

@CSTANJ

@CS4NJ

#CSPDWeek2026

#CompSciNJ

@csteachersorg



New Jersey CSPDWeek

This material is based upon work supported by the National Science Foundation under Award No. 2607763.

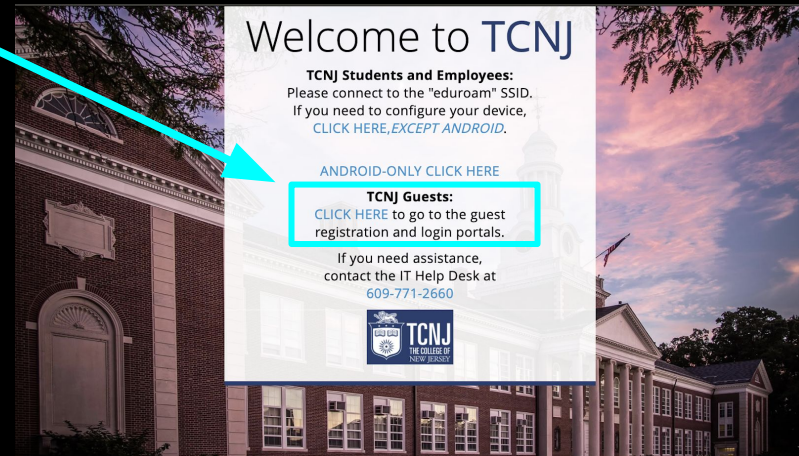
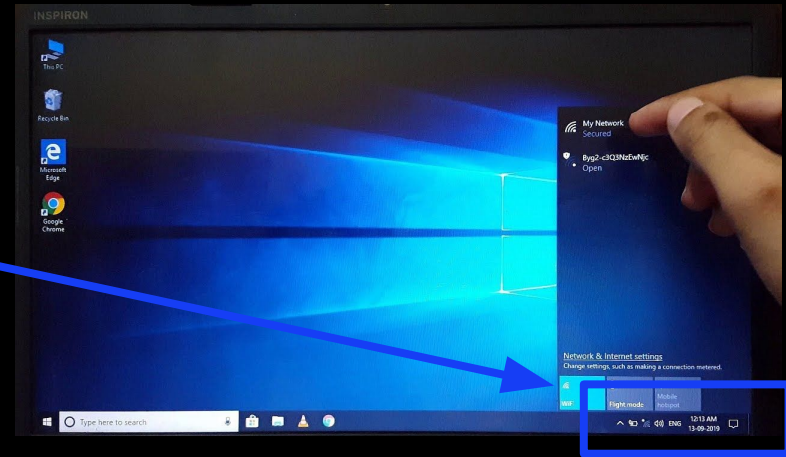


www.centralnjcshub.org



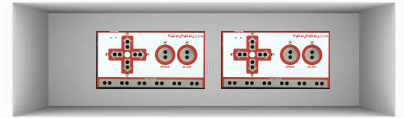
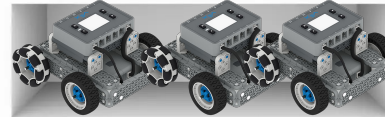
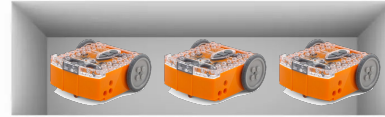
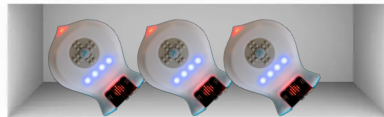
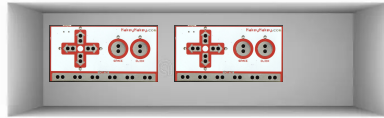
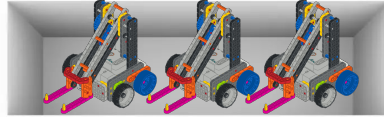
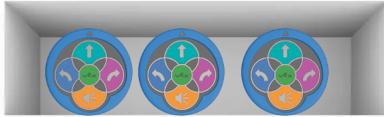
To access TCNJ's WIFI

- Select "Welcome-to-TCNJ" from your wifi menu
- Click the "CLICK HERE" for guests
- Enter your name, email, and phone number
- A unique login will be texted to your phone number for you to use



