Cornell Electric Vehicles.

SPONSORSHIP PACKET
2023-2024

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Cornell Engineering

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ABOUT US

Cornell Electric Vehicles...

is an engineering project team dedicated to building the world's most **energy-efficient autonomous** electric vehicle. CEV gives students of **all majors and ages** the distinct opportunity to apply knowledge from their academics to modern real-world issues in engineering such as sustainable design, autonomous vehicles, and electric mobility.

Our team consists of **passionate, self-driven students**. Members of CEV gain hands-on technical skills, a growth mindset, and invaluable collaborative experience. Sponsoring our team is an excellent way to your company's presence in the Cornell community, while supporting the next generation of engineers.

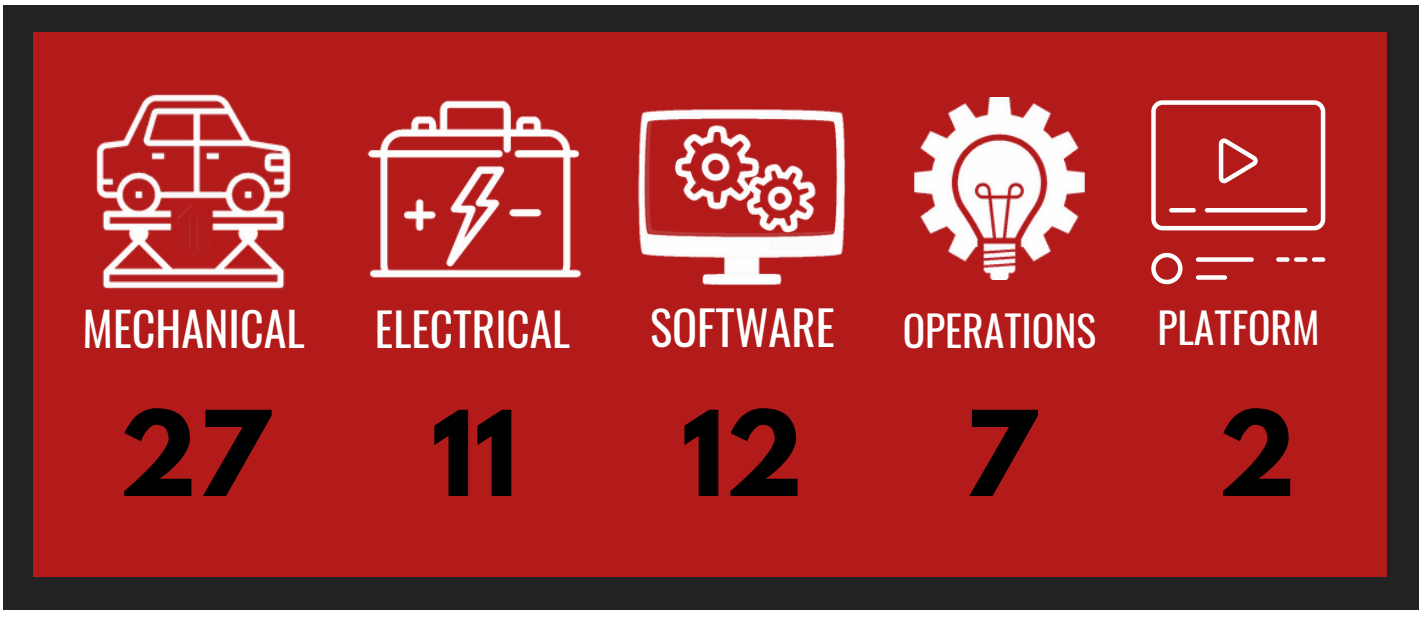
TEAM STRUCTURE

CEV is broken down into five subteams: Mechanical, Electrical, Software, Platform, and Operations.

Our **interdisciplinary team** works together to develop the technical skills needed to design and build a high-efficiency autonomous electric vehicle.

Our members are trained in a **wide range of skills** including mechanical design, metal and composite manufacturing, circuit analysis and testing, algorithm design, machine learning, optimization strategies, and managerial skills.

2023-2024 MEMBER BREAKDOWN



MECHANICAL

DRIVETRAIN

The drivetrain subsystem is responsible for completing the driveline verification process, ensuring we will run our motor at the optimal rate while **maximizing our efficiency.**

STEERING

The steering subsystem is modified to include a **better suspension system**, and to ensure the rigidity of our structure. Prototypes of our assemblies are being constructed for initial testing.

