Black Moon Systems

2025-2026 DECODE Season

DECODE

SPONSOR IMPACT REPORT

Black Moon Systems

FTC ENIGMA 16265 · ENIGMA Green is Everywhere

Gold

LEARN MORE ABOUT BLACK MOON SYSTEMS

Black Moon Systems: https://blackmoon.systems

FTC PROGRAM

FIRST Tech Challenge (FTC)

Learn more: https://www.firstinspires.org/robotics/ftc

A MESSAGE OF APPRECIATION

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

Anirudh N. Asa H. Callie W. Cody S. David M. Davy G. Elliott C. Gabriel G. Heath L.

James H. Jody C. Luke C. Phillip M. Sammy G. Russell M. Dan C. Renzo D. Gray S.

Peter F. Felix M. Isabel M. Madelene C. Dave C. Matt W. Brian H.

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

26–11 Official Season Record	**18–7** Qualification Record	**8–4** Playoff Record	**2** Inspire Awards
4th Trip to Worlds	**10** Student Team Members	**4** Graduating Seniors	**3** Major Robot Generations

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

Anirudh N.

- Builder
- Fabricator
- Skilled 3D Prints
- Human Player
- Electronics
- Wiring & Soldering
- Skilled Bandsaw
- Learning Java Code
- Outreach
- Fundraising
- Portfolio / Notebook
- Team Spirit
- Team Media
- Alumni

Asa H.

- Builder
- Fabricator
- Outreach
- Fundraising
- Portfolio / Notebook
- Skilled Bandsaw
- Rookie Year
- Wiring & Soldering
- Electronics

Callie W.

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

Cody S.

- Graphic Designer
- Social Media
- Outreach
- Fundraising
- Portfolio / Notebook
- Team Spirit
- Team Media
- Assembly

David M.

- Portfolio / Notebook
- CAD Designer
- Builder
- Fabricator
- Skilled 3D Prints
- Assembly
- Design & Prototype

Davy G.

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

Elliott C.

- Drive Team
- Driver Chassis
- Driver Mechanisms
- Human Player
- Skilled Java Coder
- Skilled Autonomous Pathing
- Skilled Vision Coder
- Electronics
- Portfolio / Notebook

Gabriel G.

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

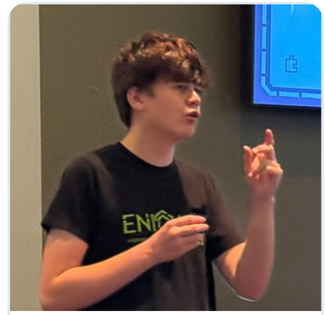
Heath L.

James H.

- CAD Designer
- Builder
- Fabricator
- Portfolio / Notebook
- Outreach
- Fundraising
- Skilled Bandsaw
- Skilled 3D Prints

Jody C.

- Portfolio / Notebook
- Team Spirit
- Rookie Year
- Assembly
- Builder
- Electronics
- Team Photographer
- Outreach
- Fundraising
- Game Manual Expert
- Judging Awards
- Design & Prototype



Luke C.

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

Phillip M.

- Builder
- Skilled CNC Mill
- Assembly
- Outreach
- Portfolio / Notebook

Sammy G.

- Skilled Java Coder
- Skilled Vision Coder
- Skilled Autonomous Pathing
- Learning Java Code
- Portfolio / Notebook
- Team Spirit
- Electronics
- Outreach
- Fundraising

Coaches and mentors

BLACK MOON SYSTEMS

Frank D.

Owner

- 3D Prints Mentor
- Systems Mentor

FTC ENIGMA 16265

Russell M.

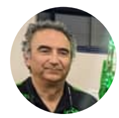
Coach #1

- 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



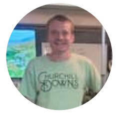
Renzo D.

Mentor

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

Gray S.
Mentor

- FIRST Alumni
- Build & Fabrication
- Robot Driving
- Wiring and Electronics
- CAD Training
- Electrical Engineering
- Quality Control
- Game Strategy
- Design
- Mechanical Engineering
- Systems Mentor
- Robotics Ambassador
- Robotics Control Systems
- 3D Prints Mentor



Peter F.
Mentor

- Build & Fabrication
- Robot Driving
- CAD Training
- Wiring and Electronics
- Quality Control
- Robotics Ambassador
- Game Strategy
- Robotics Control Systems
- Systems Mentor
- Design
- Mechanical Engineering
- Electrical Engineering

Felix M.
Mentor

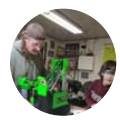
- FIRST Alumni
- Mechanical Engineering
- Wiring and Electronics
- Build & Fabrication
- Quality Control
- Electrical Engineering
- Robotics Ambassador
- Game Strategy
- Robotics Control Systems
- Design
- Systems Mentor
- Machine Training

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

Madelene C.
Mentor

- Team Administrator
- Safety Coordinator
- Build & Fabrication
- Wiring and Electronics
- Quality Control
- Machine Training
- FIRST Alumni
- Systems Mentor
- Design
- Media Production



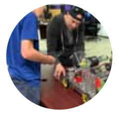
Dave C.
Mentor

- 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



Brian H.

Mentor

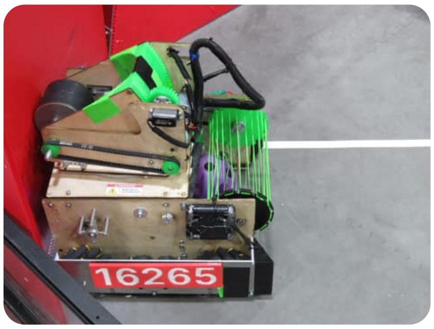
- Build & Fabrication
- Wiring and Electronics
- Quality Control
- Java Programming
- Mechanical Engineering
- Computer Science
- Game Strategy
- Systems Mentor

