This is something that I got involved in about six years ago with my students. For those reading this that may not know, Electrathon is a competition for purpose-built electric powered vehicles. These are not little toys or R/C cars; they are 3 or 4-wheeled vehicles that you can get in and drive. These also are not the $100,000+ solar experimentals that race across country every Spring. An Electrathon car may be built from a kit or completely scratch built. Although the kits can get pricey, depending on options, I have seen some very good competitive cars built from scratch for around $500! The final cost depends greatly on the ingenuity of the builder.

Although Electrathon is a great project for high school kids, it is not limited to them. Anyone who posesses a valid driver's license can participate in Electrathon. The races are "enduro style" which means that we race for a specified length of time (usually one hour). Whoever completes the greatest distance (most laps) in the designated time is the winner.

After the initial expense of obtaining or building a car, the upkeep and maintenence is really cheap. Most of the cars run bicycle tires in the $12 to $20 price range; how long they last depends on the surface we race on. Lube the chain, charge the batteries, slap on a couple of fresh tires and go race. At the end of the day we usually have spent $30 - $40. When I was racing stock cars, that wouldn't fill the fuel tank and tires were $110 each. Electrathon is just good cheap fun...

I recently sold one of my cars and have undertaken, with a couple of my students, to build a new one to replace it. Follow along on this thread and see how we do it. For more info on Electrathon cars and events, check out the Electrathon America website: www.electrathonamerica.org

The pic below is the start of a race a few years ago...

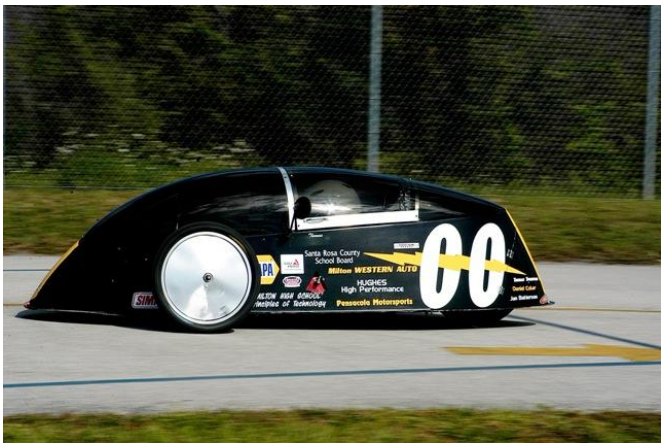
Attached Images

The cars are technically interesting and sometimes aesthetically appealing, too. Most of all, they are a blast to drive. Being an old stock car racer, I am accustomed to combustion engines that have to turn up some RPM's to generate horsepower. Boy, did I have a lot to learn when I started playing with electric motors! I still have a lot to learn...

The objective in Electrathon is to complete the most laps in a given amount of time (usually 1 hour). We are limited to 67 pounds of lead-acid Gel Cell or AGM batteries or we can use two batteries off the approved list (My team uses two Optima batteries) wired in series for a 24 volt system. Each car must also carry a 180 pound payload (payload is defined as the driver plus ballast, if necessary, to equal a minimum of 180 pounds).There are races held at real racetracks occasionally, but most of the courses we run on are temporary parking lot venues. All you need is somebody to race against and a place to do it and you can hold an Electrathon race.