CENTRAL NEW JERSEY CS EDUCATION HUB

Lending Library



Hands-on with Robotics Education through Vex



Kathy Effner
Parsippany High School

keffner@pthsd.net



Agenda for the Day

- I. Current Middle School Computer Science Program
- II. History of Computer Science in Parsippany School District
- III. Current High School Computer Science Program
- IV. Robotics Class Curriculum
- V. Virtual programming through VR Vex
- VI. Robotics Class Examples
- VII. How is AI used in Robotics
- VIII. Examples of AI and Robotics
- IX. Real world examples of AI and Robotics
- X. Robotics Competitions

Middle School Robotics Introduction in the Parsippany Troy-Hills School District

- Robotics I and II are quarter-long middle school electives that provide students with hands-on experience designing, building, and programming robots to complete a variety of tasks.
- Students explore engineering concepts, simple machines, sensors, autonomous movement, and real-world problem-solving through collaborative, project-based challenges.
- Robotics II builds upon the skills introduced in Robotics I and offers more advanced design and programming experiences.
- The program currently uses LEGO SPIKE robotics equipment and will be transitioning to the VEX IQ platform over the next two school years.

History of Computer Program at Parsippany School District

2014-2015 AP CSA Intro to CS Data Str.

2015-2016 AP CSA Intro to CS Data Str.

2016-2017 AP CSA Intro to CS Data Str. AP CSP

2017-2018 AP CSA Intro to CS Data Str. AP CSP *Redbots team started

2018-2019 AP CSA Intro to CS Data Str. AP CSP Python

2019-2020 AP CSA Intro to CS Data Str. AP CSP Python Robotics

2020-2021 AP CSA Intro to CS Data Str. AP CSP Python Robotics CISCO Net

2021-2022 AP CSA Intro to CS Data Str. AP CSP Python Robotics CISCO Net CISCO Switching

2022-2023 AP CSA Intro to CS Data Str. AP CSP Python Robotics CISCO Net CISCO Switching CISCO Ent. Syst. DS

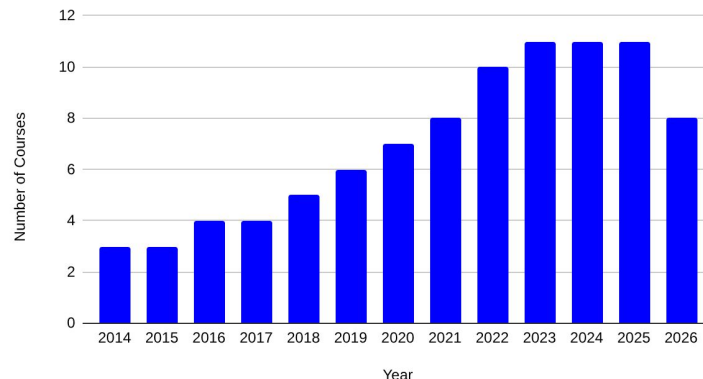
2023-2024 AP CSA Intro to CS Data Str. AP CSP Python Robotics CISCO Net CISCO Switching CISCO Ent. Syst. DS Cyber Security

2024-2025 AP CSA Intro to CS Data Str. AP CSP Python Robotics CISCO Net CISCO Switching CISCO Ent. Syst. DS Cyber Security

2025-2026 AP CSA Intro to CS Data Str. AP CSP Python Robotics CISCO Net CISCO Switching CISCO Ent. Syst. DS Cyber Security

2026-2027 AP CSA Intro to CS Data Str. AP CSP Python Robotics Intro to Cyber Security AP Cyber Security

Number of Courses vs. Year



Current Computer Science Program

**Number Computer Science Courses
Running**

8

**Number CERTIFIED Teachers Teaching
Computer Science**

3 (Hills) 5 (High)

**Number Computer Science Sections
Running**

12(Hills) 8(High)

Number Students Taking Computer Science

**200 (Hills) 151 High
Total: 351**

[Link to Middle School Curriculum at Parsippany](#)

Parsippany High School Robotics Class Curriculum

Written Curriculum

- I. Introduction to Engineering
- II. Introduction to Robotics
- III. Robot Build
- IV. Introduction to Programming and VexNet
- V. Robotic Arm Manipulation
- VI. Swept Away Challenge
- VII. Drivetrain Programming
- VIII. Motor Programming
- IX. Gear Ratios, Torque and Tank Tread Conversion
- X. Using Sensors
- XI. Final Project