Robot showcase

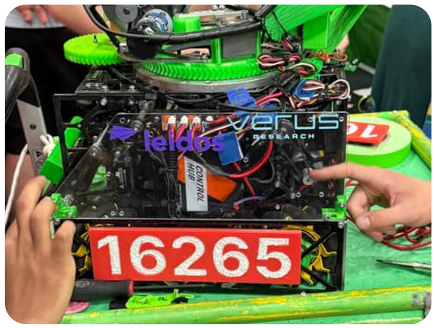

ORIG_047_20260217_174934


031_114_20251208_190541

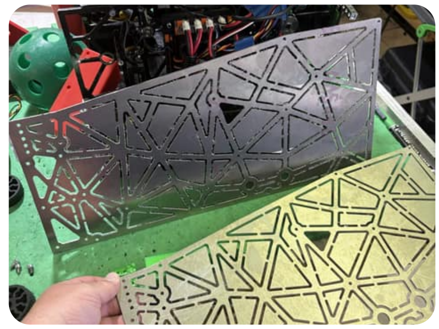

040_IMG_1143

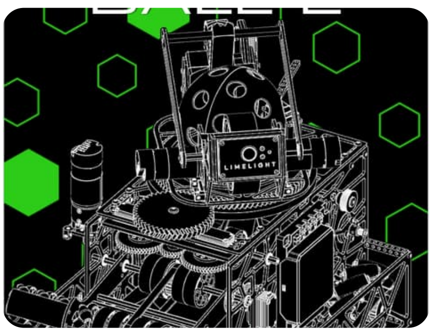


048_IMG_1151

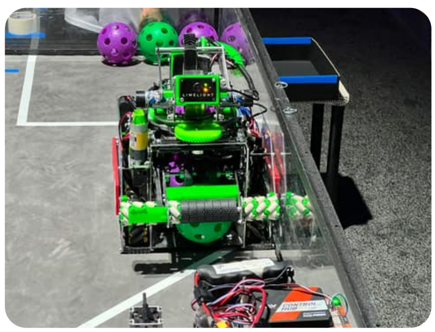


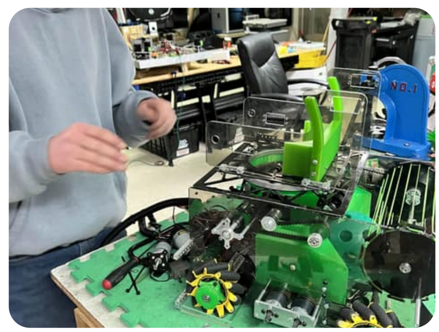
220_IMG_1324


480_001_IMG_0435

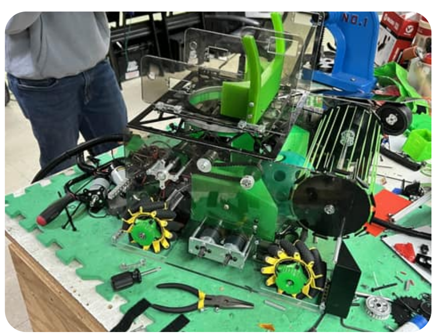


1188_009_image


1359_008_IMG_0891


1379_040_IMG_9699

1390_054_IMG_0254


IMG_9700

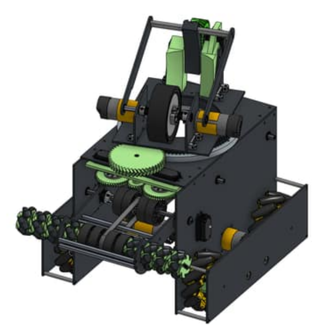


image-21

20260328_125144

Year in review

DECODE · Robot: BALL-E

Total hours invested: 2,650

OUR SEASON

Beginning With StrategyBefore choosing mechanisms, ENIGMA studied the DECODE point structure and identified three major design priorities:
Artifact cycle speed
Match flexibility
Ranking-point capability
The team wanted a robot that could acquire artifacts without stopping, feed them directly into a launcher, fire rapidly, shoot from much of the field, work alongside many different alliance partners, and contribute toward multiple ranking points.

Students considered two major robot archetypes: a spindexer and a direct-feeder system.

A spindexer would store and organize artifacts so the team could deliberately choose their firing order. That could improve motif scoring and ranking-point potential, but it would also introduce a delay between shots and increase mechanical complexity.

A direct feeder would launch artifacts in the order they entered the robot. It would sacrifice some automated sorting ability but provide the fastest path from intake to shooter.

The students created a weighted decision matrix rather than selecting the concept they found most visually interesting. Direct feeding scored highest because it best supported cycle speed and alliance flexibility.

The result was a robot whose artifacts traveled through the chassis in one continuous direction, from the front intake to the rear-mounted turret and launcher.
Three Major Robot GenerationsBALL-E was not one robot that remained unchanged throughout the year. It developed through three significant structural generations.

Generation One: Laser-Cut Wood

The first BALL-E drivetrain used quarter-inch oak plywood plates.

Wood gave the team several early-season advantages:
It was inexpensive.
It could be laser cut quickly.
New plates could be manufactured without long lead times.
Students could test full-scale geometry before committing to expensive material.
The team could get a complete robot onto the field much earlier.
The wooden robot performed well at ENIGMA’s first qualifier and validated the basic concepts behind the compact

parallel-plate chassis, direct feeder, intake, and flywheel shooter.

The success of the wooden version demonstrated that prototype materials do not always produce prototype-level performance. When designed properly, a quickly manufactured robot can provide meaningful competition experience while the final system continues developing.

Generation Two: CNC-Machined Polycarbonate

After the early qualifier experience, the team replaced the wooden drivetrain plates with quarter-inch polycarbonate.

Polycarbonate provided:
Greater rigidity
More consistent dimensions
Better visibility through the chassis
Strong but ductile construction
Improved resistance to match impacts
Faster production than a complete machined-aluminum chassis
The students CNC-machined the new plates and transferred the functioning mechanisms onto the more refined structure.

This version allowed the team to continue improving BALL-E while preserving the basic parallel-plate architecture and modular subsystem mounting.

Generation Three: Sponsor-Produced Aluminum Worlds Robot

For the FIRST Championship, ENIGMA completed its most significant revision.

The final BALL-E used custom pocketed one-eighth-inch aluminum plates produced locally by sponsor VBS Manufacturing from the students' designs.

The Worlds version was not simply the same mechanisms installed on metal plates. It represented a broad redesign that incorporated lessons from the entire regional season:
Compact 12.5-by-13-inch drivetrain
Approximately 500 RPM drive speed
Four-stage, two-motor floating intake
Faster direct transfer to the shooter
Redesigned dual-servo turret
Increased launcher inertia
Limelight corrective feedback
Improved electronics access
Partner-compatible autonomous variants
Servo-powered tilt mechanism
Better packaging
Improved structural rigidity

Reduced drivetrain weight
The three versions demonstrated a mature engineering approach: build quickly, compete early, collect real evidence, and invest in final materials only after the design has earned that investment.
Compact DrivetrainBALL-E's drivetrain measured approximately 12.5 inches wide by 13 inches long.

The compact footprint supported several strategic objectives:
Leaving more room for other mechanisms
Moving through traffic more easily
Reaching endgame parking requirements
Increasing the possibility of a double park
Reducing total chassis mass
Making the robot more difficult to block
The team geared the drivetrain to approximately 500 RPM to support faster artifact cycles.

A parallel-plate architecture provided a rigid base while offering flexible mounting locations for the intake, turret, electronics, odometry, and tilt system.
Pocketed Aluminum PlatesThe final Worlds chassis used pocketed one-eighth-inch aluminum.

Pocketing reduced the total drivetrain weight by approximately 27.5 percent and reduced the individual plate weight by approximately 63.5 percent while preserving supports around load-bearing areas.

Students learned that weight reduction does not mean removing material indiscriminately. The CAD needed to preserve structural paths around bearings, motors, fasteners, and subsystem mounting points.

VBS Manufacturing converted the students' CAD into accurate laser-cut parts, giving ENIGMA a direct connection between student design and local professional manufacturing.
Accessible ElectronicsThe team experimented with several mounting orientations for the Control Hub and Expansion Hub.

The final design placed both hubs facing outward. This made wiring, inspection, troubleshooting, and repairs easier between matches.

A polycarbonate cover protected the electronics from robot contact while still allowing students to see and access the wiring.

This was an example of designing not only for normal operation, but also for maintenance and competition serviceability.
"Touch It, Own It"ENIGMA concluded that intake performance would be one of the largest determinants of success.

The robot needed to drive into a group of artifacts and acquire them without stopping. Students called this approach "touch it, own it."

For the concept to work, the intake's surface speed needed to exceed the drivetrain's ground speed. Otherwise, BALL-E could drive into artifacts faster than the intake could pull them inside.

The final intake used four stages and two motors.

The front stage was mounted on a servo-controlled floating arm. It used 48-millimeter Gecko wheels for grip and Vector wheels on the outer edges to center artifacts.

