourth.

Team 7813, Alpha Hawks, selected ENIGMA as the first partner on the top-seeded alliance. The alliance went undefeated in the playoffs, winning both semifinal matches and both final matches to become the event champions.

ENIGMA also earned the Think Award for its engineering process, robot iterations, technical documentation, and portfolio. The team received second-place Inspire Award recognition as well. The event demonstrated that Link was already competitive while also validating the team's documented design and development process.

NM FTC Albuquerque Qualifier

Dec 16, 2023 · La Academia de Esperanza Charter School, Albuquerque, New Mexico

Winning Alliance Captain, Connect Award, 3rd Place Inspire Award

At the Albuquerque Qualifier, ENIGMA delivered one of its strongest performances of the season. The event included 14 teams, and ENIGMA completed qualifications ranked first.

As captain of the top-seeded alliance, ENIGMA selected Alpha Hawks as its partner. The alliance remained undefeated through the playoffs, winning the semifinals and then taking the finals by scores of 200–52 and 162–80.

ENIGMA finished the event as the Winning Alliance Captain, earned the Connect Award, and received third-place Inspire Award recognition. The tournament highlighted Mantis's growing reliability and scoring ability while recognizing the team's strong relationships with mentors, engineering professionals, sponsors, and the broader STEM community.

New Mexico FTC Regional Championship

Jan 20, 2024 · Raymond Sarracino Middle School, Socorro, New Mexico

Winning Alliance Captain, Control Award

The New Mexico Regional Championship brought together 16 teams competing for two advancement positions to the FIRST Championship. ENIGMA completed qualification matches ranked first and entered alliance selection as the top seed.

ENIGMA selected Team 23974, A.S.T.R.O. Vikings, as its alliance partner. The alliance remained undefeated throughout the elimination rounds and won the championship, making ENIGMA the New Mexico Winning Alliance Captain.

The team also earned the Control Award for Link's advanced programming and control systems, including state-machine architecture, coordinated mechanism movement, sensors, odometry, servo tuning, and driver-assistance features. ENIGMA also received second-place Inspire Award recognition.

Winning the championship secured ENIGMA's advancement to the FIRST Championship in Houston, marking the team's second trip to Worlds.

2024 FIRST Championship presented by BAE Systems — Ochoa Division sponsored by Qualcomm

Apr 15, 2024 · George R. Brown Convention Center, Houston, Texas

2–8, 48th out of 56

ENIGMA represented New Mexico at the 2024 FIRST Championship and competed in the 56-team Ochoa Division. This was the team's second appearance at Worlds.

The Championship exposed the students to a much higher level of robot performance, autonomous capability, cycle speed, backdrop strategy, and alliance coordination than they had experienced during the regional season. ENIGMA finished qualification play ranked 48th in the division and did not advance into the playoffs.

Although the competitive results were difficult compared with the team's undefeated New Mexico playoff run, Worlds provided an important measure of the next level. Students competed with teams from across the United States and around the world, observed advanced robot and software designs, and gained experience that would influence future ENIGMA seasons.

Outreach

Total people reached: 915

Total volunteers: 48

CENTERSTAGE was also an extensive outreach and community-building season for ENIGMA.
FLL EducationENIGMA continued teaching LEGO robotics classes in the Rio Rancho area.

The program had been coached for several years, with current ENIGMA members increasingly taking responsibility for instruction. Students taught robot construction, programming, teamwork, and problem-solving to younger participants.

The team also helped Desert Ridge Elementary establish four new FLL teams after a robotics demonstration. ENIGMA students and mentors supported the new programs and helped families understand the progression from LEGO robotics into FTC and FRC.
FIRST LEGO League QualifierENIGMA hosted an Albuquerque FIRST LEGO League Qualifier.

The team helped provide the venue, recruited volunteers, assisted teams, and created a competition opportunity for students who otherwise might have needed to travel farther to participate.

Hosting the qualifier allowed ENIGMA members to serve as event volunteers while introducing many families to the larger FIRST community.
Super STEM SaturdayENIGMA participated in Super STEM Saturday, where students demonstrated robots and helped introduce hundreds of visitors to FIRST and hands-on engineering.

The team also recruited a new mentor through this event, showing that outreach can strengthen both the public and the team itself.
Sandia National Laboratories Kids DayENIGMA toured Sandia National Laboratories during Kids Day and received a special presentation from the robotics laboratory.

Students were introduced to professional robotics projects, including advanced mobile and inspection systems, and saw how the skills practiced in FTC relate to real engineering careers.
Battle Bots and Summer CampENIGMA partnered with other FTC groups and nonprofit organizations to run a summer camp that included robotics and Battle Bots activities.