Curriculum Run in 2025-2026

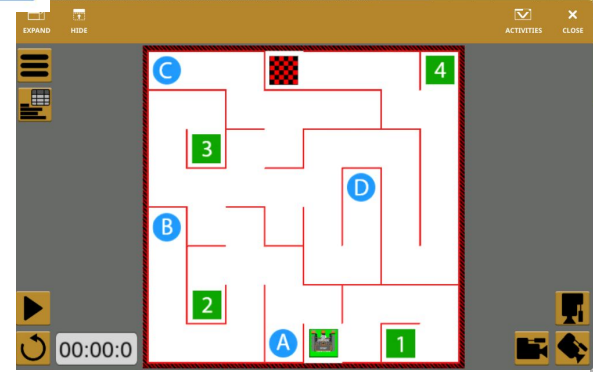
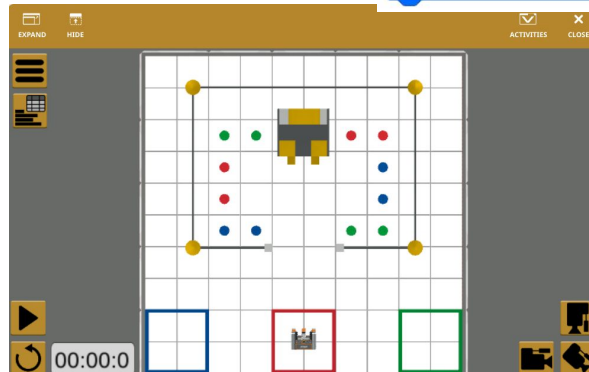
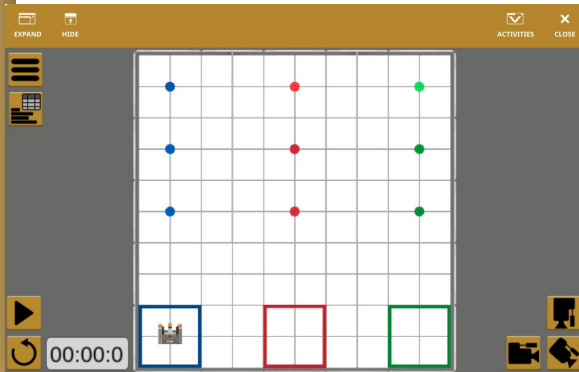
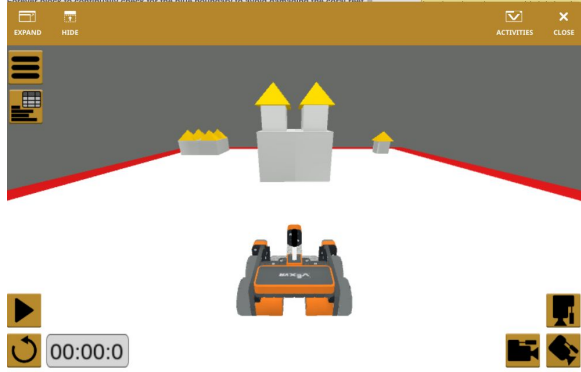
- I. Introduction to Engineering
- II. Introduction to Robotics
- III. Introduction to Vex Coding
- IV. Robot Build
- V. Games/Tasks with basic clawbot
- VI. Basic Coding with drivetrain and arm
- VII. Gear Project (add/modify robot's gears)
Torque and mechanical advantage calculations
- VIII. Pulley Project (add pulleys to the robot or separate build) Calculate mechanical advantage
- IX. Sensors and programming
- X. Tipping Point Vex Game
- XI. CAD a Battle Bot (Final Project)

