CEV
CORNELL ELECTRIC VEHICLES

SPONSORSHIP PACKET

2019-2020

PREVIOUSLY KNOWN AS
CORNELL RESISTANCE RACING
ABOUT US

CEV is a team of students at Cornell University dedicated to building the world’s most energy-efficient electric vehicle.

By nature, our team is comprised of passionate, self-driven students. Our project teaches perseverance, hands-on technical skills, and teamwork – skills that last a lifetime! Sponsoring our team is an excellent way to grow your company’s brand in the Cornell community!
Our interdisciplinary team works together to develop the technical skills needed to design and build a high efficiency electric vehicle. Our members are trained in a wide range of skills, including mechanical design, metal and composites manufacturing, circuit analysis and testing, algorithm design, machine learning, optimization strategies, and managerial skills.

**OUR SUBTEAMS**

- **MECHANICAL**: 16 MEMBERS
- **SOFTWARE**: 16 MEMBERS
- **ELECTRICAL**: 10 MEMBERS
- **OPERATIONS**: 5 MEMBERS
This subsystem develops the powertrain, electronic mount, and rear brake systems. This year, the team is implementing a powertrain that will operate above 80% efficiency, a multi-layer electronics mounting board, and a hydraulic brake system.

**Chassis**

This team designs and manufactures an ultralight carbon fiber vehicle body. This process requires an extensive knowledge of aerodynamics, vehicle dynamics, composite material strength and testing, and digital manufacturing techniques.

**Front Assembly**

This team creates the front brakes and the steering system of the car. This year the team is implementing a low-play steering system using a right-angle gearbox, a hydraulic braking system, and wheel mounts that mount onto a carbon-fiber tube.

**Rear Assembly**

This subsystem develops the powertrain, electronic mount, and rear brake systems. This year, the team is implementing a powertrain that will operate above 80% efficiency, a multi-layer electronics mounting board, and a hydraulic brake system.
The battery management system provides safety for the vehicle by monitoring for conditions outside of the 24V battery’s safe operating limits and isolating it through both physical and electrical means in the case of dangerous conditions.

The automation system electrically actuates the steering, throttle, and braking of the car to allow autonomy software to control the vehicle.

The motor controller is custom PCB that controls the speed of the car by supplying current to the brushless DC motor. It uses several control algorithms (such as Field Oriented Control) to operate the motor as efficiently as possible.
SOFTWARE

Vision

The Dashboard system implements a web-based platform to display crucial information about the vehicle in real-time to both the driver and the team in the paddocks. This is used to analyze data about the car’s during the competition.

Motion Planning & Localization

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

Dashboard Subsystem

The vision system is responsible for detecting objects and localizing them around the vehicle using cameras and various deep learning algorithms. This helps the car understand its environment to prevent collision on the track.
The Operations team **manages** the team **timeline and day-to-day operations.** There are 5 main tasks the operations team performs:

**Website**
- Maintains our website constantly with team updates

**Public Relations**
- Manages our social media and publicizes crowdfunding events

**Sponsor Relations**
- Reaches out to potential sponsors and maintains contact with current ones

**Graphic Design**
- Creates graphics for our branding and recruitment

**Logistics**
- Manages team logistics including travel, ordering parts and materials, and overseeing the team timeline
Cornell Electric Vehicles competes annually in the Shell Eco-Marathon to create the most energy-efficient vehicle. Our battery-electric vehicle regularly operates at over 4000 MPGe!

This year, our car will feature:

**Lightweight Carbon Fiber Chassis**

Our custom carbon fiber chassis weighs as little as 17 kg and has a coefficient of drag less than 0.2!

**Custom Motor Controller System**

The team’s custom motor controller and battery management system can handle up to 1800W within a 10 cm x 10cm footprint!

**Autonomy Program**

Our perception and motion planning team is using machine learning, computer vision, and statistical methods to calculate an optimal path and create semi-autonomous system.

**2018: 5th Place / 23 Teams**

**CRR18**

**2019: 3rd Place / 25 Teams**

**KIWI KRUISER**
## Sponsorship Benefits

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<th>Sponsorship Benefits</th>
<th>TERAWATT $6000+</th>
<th>GIGAWATT $5000-5999</th>
<th>MEGAWATT $1000-3499</th>
<th>KILOWATT $500-999</th>
<th>WATT $100+</th>
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<td>Thank You Letter</td>
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CONTACT US

For more information, please visit our website at https://cev.engineering.cornell.edu/

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THANK YOU