The remaining stages used additional Gecko wheels, with the final stage incorporating two-inch surgical-tubing rollers to transfer artifacts into the shooter.

A printed ramp maintained compression through the system.

Separating the front intake and rear transfer across two motors allowed both systems to run at high speed without placing the entire load on one motor.

Intake Speed CalculationsThe final design used approximately:

2,160 RPM at the first stage

1,620 RPM at the second stage

1,800 RPM through the later transfer stages

The students compared the roller circumference and rotational speed with the drivetrain's expected surface speed.

Their objective was to ensure that the intake pulled artifacts inward faster than BALL-E approached them.

This transformed "touch it, own it" from a slogan into a measurable engineering requirement.

Three Intake GenerationsThe intake received more iteration than any other BALL-E subsystem.

Intake V1

The first intake:

Used one motor

Held only two artifacts

Struggled to raise artifacts over its ramp

Transferred slowly into the shooter

Often depended on collecting against a wall

This version helped the students verify basic roller concepts but did not meet the desired cycle speed.

Intake V2

The second intake:

Used one motor

Could hold three artifacts

Collected while BALL-E was moving

Still transferred slowly

Struggled in corners

Used rubber-band hubs that were prone to breaking

V2 improved capacity and mobility, but the limitations became more obvious as the drivetrain and shooter became faster.

Intake V3

The final Worlds intake:
Was three artifacts wide
Could collect at full driving speed
Used a fast four-stage transfer
Included adjustable compression
Split intake and transfer power between two motors
Centered artifacts with Vector wheels
Used a printed ramp to preserve compression
Reduced the possibility of motor stalling
Introduced greater mechanical complexity
The V3 system fulfilled the original “touch it, own it” vision more completely than the earlier designs.
Intake PrototypingEarly intake prototypes used a handheld drill to test roller materials and arrangements.

Students compared:
Surgical tubing
Flexible wheels
Rubber-band rollers
Gecko wheels
Vector wheels
Different roller diameters
Different compression levels
Different transfer speeds
The first-stage design eventually changed from surgical tubing to rubber bands because tubing struggled to lift several artifacts in sequence.

Students tested roller diameters from three to 4.5 inches and found that the larger roller performed best.

Additional refinements included:
More stretch-resistant rubber bands
Greater intake width
Grip tape on the front ramp
Thicker printed hubs
Larger internal fillets
Stronger printed holders
Better centering geometry
Separate transfer power
Some changes appeared minor individually, but together they substantially increased cycle speed and reliability.
Weighted Flywheel LauncherBALL-E used a hooded flywheel launcher.

The final Worlds configuration included:
Two bare goBILDA motors

GT2 belt transmission
One goBILDA Rhino flywheel
One 96-millimeter SWYFT steel flywheel weight
Three 72-millimeter steel weights
Servo-operated artifact gate
Servo-adjustable hood
The additional steel mass increased rotational inertia.

When an artifact contacted the launcher, some of the wheel’s stored energy transferred into the shot. A lightweight wheel could slow significantly after each artifact, changing the trajectory of the next one.

The weighted system resisted that speed loss, helping BALL-E fire several artifacts in rapid succession without waiting for the launcher to recover fully between shots.
Adjustable HoodAn Axon Mini servo adjusted the shooter hood.

Changing hood angle altered artifact trajectory and gave the team another method of controlling range beyond changing flywheel velocity.

The combination of variable wheel speed and adjustable angle allowed BALL-E to shoot from much of the legal scoring area.

This flexibility reduced the need to drive to one exact shooting location and made the robot more difficult for opponents to disrupt.
Turret V1The first turret used:
One motor
Lazy-susan bearing
Belt-driven rotation
Studica encoder
Belt tensioners
Approximately 33.9 kg-cm stall torque
It could rotate quickly under no load, but the system experienced belt skipping and additional tension increased friction.

The motor also occupied valuable vertical space.
Turret V2The final turret used:
Two Axon Mini servos
One-to-one gearing
Custom printed gear chain
AndyMark lazy-susan bearing
Approximately 50 kg-cm combined stall torque
Servo positioning mode
Compact horizontal packaging
The dual-servo turret rotated somewhat more slowly with no load, but it provided greater torque, eliminated belt skipping, reduced the vertical footprint, and freed a motor port for another mechanism.

The design represented a deliberate tradeoff. The team sacrificed some theoretical no-load speed for reliability, packaging, torque, and position control.
Pass-Through ArchitectureBALL-E's intake collected artifacts at the front and transferred them through the chassis to the rear-mounted launcher.

The pass-through design minimized changes in artifact direction and allowed the intake and shooter to function as one continuous system.

Because the launcher sat on a turret, BALL-E could continue facing a useful driving direction while the shooter independently aimed at the target.

This reduced wasted turning and supported faster cycles.
PID-Controlled ShooterThe shooter used PID velocity control.

Battery voltage changes throughout a match. A motor commanded only by percentage output can change speed as the battery drains or other mechanisms draw current.

The PID controller measured actual flywheel velocity, compared it with the desired velocity, and adjusted motor output to reduce the error.

This allowed BALL-E to maintain more consistent shot behavior under changing electrical conditions.
Field-Oriented DrivingBALL-E used field-oriented drive controls.

In conventional robot-oriented driving, joystick direction is tied to the robot's front. If the chassis rotates, the meaning of "forward" changes.

With field-oriented control, joystick direction remains tied to the field.

This simplified driving while the turret operated independently and reduced the mental load placed on the driver.
Mathematical Goal TrackingBALL-E used odometry to estimate its location and heading.

The programming team calculated the angle between the robot and the goal, then commanded the turret to face that direction.

This required students to combine:
Robot coordinates
Goal coordinates
Robot heading
Turret heading
Encoder information
Trigonometric calculations
PID feedback
The result was an automatic aiming system that reduced the need for the driver to align the entire chassis before every shot.

Limelight Corrective VisionOdometry provides continuous position estimates, but those estimates can drift if the robot is hit, pushed, or lifted enough for the tracking wheels to lose reliable contact.

To address that limitation, the final BALL-E mounted a Limelight camera on the turret.

The mathematical odometry system remained the primary aiming method. Limelight vision provided an additional source of feedback by observing the AprilTag near the goal.

The combined system gave the team two complementary sources of information:
Odometry and mathematics for continuous aiming
Vision for correcting accumulated position error
The students learned that sensing systems do not always need to compete for selection. Different sensors can address different weaknesses when integrated thoughtfully.
Driver FeedbackBALL-E used a light indicator to communicate shooter conditions.

The software evaluated the robot's position relative to the goal and linked that location to suitable hood and velocity settings.

Different light colors communicated range information to the driver. A red indication warned that BALL-E occupied one of the limited areas from which the robot could not make a reliable shot.

The system translated complicated position and launcher calculations into immediate visual feedback.
Pedro PathingBALL-E used Pedro Pathing for autonomous control.

The system worked with the goBILDA Pinpoint Odometry Computer to estimate the robot's position and velocity.

Pedro Pathing used that feedback to follow predetermined trajectories and correct movement error.

The team reported repeatability approaching one inch under suitable conditions.
Pedro Pathing IvyThe programming team also used Pedro Pathing Ivy to organize commands and mechanism actions dynamically.

Instead of writing every autonomous routine as one long sequence, students could define reusable actions and tell the robot what needed to happen.

Commands could evaluate robot status and determine when an action should begin or finish.