Additional optional topics also taught

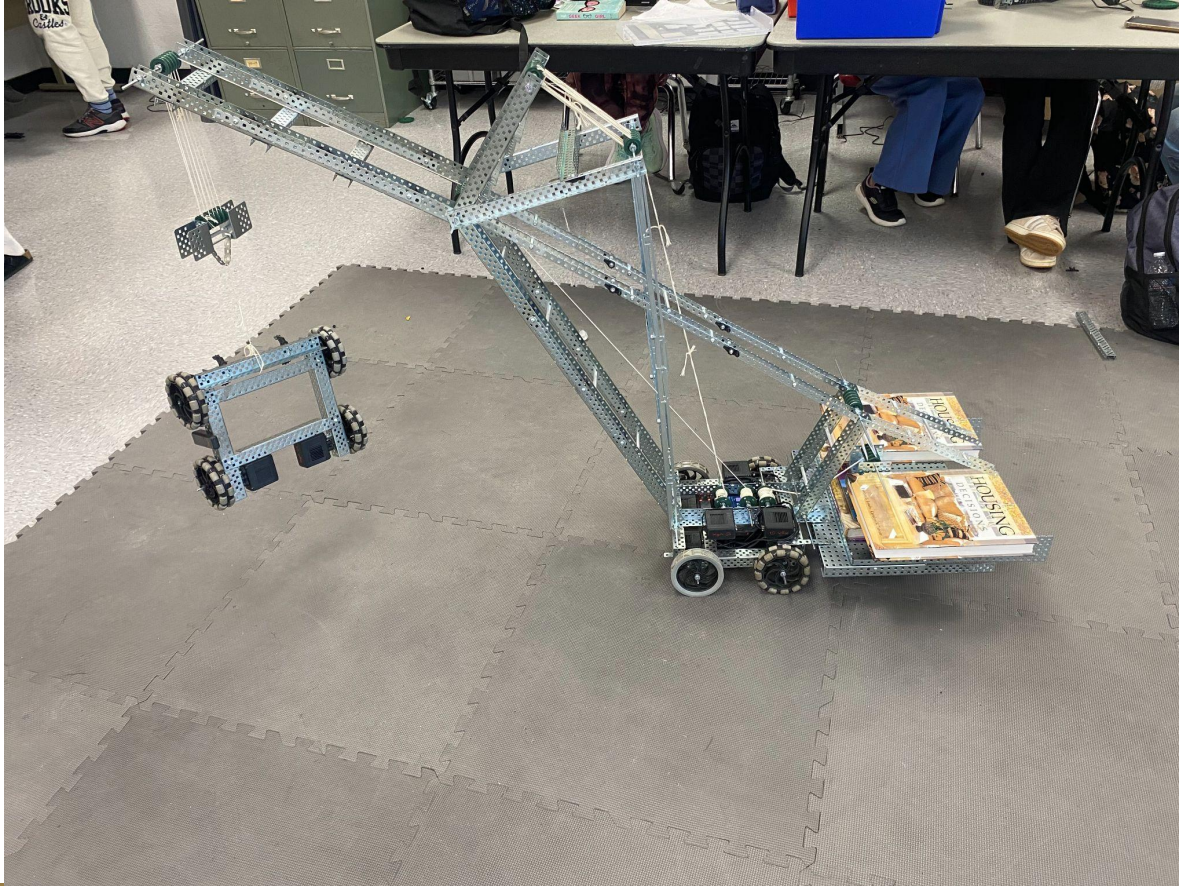
- [AI and Robotics](#) - students complete research projects into what is happening with AI and robotics
- Battle Bots - students CAD a Battle Bot and present - have them think about how AI could be used to better their battle bot
- Free Build - students spend time using the materials in the classroom to build onto their robots for a particular purpose - that purpose is decided by them. They can be given a time limit and will need to talk about the changes they made, the difficulties they had, how they resolved those problems and what other enhancements they could add onto the robot
- Obstacle course - multi-level, varying activities. Students design course, then build their robots to be able to complete it (much smaller version for automic portion)

Vex Virtual Reality Programming

[Link to Vex Vr](#)



Class Projects - Artem's Robot



Artem's Robot at Full Work Load





How is AI used in robotics?

- Computer vision to identify objects and people
- Navigation and obstacle avoidance
- Speech recognition and conversation
- Machine learning to improve performance over time
- Decision-making based on sensor data

Examples of AI and Robotics



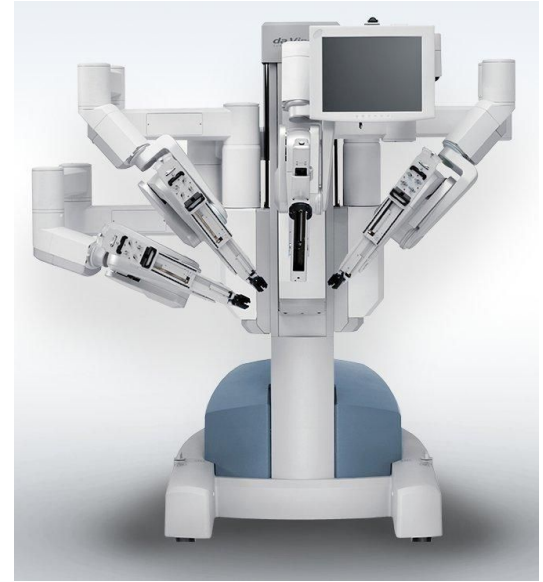
Spot – Inspects construction sites and hazardous areas.

Others:

Warehouse robots –
Move products efficiently
in fulfillment centers.