Students designed and built small fighting robots while learning about structure, durability, energy, safety, iteration, and controlled competition.

Several participants and mentors later became involved in FIRST programs.
STEM and FLL Information EventsThe team participated in FLL information sessions where students and parents could ask questions directly of experienced FIRST participants.

ENIGMA helped families understand team formation, registration, mentoring, expectations, and the progression through FIRST programs.
Alumni MentorsFormer ENIGMA students returned as mentors, including alumni with FTC, FRC, and broader FIRST

experience.

Their participation demonstrated the long-term mission of ENIGMA: develop students who eventually return to guide the next generation.
Professional STEM ConnectionsThe team continued forming relationships with engineers, business professionals, recycling and electronics organizations, telecommunications professionals, and local companies.

Students toured Albuquerque Computer and Electronics Recycling, learned about electronics recovery and reuse, and discussed pathways in technology-related careers.

They also connected with Sun Country Industries and other businesses that expressed interest in supporting the program through mentoring, manufacturing, or partnership opportunities.
American Ninja Warrior OutreachOne of the team's most unusual outreach opportunities came when ENIGMA alumna and FIRST supporter Ixchel Valentino, known as The Nerdy Ninja, brought an ENIGMA robot into the environment surrounding American Ninja Warrior.

The robot was demonstrated to people outside the normal FIRST audience, providing robotics exposure through a highly visible entertainment community.
Team Identity and GiveawaysENIGMA used buttons, stickers, temporary tattoos, bookmarks, business cards, tape measures, and tool sets to promote the team and FIRST.

These materials gave visitors a physical reminder of the program and helped start conversations at outreach events, competitions, and demonstrations.
Social Media and Online OutreachThe team used Instagram, Facebook, Twitch, TikTok, email, and other digital platforms to share robot progress, competition experiences, event information, technical knowledge, and FIRST opportunities.

Online communication allowed ENIGMA to reach students and teams well beyond Albuquerque.

Lego Classes in Rio Rancho

Rio Rancho · 15 reached · 5 volunteers

ENIGMA continued teaching LEGO robotics classes in the Rio Rancho area.

The program had been coached for several years, with current ENIGMA members increasingly taking responsibility for instruction. Students taught robot construction, programming, teamwork, and problem-solving to younger participants.

The team also helped Desert Ridge Elementary establish four new FLL teams after a robotics demonstration. ENIGMA students and mentors supported the new programs and helped families understand the progression from LEGO robotics into FTC and FRC.

FIRST LEGO League Qualifier

Dec 22, 2023 · God's House Church 2335 Wyoming Blvd NE, Albuquerque, NM 87112 · 250 reached · 19 volunteers

ENIGMA hosted an Albuquerque FIRST LEGO League Qualifier.

The team helped provide the venue, recruited volunteers, assisted teams, and created a competition opportunity for students who otherwise might have needed to travel farther to participate.

Hosting the qualifier allowed ENIGMA members to serve as event volunteers while introducing many families to the larger FIRST community.

Super STEM Saturday

Apr 22, 2023 · Albuquerque Convention Center · 450 reached · 5 volunteers

ENIGMA participated in Super STEM Saturday, where students demonstrated robots and helped introduce hundreds of visitors to FIRST and hands-on engineering.

The team also recruited a new mentor through this event, showing that outreach can strengthen both the public and the team itself.

Sandia National Labs Tour

Apr 27, 2023 · Sandia National Labs, Albuquerque · 75 reached · 8 volunteers

ENIGMA toured Sandia National Laboratories during Kids Day and received a special presentation from the robotics laboratory.

Students were introduced to professional robotics projects, including advanced mobile and inspection systems, and saw how the skills practiced in FTC relate to real engineering careers.

Artrageous Battle Bots and Summer Camp

Jul 7, 2023 · Artrageous Artreach Ltd., Tijeras, NM · 50 reached · 5 volunteers

ENIGMA partnered with other FTC groups and nonprofit organizations to run a summer camp that included robotics and Battle Bots activities.

Students designed and built small fighting robots while learning about structure, durability, energy, safety, iteration, and controlled competition.

Several participants and mentors later became involved in FIRST programs.

STEM and FLL Information Events

Sep 9, 2023 · Project Y - Los Alamos · 75 reached · 6 volunteers

The team participated in FLL information sessions where students and parents could ask questions directly of experienced FIRST participants.ENIGMA helped families understand team formation, registration, mentoring, expectations, and the progression through FIRST programs.