# *FIRST* Robotics Team 1756 Argos

## Celebrating 19 Years of Engineering Our Future

**Changing Lives**

**Transforming Our Community**

**Celebrating Engineering**

**Student Impact:**

Majority pursuing engineering, manufacturing or technical careers

25% Female Students (increase by 100% from 2022 season) due to student led outreach demos

In house robot manufacturing builds confidence and develops technical skills for entry level jobs (welding, CNC machining, plasma operation)

**Growing *FIRST***

Helped start 5 *FIRST* Lego League teams in the Chicago suburbs in 2021

Reached 50 students in a school that previously did not have a *FIRST* program

Assisted new FLL team of homeschool students in 2022

Hosted FLL qualifier in 2022 & 2023 and assisted with judging and team queuing. Robot demo during awards to show progression of *FIRST* programs.

**Machine Attribute Awards:**

2024 Innovation in Control Award
2023 Quality Award
2023 Creativity Award
2022 Excellence in Engineering
2022 Industrial Design Award
2021 Excellence in Engineering
2020 Autonomous Award
2019 Industrial Design Award
2018 Industrial Design Award
2018 Quality Award
2016 Industrial Design Award
2015 Championship Quality Award
2015 Excellence in Engineering
2015 Creativity Award
2014 Industrial Design Award
2013 Excellence in Engineering
2012 Quality Award

**Community Outreach:**

Caterpillar Demo Bot - to support corporate sponsor

LCHS polycarb shields for Covid mitigation

LCHS technology support – plasma cutter repair and upgrade

Easter Seals – annual fundraiser

Go Baby Go! – adapt remote control cars for children with spina bifida, cerebral palsy, and osteogenesis imperfecta

Robot Rumble – promote *FIRST* programs

**Acknowledgement:**

In 2018, Argos received the Championship Imagery Award

"The team is the full representation of the inspiration: engineering, impacting community, and corporate sponsorship" – Don Bossi (former president of *FIRST*)

**Sponsor Support:**

A 19-year partnership with Caterpillar:
Branding identifies us as the Caterpillar team
Majority of mentors are Caterpillar employees
2022 Robot demo at Caterpillar Family Day with >1k visitors
Two student trainees from our team in 2022
2018 Robot on display at the Caterpillar Visitors Center
Featured in multiple Caterpillar recruitment videos

# *FIRST* Robotics Team 1756 Argos

**Climber:**

-Linear rails selected for packaging

-Independent of launcher elevator to allow for TRAP scoring

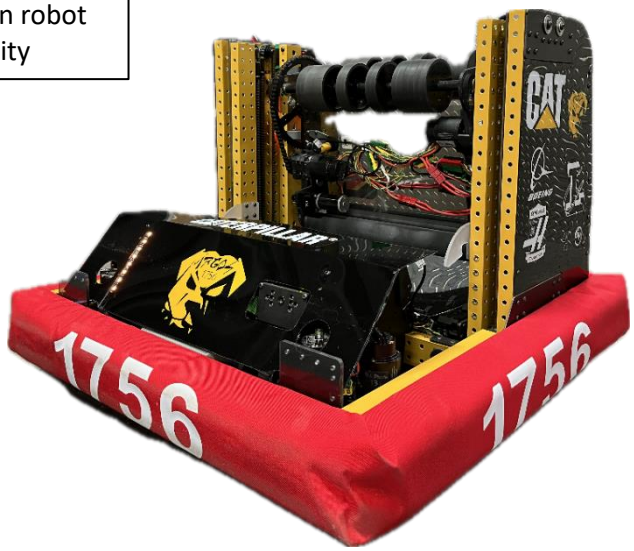
-Compact and centered in robot with two hooks for stability

**Intake:**

-Non-actuated solid rollers between swerve modules under bumper

-Mechanical auto-funneling using omni-wheels and HDPE surface with centering blocks

-Beam break to signal driver (LEDs) and automate handoff




**Launcher / Elevator:**

-Elevator can raise up to 4' height limit to allow for TRAP scoring and to avoid defense using linear rails to constrain twisting motion

- Handoff rollers to stage NOTE from intake and feeds launching wheels for AMP and SPEAKER scoring. Reversed for TRAP scoring

-Launching wheels mounted on non-parallel axles to add stabilizing spin on the NOTE

-Wheels spaced to optimize contact to weight ratio

**Drivetrain:**

-Swerve drive used for increased mobility

**Controls – Pre-sets:**

-Launcher rotates to set point during intake

-AMP scoring triggered by operator with driver controlled NOTE delivery

-SPEAKER scoring is automated (undefended) with preset location for vision redundancy and raised elevator if defended

-TRAP scoring sequence is fully automated

**Controls – Features:**

-Automated intake with handoff to launcher using two beam break sensors
-Encoders in drivetrain, elevator, and launcher to control location and speed

<u>Vision Processing:</u>
-Limelight camera to detect AprilTags on field elements to localize robot and auto-adjust launcher angle
-Motion-aware targeting to score in SPEAKER without stopping to aim

<u>Safety Features:</u>
-Mechanical avoidance of elevator/launcher
-Climb and TRAP scoring sequence split with elevator raising to avoid chain

**Controls – LED Signaling:**

-LEDs used as sensor driven feedback loop to driver/operator
for startup, intake status, and vision alignment


**Automation:**

-200Hz latency-compensated odometry running in a background thread for accurate autonomous path exec

**Autonomous:**

-Autonomous paths adapt to missing notes and advance to later notes to maximize scoring capabilities