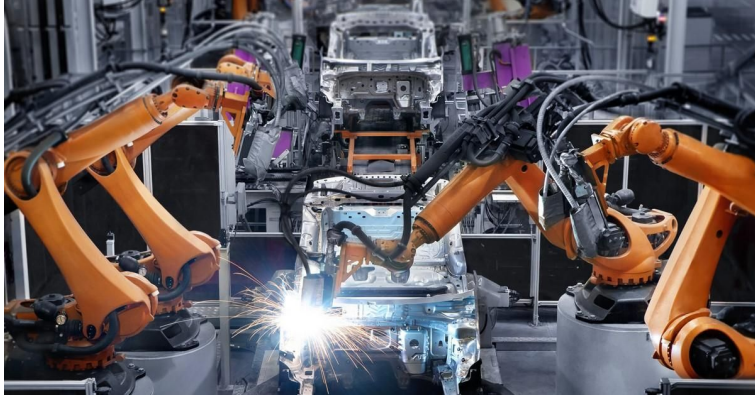


Tesla Optimus – A humanoid robot designed to perform everyday tasks.



da Vinci Surgical System – Assists surgeons with precise operations.

Real World Applications of AI and Robotics



- Manufacturing
- Healthcare
- Agriculture
- Disaster response
- Space exploration
- Home automation

Robot Build

VEX EXP

[VEX Exp Build Instructions](#)

[VEX Exp Stem Labs](#)

[VEX Exp Robot Build](#)

[VEXcode](#)

Vex Library

VEX IQ

[Vex IQ Build Instructions](#)

[Vex IQ Stem Labs](#)

[Vex IQ Robot Build](#)

[VEXcode IQ](#)

VEX IQ



VEX IQ - Grades 4 - 8

Classroom Bundles

5, 10 or 15 IQ Education Kits

Organized storage

STEM Games

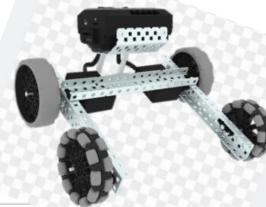
More...



Starting at \$2,739.99

VEX OPTIONS

VEX EXP



VEX EXP Classroom Bundles

\$4,369.99

Grades 8 - 12

Works with **EXP** products and accessories.

Education
Kits

Classroom
Bundles

All-in-one Classroom Solution

INCLUDES:

STEM Labs Curriculum

Educator Resources

Professional Development

[Learn about EXP >](#)

[Explore the VEX EXP Kit of Parts >](#)

[Compare VEX EXP to V5 >](#)

Choose the bundle size that best fits your classroom size and robot needs.

Bundle Size	<u>Small</u> Classroom	<u>Medium</u> Classroom	<u>Large</u> Classroom
Number of Students	10	20	30
Robots Included	5	10	15
Price	\$4,369.99	\$8,699.99	\$12,999.99
Full Contents	View >	View >	View >

Robotics Competitions

VEX

Team registration is \$200.

Pay for competitions \$50-100, gain points which add up to see which teams go on up through Worlds (\$1800)

Have driving skills challenges and Autonomous skill challenges

Offered for the IQ and the V5



VEX V5 Competition Super Kit

\$2,149.99 In stock

Works with **V5** products and accessories. VEX V5, VEX U, VEX AI legal.

Starter Kits	Super Kits
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The perfect all-in-one kit for any new [VEX Robotics Competition team](#) or an existing team looking to supercharge their robot. This kit includes everything needed to begin using the V5 Control System, along with a variety of aluminum structural parts to build lighter, faster mechanisms and the [AI Vision Sensor](#) to see the competition from a whole new perspective.

- Compete with over 11,000 worldwide VEX Robotics Competition teams
- Build powerful mechanisms with the included high-strength gears, sprockets, and shafts
- Scalable programming software suite available with [VEXcode](#)
- See the [full kit contents](#) or view the [parts poster](#)

Recommended: one competition team per kit.