This made autonomous development faster, more organized, and easier to adapt.
Alliance-Compatible Autonomous RoutinesENIGMA recognized that a powerful autonomous routine is not useful when it conflicts with an alliance partner.

BALL-E could run from:
Red alliance, close side
Red alliance, far side

Blue alliance, close side
Blue alliance, far side
The team also created variants within those starting configurations to reduce the likelihood of route conflicts or collisions.

This flexibility made ENIGMA more useful to different partners and reflected the team's broader alliance philosophy: the best plan is not always the one that maximizes BALL-E alone, but the one that produces the strongest combined alliance.
Servo Tilt Endgame SystemBALL-E's compact drivetrain supported the endgame park, but the team wanted to reduce its occupied floor area further and improve the possibility of a double park.

Students considered two major mechanisms:
A drivetrain power-take-off lift
A servo-powered tilt system
The PTO concept would redirect power from all four drivetrain motors through an engagement system. It offered substantial lifting ability but introduced mechanical complexity.

The servo tilt was simpler. Two Axon Max+ servos powered a rack-and-pinion mechanism that raised the front of the robot.

The team used a weighted decision matrix and selected the servo tilt.
Tilt Torque and Failure AnalysisThe two servos provided an estimated combined stall torque of 68 kg-cm.

The team calculated the approximate torque needed to lift the robot and targeted a sub-three-second deployment.

During full-weight testing, the printed PETG rack snapped.

Rather than abandoning the mechanism, students analyzed the load and changed the rack material to carbon-fiber-reinforced nylon.

The Nylon-CF rack survived the intended load and produced a more reliable system.

This became one of the season's clearest examples of engineering through controlled failure:
Calculate the expected load.
Build the mechanism.
Test it at full weight.
Identify the failed component.
Change the material.
Retest the complete system.
Complementary Alliance SelectionAt both qualifiers, ENIGMA finished first after qualification matches.

The obvious conventional decision would have been to select the second-ranked robot and form what appeared on paper to be the strongest possible alliance.

The students chose a more thoughtful path.

They evaluated which teams complemented BALL-E's abilities, autonomous routines, scoring priorities, reliability, and strategy. They looked beyond ranking alone and selected teams they believed could create stronger overall alliances.

These decisions brought lower-seeded teams into prominent playoff roles and created more competitive, less predictable elimination rounds.

For the selected teams, the experience meant more than an alliance number.

After one event, a parent approached an ENIGMA coach and explained that the team could never fully understand what the selection had meant to her students. Competing alongside ENIGMA gave them a tremendous boost in confidence, excitement, and belief in what their own program could become.

ENIGMA did not select partners as an act of charity. The students made strategic choices based on compatibility. Yet those choices also demonstrated one of the most meaningful qualities of FIRST: competitive decisions can strengthen other students and programs while still producing exciting, high-level matches.
Albuquerque QualifierENIGMA entered the Albuquerque Qualifier with the early wooden version of BALL-E.

The robot's quickly manufactured chassis allowed the team to compete with a functioning intake and shooter while more advanced systems continued development.

ENIGMA completed qualifications undefeated at 5–0 and ranked first among 17 teams.

As the top-ranked alliance captain, the students selected Team 7813, Alpha Hawks, based on the alliance's combined capabilities rather than simply choosing the next team in the rankings.

The alliance advanced through the playoff bracket and reached the championship match, finishing as the Finalist Alliance.

ENIGMA also earned the Inspire Award, recognizing the team's strength across engineering, performance, outreach, sustainability, mentoring, organization, and presentation.

The wooden BALL-E had done exactly what it was designed to do: get onto the field quickly, perform competitively, and expose the next areas for improvement.
Alamogordo QualifierBy Alamogordo, BALL-E had continued evolving.

ENIGMA finished qualifications at 4–1 and again ranked first, this time among 15 teams.

The students again resisted selecting by ranking alone. They chose Team 15789, Lovington RoboCats, because its capabilities complemented ENIGMA's intended match strategy.

The alliance recovered from a narrow upper-bracket loss, produced a dominant lower-bracket victory, and reached the championship final.

ENIGMA finished as the Finalist Alliance Captain and received second-place Inspire Award recognition.

The two qualifier results were competitive successes, but the alliance-selection decisions also made the events more exciting and gave other students the opportunity to experience high-pressure championship matches.
New Mexico ChampionshipAt the New Mexico Championship, ENIGMA completed qualification matches undefeated at 5–0 and ranked second among 18 teams.

As captain of the second alliance, ENIGMA selected rookie sister team Mechanical Error 33778.

This alliance was the culmination of a year-long investment.

ENIGMA had helped create Mechanical Error, mentored its members two to three times each week, shared a workshop and tools, provided technical guidance, and helped its first- and second-year students develop into an independent competition team.

Together, ENIGMA and Mechanical Error won all three playoff matches:
149–98
184–64
164–72
ENIGMA became the New Mexico Winning Alliance Captain, and Mechanical Error became the first selection of the Winning Alliance.

ENIGMA also earned the Inspire Award and Compass Award.

The alliance victory showed that developing another team does not weaken a veteran program. When knowledge is shared well, the entire region becomes stronger—and someday the students being mentored may become the partners who help win a championship.
Fourth Trip to WorldsThe New Mexico Championship qualified ENIGMA for its fourth FIRST Championship.

The team competed in the Jackson Division with the final aluminum version of BALL-E.

The Worlds robot represented the accumulated lessons of the season:
Three drivetrain materials
Three major intake generations
Two turret generations
Advanced shooter inertia
Faster direct transfer
Pedro Pathing and Ivy
Four-wheel odometry
Pinpoint localization
Multiple autonomous variants
Limelight correction
Compact servo tilt

Improved electronics access
Sponsor-produced aluminum structure
ENIGMA completed Worlds qualifications with a 4–6 record and ranked 40th in the 55-team division.

The team did not advance into the division playoffs, but the Championship provided the clearest measure of world-level cycle speed, autonomous capability, shooter precision, localization, and strategic execution.

BALL-E’s final form proved how much the students could accomplish when they treated every event as another design review rather than a finish line.
A Season of LegacyFour seniors were preparing to graduate from ENIGMA.

They possessed years of knowledge in CAD, fabrication, strategy, driving, outreach, leadership, and team culture. Losing that experience all at once could have created a significant gap.

The team therefore made legacy a deliberate season goal.

Veteran students did not wait until the final event to begin explaining their work. They:
Trained younger drivers.
Shared strategy responsibilities.
Involved developing students in CAD.
Assigned real fabrication work.
Taught inspection and maintenance routines.
Shared programming practices.
Encouraged younger members to speak with judges.
Mentored students through mistakes.
Allowed new leaders to make decisions.
Documented the reasoning behind mechanisms.
Helped students understand not only what to do, but why.
The senior students successfully passed the baton.

Their departure would not mark the loss of everything they knew. They planned to return as alumni mentors, joining the growing cycle in which former ENIGMA students come back to guide the next generation.

The final measure of their season was therefore larger than trophies or rankings. They left behind students prepared to drive, design, build, program, lead, and eventually mentor others.

GOALS

Build a Top-100 Competitive RobotENIGMA established a SMART goal of building a robot capable of reaching the top 100 in offensive performance.

The goal was not merely about statistical recognition.

A high-performing robot could:
Work with stronger alliances.