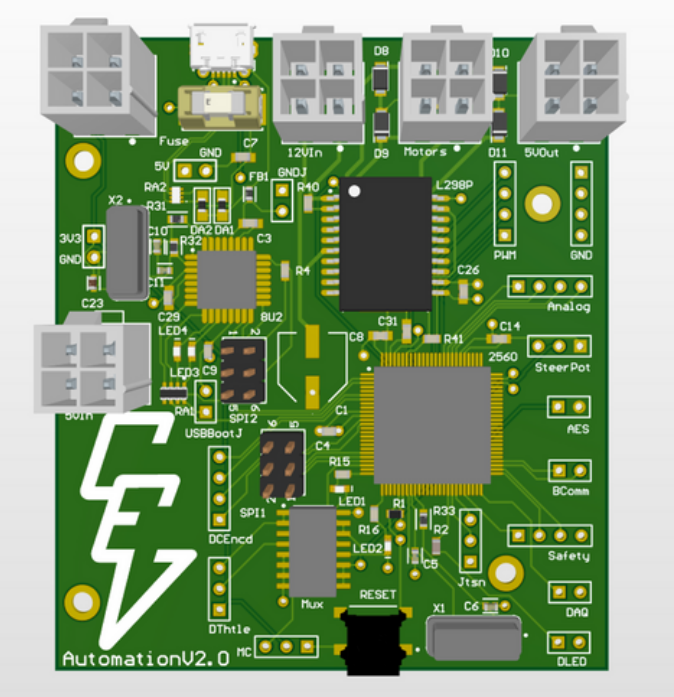
REAR ASSEMBLY & CHASSIS

This subsystem develops the powertrain, electronic mount, and rear brake systems. This year, the team is implementing a driveline that will operate **above 80% efficiency** using a custom-built differential transmission while machining custom wheel-side assemblies. The chassis team continues to manufacture and construct composites and sand molds for our carbon fiber layups.

ELECTRICAL

AUTOMATION SYSTEM

Actuates throttle, steering, and breaking to allow autonomy software to control the vehicle.



SAFETY SYSTEM

Enables remote manipulation of vehicle throttle, braking, and steering from a handheld controller.

BATTERY MANAGEMENT SYSTEM

Monitors and corrects cell operations when conditions arise outside of the battery operating limits.

MOTOR CONTROLLER

Collects and communicates sensor data to provide real-time vehicle characterization

POWER CONVERTERS

Creates highly efficient DC-DC converters that lower battery voltage for other systems on the vehicle.

SOFTWARE

VISION

The vision system is responsible for detecting objects and localizing them around the vehicle using camera input and various deep learning algorithms. This helps the car understand its environment to prevent collisions on the track.

LIVE DASHBOARDS

The live dashboard system implements a web-based platform to display crucial information about the vehicle in real-time to the team in the paddocks, and a mobile app-based dashboard for the driver in the car with important driver-related data. These are used to analyze the performance of the car during the competition.

MOTION PLANNING & LOCALIZATION

The planning and localization team fuses sensor inputs to accurately estimate the current pose of the car, create an obstacle map, and calculate an efficient trajectory for the vehicle. This team heavily involves algorithm development, tuning, and robotics fundamentals.

BACKEND & HISTORICAL DASHBOARD

The backend system receives data sent by the sensors and mobile application through Bluetooth and stores the data in a meaningful way. This data is used by the historical dashboard system to generate useful insights about the vehicle's past test and competition runs.

PLATFORM

A NEW SUB TEAM...

In 2023, the newly established Platform subteam seeks to complement CEV's transition to self-driving by developing dedicated computer platforms for autonomy. Currently, our computer platforms are general-purpose, power-intensive, and heavy. This subteam will address these shortcomings, and investigate the burgeoning possibilities of heterogeneous computing, leveraging industry FPGA SoCs from Xilinx. FPGA's flexibility allows us to iteratively improve our self-driving algorithms and easily synthesize new designs. FPGA's parallel computing capabilities allow us to accelerate large-scale operations, such as image processing, and assign independent tasks to dedicated hardware blocks. This semester, we are working to develop our first hardware acceleration model for object detection, hoping to boost the algorithm's performance and power efficiency.

OPERATIONS

WEBSITE

Maintains our website with team updates, current members, and recruitment information

PUBLIC RELATIONS

Manages our social media, publicizes crowdfunding events. and promotes team events

SPONSOR RELATIONS

Reaches out to potential sponsors and maintains contact with current sponsors

FINANCE

Communicates financial plan, orders parts and materials, and manages budget across subteams

GRAPHIC DESIGN

Creates graphics for our branding, recruitment, and fundraising

SHELL ECO-MARATHON

Cornell Electric Vehicles competes annually in the Shell Eco-marathon to create the most **energy efficient** vehicle.

2023 - 2024 CAR FEATURES: CHICKEN COUPE

Urban Concept Chassis

Our custom carbon fiber chassis will be modeled more closely to a passenger car for this competition cycle, pushing our EV to match consumer needs

AR Windshield

Driver dashboard will be directly on the windshield instead of on a separate device, using our space more efficiently and allowing the driver to experience overlaid visuals to enhance their driving.

Autonomy Software

Our Autonomy team is using data-driven vision, optimization, and statistical methods perceive the environment and plan an efficient trajectory for autonomous operation of the vehicle!

2022: Passed
Safety Inspection

Cuckoo Caravan

2019: 3rd Place /
25 Teams

Kiwi Kruiser

2018: 5th Place /
23 Teams

CR18

SPONSORSHIP TIERS

Sponsorship Benefits	TERAWATT $4000+	GIGAWATT $2000–$3999	MEGAWATT $1000–$1999	KILOWATT $500–$999	WATT $100–$499
Graphic Decals on Car	3x Max Size (20x20cm)	2x Large Size	2x Small Text Decal	2x Small Text Decal	
Recruitment Guidance and Information	●	●			
Logo on Banner in Team Office	●	●	●		
Thank You Plaque	●	●	●		
Resume Book	●	●	●		
Logo on all CEV Publications	●	●	●		
Info Session open to Cornell Community	●	●	●		
Social Media Spotlight	●	●	●	●	
Company Name listed in all CEV Publications	●	●	●	●	●
Company Logo on CEV Website	●	●	●	●	●
Thank You Letter	●	●	●	●	●

CURRENT SPONSORS

NVIDIA

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