[View our Sales Brochure](#)

V5 Competition Super Kit •

V5 Competition Super Kit • \$2,149.99

SKU#: 276-7040 ✓ **care** Extended Warranty [eligible](#)

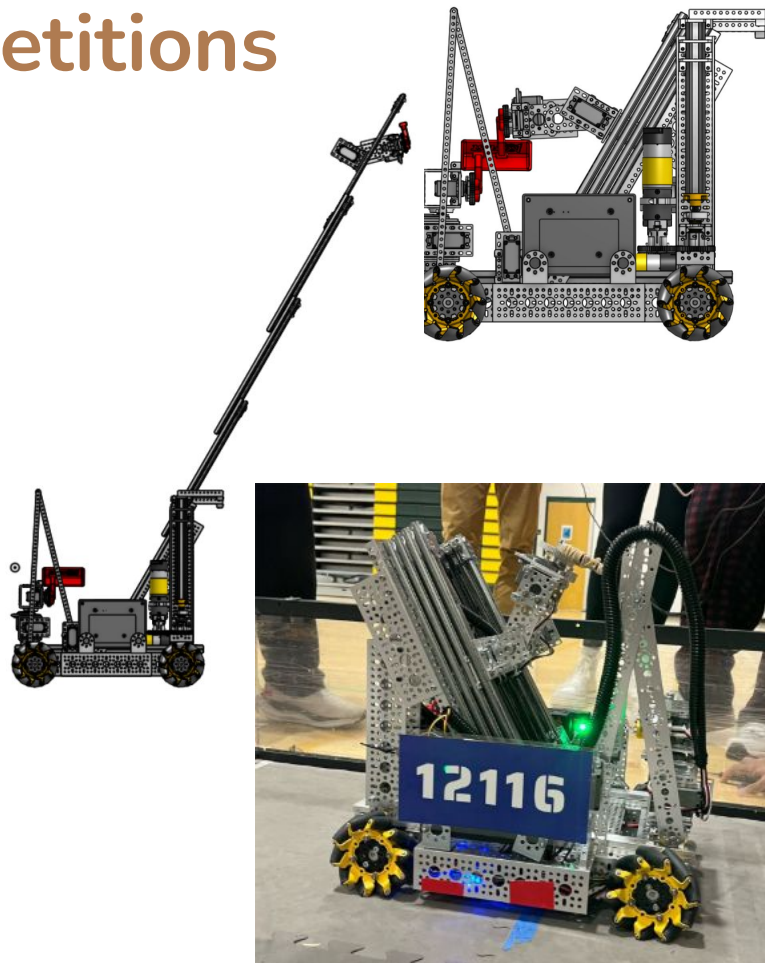
Robotics Competitions

FIRST TECH CHALLENGE (FTC)

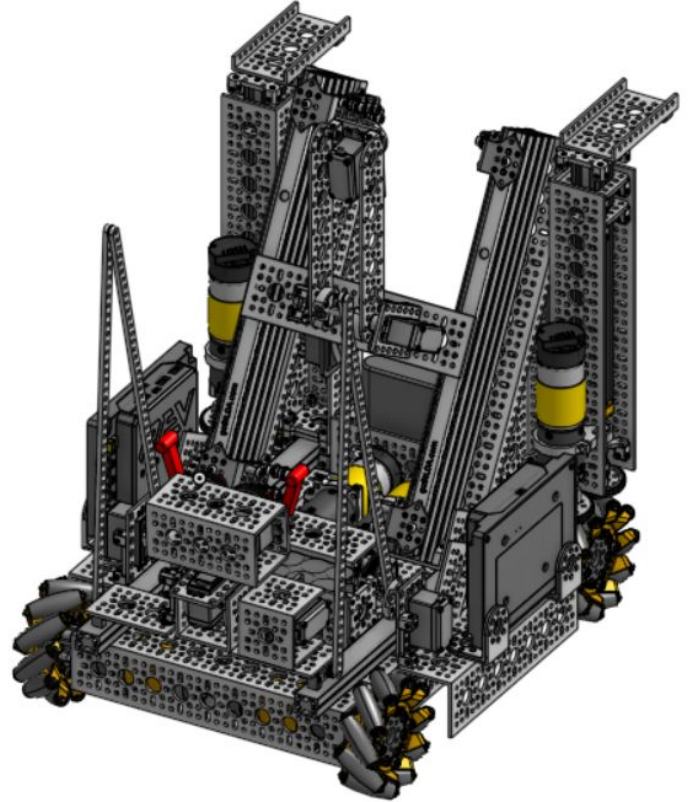
3-5 Meets, Tournament, States, Worlds

Costs \$5000, not every year- registration (\$495 + parts)

Engineering Process, CAD, Planning, Building,
Problem Solving, Driving, Programming,
Outreaches, Fundraising, Presenting



Redbots Robotics Team



"Robotics provides the body, while AI provides the intelligence. Together, they enable machines to sense their environment, make decisions, learn from experience, and perform tasks that would be difficult or dangerous for humans."

Feedback Survey

Please take a few minutes to fill out the Feedback Survey on Sched.

Thank you and have a great rest of the school year!

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