Increase opportunities to learn from elite teams.
Attract technical partners.
Build student confidence.
Represent New Mexico nationally.
Reveal the standards required for world-level competition.
Return to WorldsThe team wanted to earn another invitation to the FIRST Championship through its regional performance.

ENIGMA achieved this by becoming the New Mexico Winning Alliance Captain and earning the Inspire Award.

DECODE marked the team's fourth trip to Worlds.
Maximize Cycle SpeedEvery major BALL-E subsystem was designed around reducing wasted time.

This included:
High-speed drivetrain
Wide floating intake
Intake surface speed above drive speed
Direct transfer
Weighted launcher
Rapid multi-artifact firing
Independent turret
Multiple shooting locations
Driver feedback
Automatic aiming
Acquire Artifacts Without Slowing DownThe "touch it, own it" intake needed to collect artifacts while BALL-E continued moving.

Students converted this into a mechanical and mathematical requirement by comparing intake surface speed with drivetrain speed.
Fire Rapidly and ConsistentlyThe launcher needed to fire several artifacts with minimal loss of wheel velocity.

The weighted flywheel, PID velocity control, direct transfer, and servo gate all supported that goal.
Shoot From Most of the FieldBALL-E needed to avoid dependence on one fixed scoring location.

The adjustable hood, variable shooter velocity, turret, odometry, Limelight, and mathematical tracking allowed the robot to score from many positions and headings.
Reduce Driver WorkloadThe team wanted automation to handle repetitive alignment and mechanism adjustments.

The turret automatically tracked the goal, field-oriented drive simplified chassis movement, and colored lights communicated useful shooting information.
Pursue Ranking PointsThe compact chassis, autonomous flexibility, scoring capability, and servo tilt were developed in part to pursue multiple ranking points.

The team wanted BALL-E to attempt all available ranking-point objectives rather than relying only on winning matches.

Remain Compatible With Alliance PartnersENIGMA wanted autonomous routines and match strategies that could adapt to different partners.

The team created red, blue, close-side, far-side, and route variants to reduce autonomous conflicts.
Make Strategic Alliance SelectionsThe team wanted to evaluate complete alliance compatibility rather than selecting partners based only on ranking.

Students considered:
Autonomous compatibility
Scoring strengths
Reliability
Cycle speed
Defense
Driver control
Communication
Ability to complement BALL-E
This approach produced exciting qualifiers and meaningful opportunities for developing teams.
Spread STEAM in New MexicoENIGMA continued promoting robotics through public demonstrations, camps, school programs, FIRST events, social media, and community partnerships.
Create and Develop FIRST TeamsThe team set a goal of forming new teams and strengthening existing ones.

That included:
Creating Mechanical Error 33778
Supporting SPQR 27413
Mentoring Gearheads^2 31652
Helping Hack City 21797
Mentoring nine robotics teams at Desert Ridge
Supporting FLL events and programs
Preserve Team LegacyWith four seniors graduating, ENIGMA needed to transfer skills and responsibilities before the season ended.

The goal was for younger students to leave DECODE prepared to assume:
Drive-team positions
Strategy roles
CAD responsibilities
Programming projects
Fabrication work
Outreach leadership
Business duties
Team-culture stewardship
Build Alumni MentorsGraduating students were encouraged to remain connected as alumni mentors.

This allowed ENIGMA to preserve experience without preventing younger members from becoming the primary student leaders.

Improve Team SustainabilityThe team recognized that new members needed meaningful roles, not merely attendance.

ENIGMA created structured opportunities through:
Sister-team development
Guided programming projects
Onshape training
Free-building exercises
Robot retrofits
Drive-team training
Outreach leadership
Portfolio contributions
Mentoring relationships
Manage Resources ResponsiblyENIGMA sought to lower costs through:
Prototype materials
Reused components
Modular mechanisms
Sponsor manufacturing
Careful budgeting
Repairable designs
Parts carried over from prior robots
The wood-to-polycarbonate-to-aluminum progression demonstrated responsible investment: test first, refine second, and commit final resources after the design is proven.

Lessons learned

Build Early, Even When the Material Is TemporaryThe wooden BALL-E allowed ENIGMA to reach the field quickly.

Students learned that a functional early robot provides more value than a perfect design that never receives enough testing.

Competition revealed problems that would have been difficult to identify in CAD alone.
Prototype Material Is an Engineering ChoiceWood was not used because the team lacked a better idea.

It was selected because it was inexpensive, fast to laser cut, easy to revise, and appropriate for early validation.

Polycarbonate provided a stronger intermediate platform, while aluminum became appropriate after the final geometry was understood.
A Robot Can Be Redesigned More Than OnceThe team did not treat replacing a chassis as evidence that the earlier work was wasted.

Each version answered different questions:
Wood proved the concept.
Polycarbonate improved stiffness and visibility.
Aluminum delivered the final competition structure.
Rankings Do Not Tell the Whole StoryA second-ranked robot is not automatically the best partner.

ENIGMA's students learned to evaluate the actual combination of two machines and two drive teams.

Autonomous routes, scoring roles, reliability, communication, and strategic fit could matter more than qualification rank.
Competitive Choices Can Change Other Students' SeasonsThe parent's comments reminded ENIGMA that alliance selection has a human impact.

Being selected communicates trust. For a developing team, that trust can strengthen confidence and motivate students long after the event ends.
Speed Begins at the IntakeA high-performance shooter cannot compensate for slow artifact acquisition.

The team learned that cycle time begins at first contact with the game piece.
Intake Surface Speed Must Match StrategyTo collect while driving at full speed, intake surface speed needed to exceed drivetrain surface speed.

This connected calculations directly to match behavior.
Splitting Loads Improves ReliabilityThe single-motor intake experienced transfer limitations.

Using separate intake and transfer motors increased available speed and reduced the risk of one overloaded motor stalling the entire system.
Mechanical Complexity Must Earn Its PlaceThe V3 intake was more complicated than earlier designs.

The team accepted the complexity because it produced clear benefits in width, speed, transfer, and stall prevention.

Complexity was justified by measured performance rather than novelty.
Small Changes AccumulateGrip tape, roller diameter, hub thickness, compression, intake width, and wheel selection each contributed to the final system.

Not every improvement requires a complete redesign.
Stored Energy Supports Rapid ShootingThe flywheel weights helped preserve velocity through successive shots.

Students learned how moment of inertia can improve a mechanism's resistance to speed change.
PID Reduces Electrical VariabilityFixed motor power could not guarantee fixed shooter speed as battery voltage changed.

Feedback control gave the launcher a way to respond.
Faster Is Not Always BetterTurret V1 rotated more quickly without load, but it skipped belts and occupied more space.

Turret V2 was somewhat slower but offered greater torque, better packaging, reliable gearing, and position control.

The best mechanism is not necessarily the one with the highest isolated speed.
Vision and Odometry Solve Different ProblemsOdometry provided continuous field position but could drift after heavy contact.

Limelight vision could observe the field target and help correct error.

Combining them produced a more resilient system than relying entirely on either source.
Partner Compatibility Is Part of Autonomous QualityAn autonomous routine is not truly successful when it blocks or collides with an alliance partner.

The team learned to judge autonomous performance at the alliance level.
Full-Load Testing Is EssentialThe servo tilt appeared promising until the PETG rack was tested under the robot's full weight.

The failure exposed a material limitation before the most important match.
Material Properties MatterChanging from PETG to Nylon-CF improved the rack's ability to survive load.

