

## Electrathon

Utilizing STEM knowledge and skills, the Electrathon project and event demonstrates real-world electric vehicle technology through custom, participant-designed and built, electric vehicles. Powered by an electric motor and batteries, these go-cart-type vehicles must be skillfully designed and driven to maximize the distance traveled within a one-hour limit.



Electrathon vehicles are three- or four-wheeled lightweight electric vehicles, similar to a go-cart. Electrathon class vehicles have a maximum length (12 feet), width (4 feet), wheel track (minimum 2 feet) and a maximum battery weight and chemistry (73 pounds, deep cycle sealed lead acid). Discharged for one hour, this amounts to just under one kilowatt of power (1.3 hp). The driver's weight is ballasted to 180 lb, while the vehicles themselves may weigh from 80 to 150 pounds. Safety regulations require features such as braking systems, roll bars, driver protection, helmet, and electrical disconnects.

Races can be held on parking lots, driver's education tracks, oval speedways, or any paved fairly flat surface. Pre-race inspections of vehicles are required to ensure that they are safe. The Florida Solar Energy Center hosts an Electrathon race annually as part of Energy Whiz on the second Saturday in May.

The current world record for distance traveled in one hour is 62.05 miles, which was set in July 2009 on the Ford Michigan Proving Ground. Using the Department of Energy conversion factors, this would be equivalent to 2,370 miles per gallon!

Coaching an Electrathon team is a great way to foster real-world engineering experience. The actual car requires design, fabrication, and testing—in many cycles—as the students continue to re-evaluate their design choices, vehicle efficiency and the constraints of their materials. Most Electrathon vehicles are 'works in progress' getting better year after year.

**Appropriate Grade Level:** 9 - 12, college

**Difficulty:** Since this is a larger project, the greatest challenge can be getting student commitment. Although previous knowledge by team members in areas such as DC electricity, welding, mechanics, and the physics of motion are helpful, it is not necessary for a successful program. What is necessary is that the students have the desire to put in the time and energy to research, learn, build, and test their designs.

**Cost:** Electrathon cars can be built and fabricated from scratch with available parts, built from a kit (\$1600 - 3000.) or built with a combination of fabricated and purchased parts.

Sponsorship for the team is usually necessary, but can be a good team learning experience. Occasionally, a ‘used’ electrathon vehicle may be acquired from a team who is retiring a vehicle to build a new one.

### **Internet Sites**

**<http://www.electrathonamerica.org/>**

Electrathon of America is the sanctioning body for Electrathon events. The site includes the current rules, information, race results, and resources.

**<http://www.oercommons.org/courses/stem-curriculum-for-an-electrathon-america-car/view>**

Curriculum developed by Kent Career and Technical Center, includes a combination of classroom, lab learning, on-site work experiences, and exposure to emerging green career pathways. Includes lessons on basic CAD and sketching.

**<http://electrathonoftampabay.org/www/>**

Electrathon of Tampa Bay, Florida’s electrathon association, promotes, supports and organizes the majority of Electrathon events in Florida. If you plan to race in Florida, this is the group to contact. Great resources, photos, racing schedule and tips.