Students learned that geometry alone does not determine part strength.
Accessibility Saves Competition TimeOutward-facing hubs and modular mechanisms made BALL-E easier to inspect and repair.

A few minutes saved in the pit can determine whether a robot returns for its next match.
Teach Before GraduationKnowledge transfer cannot wait until the last meeting.

The seniors passed on skills throughout the season, giving younger members time to practice while experienced students were still available to help.
Legacy Means Releasing ResponsibilityVeteran students had to allow younger teammates to drive, decide, build, and sometimes make mistakes.

Passing the baton requires more than explaining a task. It requires trusting the next person to perform it.
Alumni Mentors Preserve Culture Without Preventing GrowthGraduates returning as mentors can preserve institutional knowledge while leaving student ownership with the active team.
A Strong Team Strengthens Its RegionSupporting Mechanical Error, selecting complementary alliance partners, mentoring other teams, and hosting events did not diminish ENIGMA.

Those efforts created stronger partners, more competitive tournaments, and a healthier New Mexico robotics community.

Skills and growth

Strategic Decision MatricesStudents compared direct feeding with a spindexer and servo tilt with a PTO lift.

They learned to:
Define criteria.
Assign importance weights.
Score alternatives.
Compare tradeoffs.
Document the reasoning behind a decision.
Rapid PrototypingThe wood-frame BALL-E demonstrated how laser-cut materials can move a concept from CAD to a

functioning robot quickly.

CNC ManufacturingStudents produced the intermediate polycarbonate chassis using CNC machining.

They gained experience with:

Workholding

Toolpaths

Hole placement

Material behavior

Tolerances

Part finishing

Assembly fit

Professional ManufacturingThe final aluminum plates taught students how to prepare designs for an external manufacturing partner.

They needed to deliver accurate files and account for the capabilities of the cutting process.

Lightweight Structural DesignPocketing introduced students to the balance among:

Weight

Rigidity

Load paths

Bearing support

Fastener placement

Impact resistance

Manufacturing time

Drivetrain GearingStudents calculated gearing to produce approximately 500 RPM drivetrain speed.

They learned how motor speed, gear ratio, wheel diameter, acceleration, and controllability influence cycle time.

Four-Stage Intake DevelopmentThe final intake developed skills in:

Roller selection

Surface speed

Compression

Centering

Transfer geometry

Motor load

Belt and gear transmission

Floating mechanisms

Servo adjustment

Printed ramps

Jam prevention

Surface-Speed CalculationsStudents compared intake-wheel surface speed with drivetrain surface speed to verify the "touch it, own it" requirement.

Dual-Motor Load DistributionSeparating intake and transfer power taught students how subsystem partitioning can improve performance and reduce stall risk.

Flywheel EngineeringThe launcher introduced:

Rotational inertia

Recovery time
Surface speed
Compression
Release angle
Belt transmission
Velocity control
Shot repeatability
Adjustable TrajectoryStudents used hood angle and flywheel speed together to change artifact range.
Turret DesignThe two turret generations developed skills in:
Lazy-susan bearings
Belt drives
Printed gears
Servo mode
Encoders
Gear reduction
Mechanical limits
Wire management
Packaging
Torque comparison
PID ControlPID controllers regulated shooter velocity and turret heading.

Students gained experience with:
Error
Proportional response
Integral accumulation
Derivative damping
Overshoot
Oscillation
Settling time
Steady-state accuracy
Field-Oriented DrivingStudents transformed joystick commands using robot-heading information so controls remained aligned with the field.
Coordinate Geometry and TrigonometryAutomatic goal tracking required the programmers to calculate the desired angle between BALL-E and the target.
Sensor FusionBALL-E combined:
Pinpoint odometry
Four dead wheels
Turret feedback
Limelight vision
Mathematical target calculations
Students learned how multiple information sources can improve system resilience.
Pedro PathingThe programming team created trajectories that responded to position and velocity feedback.
Pedro Pathing IvyStudents organized autonomous behavior into reusable actions and dynamic commands.
Autonomous Variant PlanningThe team developed routines for multiple alliances, sides, and partner configurations.

This required programming, field strategy, communication, and testing to work together.
Driver Feedback DesignColored lights converted position and shooter data into information the driver could interpret quickly.
Servo Tilt EngineeringThe endgame mechanism developed skills in:
Rack-and-pinion systems
Servo torque
Safety factors
Shock-load protection
External gearing
Material selection
Failure analysis
Endgame packaging
PETG and Nylon-CF ComparisonThe failed PETG rack and successful Nylon-CF replacement gave students a practical lesson in material strength and loading.
Electronics ServiceabilityThe outward-facing hubs and polycarbonate protection developed skills in wiring organization, protection, inspection, and fast repairs.
Alliance ScoutingENIGMA's nontraditional selections required deeper scouting than reading rankings.

Students evaluated how robots would function together.
Drive-Team SuccessionYounger members received meaningful practice and responsibility so driving knowledge would not leave with the graduating seniors.
Leadership SuccessionSeniors developed younger students in:
Shop organization
Decision-making
Match strategy
Team communication
Mentoring
Competition etiquette
Problem solving
Mentoring as Technical MasteryTeaching Mechanical Error and other teams required ENIGMA students to explain systems clearly and diagnose problems on robots they had not designed.
Business and SustainabilityStudents worked on:
Budgets
Sponsor relations
Marketing
Apparel
Giveaways
Social media
Event hosting
Fundraising
Community partnerships
Growth Beyond BALL-EDECODE showed that engineering includes far more than producing a final robot.

Students learned to ask:

What strategy creates the most value?

Which design criteria matter most?

How quickly can we test an idea?

What material is appropriate at this stage?

How can we manufacture the next version?

Does the intake outrun the drivetrain?

How do we preserve shooter velocity?

How do we correct localization drift?

Can our autonomous work with any partner?

Which team complements our strengths?

How will this decision affect other students?

Who will know how to do this after the seniors graduate?

What knowledge must become part of the team rather than remain with one person?

Those questions represent a team learning not only how to build a robot, but how to build a sustainable engineering program.

Competitions

New Mexico FTC Albuquerque Qualifier

Dec 13, 2025 · Albuquerque, New Mexico

Finalist Alliance Captain, Inspire Award Winner

The Albuquerque Qualifier was BALL-E's first official DECODE competition and the competitive debut of the team's rapidly manufactured wood-frame robot.

ENIGMA used laser-cut quarter-inch oak plywood to get a complete robot onto the field quickly. Although this was the earliest of three major BALL-E versions, it performed well and gave the students valuable competition data before they committed to the final chassis material and mechanism layouts.

ENIGMA completed qualification matches undefeated with a 5–0 record and ranked first among 17 teams.

As the top-ranked alliance captain, ENIGMA did not automatically select the second-ranked team. The students evaluated autonomous compatibility, scoring roles, reliability, and how each potential partner would complement BALL-E. They selected Team 7813, Alpha Hawks.

The alliance won its opening playoff match, experienced a loss in the upper bracket, recovered through the lower bracket, and advanced to the championship final.

ENIGMA finished as the Finalist Alliance Captain.

The team also earned the Inspire Award, the event's highest overall judged honor. The award recognized ENIGMA's robot performance, engineering, outreach, mentoring, organization, sustainability, and presentation.

The event validated the direct-feeder and rapid-shooter strategy while identifying areas for continued development, including the turret, aiming system, intake transfer, drivetrain rigidity, and driver feedback.

It also demonstrated the value of building early. The wood-frame BALL-E was not the season's final robot, but it gave the students the real field experience needed to design the next version intelligently.

New Mexico FTC Alamogordo Qualifier

Jan 17, 2026 · Alamogordo High School, Alamogordo, New Mexico

Finalist Alliance Captian, 2nd Place Inspire Award

BALL-E entered the Alamogordo Qualifier with substantial improvements in shooting flexibility, turret control, intake reliability, and software.

ENIGMA completed qualifications with a 4–1 record and again ranked first, this time among 15 teams.

For the second consecutive qualifier, the students chose not to make the automatic ranking-based selection. Instead, they looked for a team whose strengths complemented BALL-E and selected Team 15789, Lovington RoboCats.

The alliance won its opening playoff match before losing a close upper-bracket contest. ENIGMA and RoboCats recovered with a dominant lower-bracket victory and advanced to the finals.

They won the opening final but ultimately finished as the Finalist Alliance.

ENIGMA also received second-place Inspire Award recognition.

The alliance choice gave a lower-seeded team an opportunity to compete deep into the playoffs alongside ENIGMA. After one qualifier, a parent told an ENIGMA coach that the team might never fully understand what the selection had meant to her students. Being trusted as an alliance partner gave their entire program a powerful boost in confidence and excitement.

The event showed that competitive strategy and positive student impact do not need to be separate goals. ENIGMA selected based on genuine complementarity, created a highly competitive alliance, and gave another group of students an experience they would remember.

Alamogordo also provided further evidence for the final Worlds redesign, including improvements to BALL-E's structure, transfer, turret, shooting range, autonomous flexibility, and serviceability.

New Mexico FIRST Tech Challenge DECODE Championship

Feb 21, 2026 · Menaul School, Albuquerque, New Mexico

Winning Alliance Captain, Inspire Award Winner

The New Mexico Championship brought together 18 teams competing for regional honors and advancement to the FIRST Championship.

ENIGMA completed qualification matches undefeated at 5–0 and ranked second.

As captain of the second alliance, ENIGMA selected rookie sister team Mechanical Error 33778.

This alliance represented much more than a scouting decision. ENIGMA had created Mechanical Error to give developing students greater responsibility, mentored the team two to three times each week, shared its workshop and tools, and helped its members learn fabrication, electronics, programming, CAD, strategy, judging, and competition preparation.

Together, ENIGMA and Mechanical Error won all three playoff matches:
149–98
184–64
164–72
The alliance completed the playoffs undefeated at 3–0

2026 FIRST Championship — Jackson Division Sponsored by Qualcomm

Apr 29, 2026 · George R. Brown Convention Center, Houston, Texas

4–6 Record, 40th out of 55 teams

ENIGMA represented New Mexico in the Jackson Division at the 2026 FIRST Championship.

The team arrived with the third and most advanced version of BALL-E.

The final Worlds robot used custom laser-cut aluminum plates produced by VBS Manufacturing and incorporated lessons from the entire season:
Compact 12.5-by-13-inch chassis
Approximately 500 RPM drivetrain
Four-stage, two-motor floating intake
Direct high-speed shooter transfer
Weighted flywheel system
Adjustable hood
Dual-servo turret
Mathematical goal tracking
Limelight corrective feedback
Field-oriented drive
Pinpoint odometry
Pedro Pathing and Ivy
Multiple partner-compatible autonomous variants
Servo-powered endgame tilt
Improved electronics access
ENIGMA completed ten qualification matches with a 4–6 record and ranked 40th out of 55 teams.

BALL-E earned four victories, including alliance scores of:
177–75
286–251
164–77

Outreach

Total people reached: 2,488

Total volunteers: 61

Creating Mechanical Error 33778ENIGMA founded rookie FTC Team Mechanical Error 33778 to give less-experienced students greater hands-on responsibility.

Mechanical Error consisted primarily of first- and second-year FTC members.

The teams shared:
Workshop space
Tools
Field access
Mentors
Parts
Manufacturing capability
Technical knowledge
Program resources
ENIGMA worked with the sister team two to three times each week.

The students began by free-building a robot to learn FTC hardware, electrical systems, and construction. They competed with that learning robot at their early qualifiers.

As their skills developed, they used Onshape to design and build a custom robot for the New Mexico Championship.

Mechanical Error's season culminated in being selected by ENIGMA and becoming a member of the New Mexico Winning Alliance.
Why the Sister-Team Model MatteredCreating a second team prevented newer students from becoming permanent assistants to veteran members.

They needed to:
Make design decisions.
Wire their own robot.
Solve mechanical failures.
Write and debug code.
Speak with judges.
Develop match strategy.
Pass inspection.
Maintain their pit.
Experience responsibility for results.
ENIGMA provided guidance without removing ownership.

The model created a stronger developmental pipeline and prepared more students for future leadership.

Complementary Alliance Selection as Student ImpactENIGMA’s qualifier alliance selections became a form of competitive outreach.

The students selected partners they believed complemented BALL-E, even when those teams were ranked lower than the conventional choice.

For selected students, joining ENIGMA in the playoff bracket brought recognition, excitement, and confidence.

The parent who approached the coach after one event made the impact especially clear: being chosen had lifted the students’ belief in themselves and their team.

This demonstrated that outreach is not limited to demonstrations outside competition. The way a successful team treats, evaluates, includes, and trusts other teams can have a powerful effect within the competition community itself.
Desert Ridge MentoringCo-captain Callahan helped mentor nine robotics teams at Desert Ridge Middle School.

The program reached approximately 50 students each week.

Students received experience in:
Mechanical design
Programming
Teamwork
Problem solving
Competition preparation
Technical communication
The program helped create a progression from introductory robotics toward FTC and FRC.
Supporting Gearheads²ENIGMA supported rookie FTC Team Gearheads² 31652.

Assistance included:
Field setup
Programming
Mechanical troubleshooting
In-person visits
Online support
Competition preparation
Elliott served as a primary mentor while also leading ENIGMA’s programming work.
Supporting SPQRENIGMA helped SPQR 27413 gain access to a full field for testing.

The team also provided:
Tools
Parts
Workshop assistance
Online troubleshooting
Strategic support
Technical mentorship

Luke served as a primary mentor to SPQR.
Supporting Hack CityENIGMA helped teach FTC programming to developing members of Hack City 21797.

This strengthened regional programming knowledge while helping ENIGMA students grow as technical teachers.
Albuquerque FLL QualifierENIGMA helped host the Albuquerque FIRST LEGO League Qualifier for the third year.

The team:
Organized the event.
Recruited volunteers.
Provided food and drinks.
Filled event roles.
Coordinated with FTC Team 23974.
Received venue assistance from Hack City.
Used two judging panels to improve event flow.
Brought robots that visiting students could drive.
Approximately 250 people attended.
Interactive OutreachENIGMA improved demonstrations by allowing children to drive robots rather than only watching students speak.

Hands-on control helped young visitors understand that robotics was something they could participate in, not simply observe.
NASA Space Apps ChallengeENIGMA established a presence at the local NASA Space Apps Challenge.

The team connected with Albuquerque’s hackathon and technology community while creating potential pathways for:
New students
Alumni involvement
Professional mentors
Community partners
FIRST awareness
Kirtland Air Force BaseENIGMA operated a two-day robotics booth at Kirtland Air Force Base.

Students demonstrated FTC robots, promoted FIRST, and helped families identify robotics opportunities in their own communities.
FLL Explore FairENIGMA supported New Mexico’s FIRST LEGO League Explore Fair.

This allowed the team to encourage younger students at one of the earliest stages of the FIRST progression.
Social Media and LivestreamingThe team expanded its online presence by sharing:
Robot progress
Design revisions
Competition footage
Technical information
Team collaborations
Outreach activities
Event livestreams

Digital outreach extended ENIGMA's reach beyond those able to attend events in person.

Team MarketingStudents created:

Jerseys

Buttons

Graphics

Competition giveaways

FIRST AGE and DECODE-themed materials

These items promoted both ENIGMA and FIRST as a broader educational program.

Sponsor and Manufacturing PartnershipsThe final BALL-E displayed support from organizations including:

VBS Manufacturing

Department of Defense STEM

Ambitions Consulting Group

Leidos

Verus Research

VBS Manufacturing played a direct technical role by producing the students' final aluminum chassis plates locally.

These partnerships connected students with professional organizations while reducing the financial and manufacturing barriers associated with a custom robot.

Alumni MentorshipENIGMA's mentor group included former team members and FIRST alumni studying or working in engineering, robotics, computer science, and software.

The four graduating seniors planned to continue this cycle by returning as alumni mentors.

This allowed the team's accumulated experience to remain available while younger students became the primary owners of future robots.

Creating Mechanical Error 33778

Sep 1, 2025 · Manzano High School - Teen Tech Center · 6 reached · 5 volunteers

ENIGMA founded rookie FTC Team Mechanical Error 33778 to give less-experienced students greater hands-on responsibility.

Mechanical Error consisted primarily of first- and second-year FTC members.

Desert Ridge Mentoring

Desert Ridge Middle School · 35 reached · 3 volunteers

Co-captain Callahan helped mentor nine robotics teams at Desert Ridge Middle School.

The program reached approximately 50 students each week.

Spin Up and Mentoring Gearheads^2 New FTC Team

Boys and Girls Club - Gallup NM · 20 reached · 5 volunteers

ENIGMA supported rookie FTC Team Gearheads^2 31652.

Donated Field 1/2 Game set and help setup setup, programming, Mechanical troubleshooting, In-person visits, Online support. Competition preparation, Elliott served as a primary mentor while also leading ENIGMA’s programming work.

Supporting Teams Meetup Day

Manzano High School - Teen Tech Center · 35 reached · 4 volunteers

Teams meetup day for food and robots, help with code and build.

Hack City Java Coding Workshop

La Academia De Esperanza Charter School · 12 reached · 2 volunteers

Setup Android studio, basics on Java coding for FTC robotics including teleop and autonomous op modes, telemetry, and utility, also deploying code to the robot.

Annual Albuquerque FLL Qualifier

Dec 17, 52025 · La Academia De Esperanza Charter School · 250 reached · 17 volunteers

Organized event, provided food and drinks for the volunteers

ÏStudents, parents, and mentors volunteered to help run the event

along with FTC 23794

ÏHelp from FTC 21797 for providing the venue

ÏRecruited other volunteers to help fill additional roles.

Ï 3rd year hosting

ÏEstimated 250 people

NASA Space Apps Challenge

Albuquerque Institute of Math & Science · 30 reached · 2 volunteers

ENIGMA established a presence at the local NASA Space Apps Challenge.

The team connected with Albuquerque’s hackathon and technology community while creating potential pathways for:

New students

Alumni involvement

Professional mentors

Community partners

FIRST awareness

Kirtland Air Force Base Airshow

Kirtland Air Force Base · 1800 reached · 8 volunteers

ENIGMA operated a two-day robotics booth at Kirtland Air Force Base.

Students demonstrated FTC robots, promoted FIRST, and helped families identify robotics opportunities in their own communities.

FLL Explore Fair - State Championship

Menaul High School · 300 reached · 15 volunteers

ENIGMA supported New Mexico’s FIRST LEGO League Explore Fair.

This allowed the team to encourage younger students at one of the earliest stages of the FIRST progression.

Season highlights

ORIG_IMG_1195

ORIG_IMG_1205


001_IMG_0827


005_IMG_0848


010_IMG_0938


030_IMG_1048 (1)

038_IMG_1141

041_IMG_1115 (1)

042_IMG_1116

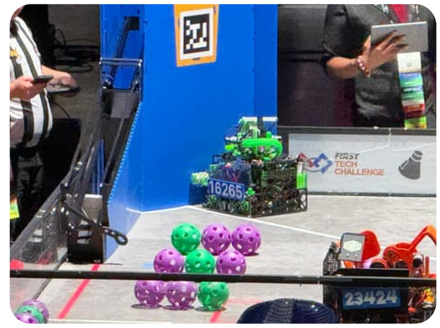
044_IMG_1119

065_IMG_1203

217_IMG_1321

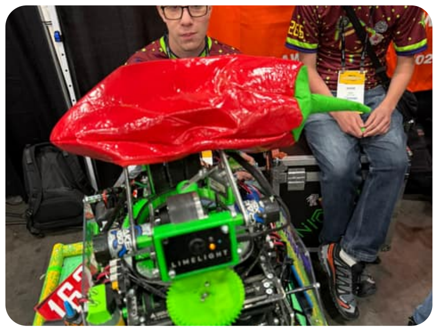
219_IMG_1323


222_005_IMG_20260429_221053



226_IMG_1328 (1)

227_019_20260430_111658

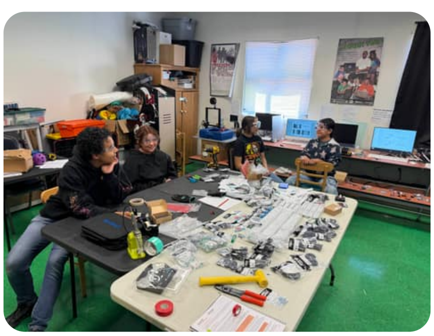

228_IMG_1335

230_IMG_1337


542_000_DSC_0062_Large

547_006_image


552_011_image


555_014_IMG_0959


557_016_IMG_0956


564_023_IMG_0947

570_030_8009536248684622887

572_032_IMG_0978

574_034_IMG_0976

1160_008_AGE8

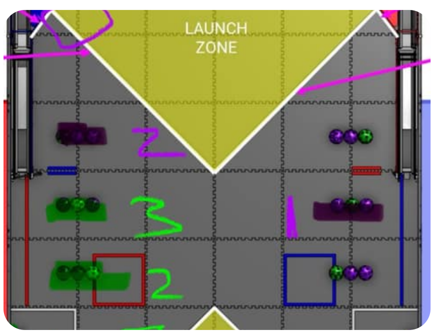
1184_003_87569128-90-BF-4FF6-B75B-5F9E834224F9

1186_007_IMG_0820

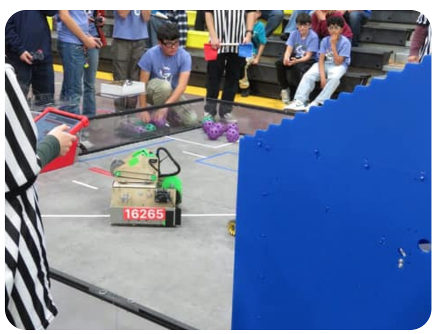
1394_064_IMG_1115

1421_091_IMG_8682

1440_130_IMG_6717



1468_188_IMG_6607



1413_083_IMG_1153

043_IMG_1146

028_112_20251101_165948