Innovation and ingenuity are the name of the game in this sport. Although most of the cars are capable of speeds in excess of 40 or even 50 mph, because of the tightness of the short courses and the need to conserve the limited battery power, race speeds are usually only in the 24 to 28 mph range which makes this a fairly safe sport. Even so, competition is sometimes close and fierce. Here are some typical cars (left to right & down):
Pic 1 is a Blue Sky Designs Aerocoupe. This is a very popular kit car. It is of the "cycle car" type, meaning it has two wheels up front and one in the rear. They are aerodynamic, light, mechanically simple, and very reliable. They ain't cheap, though.
Pic 2 is a front-wheel-drive car. Note the motor is mounted on the front fork. Batteries are behind the driver and the driver sits well back in the car. This is a tricycle design (one front wheel, two rear). Tricycle style cars have a tendency to roll over if the weight is not kept centered between the rear wheels. If you've ever ridden a three-wheel motorcycle, you know what I mean.
Pic 3 is one of my team cars. This is a cycle car style and the driver reclines way down low. It was originally built with independent front suspension, but I recently converted it to rigid suspension for better reliability and less weight.
Pic 4 is one I built for myself. this is the car that I just sold recently. It is cycle car style and includes a six-speed derailleur.
Pic 5 is the dominant car in this area right now. It ain't pretty, but it's fast. It is powered by a 1 hp Scott motor, uses a six-speed derailleur in the rear, and the chassis is suspended and linked to the steering so that it leans into the turns.

Attached Images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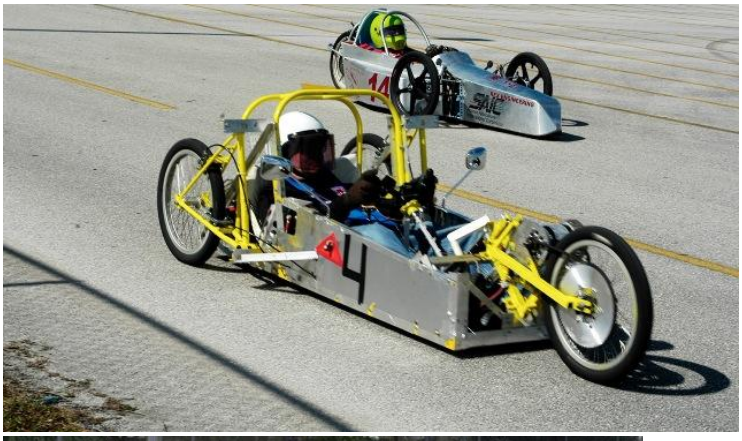
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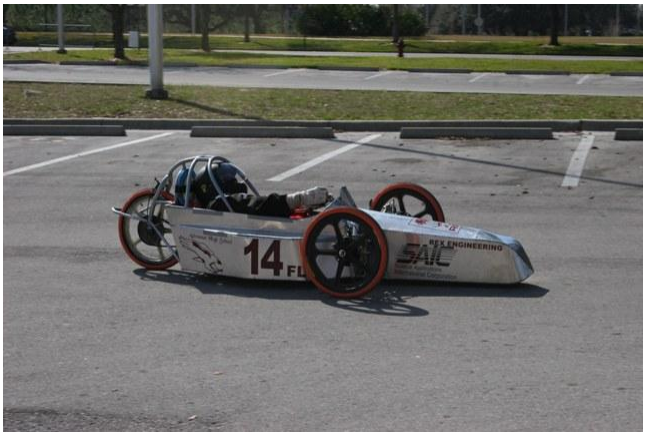
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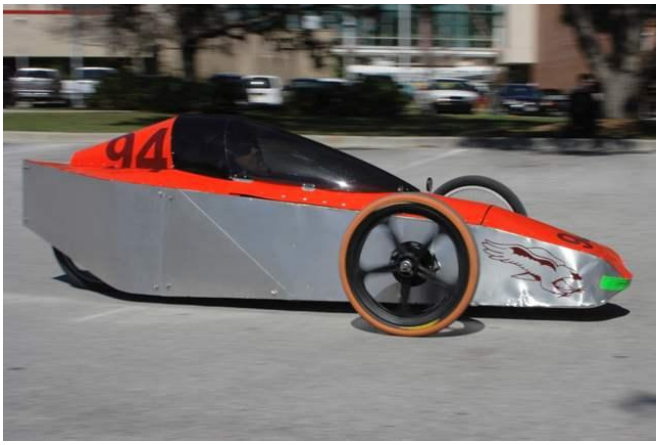

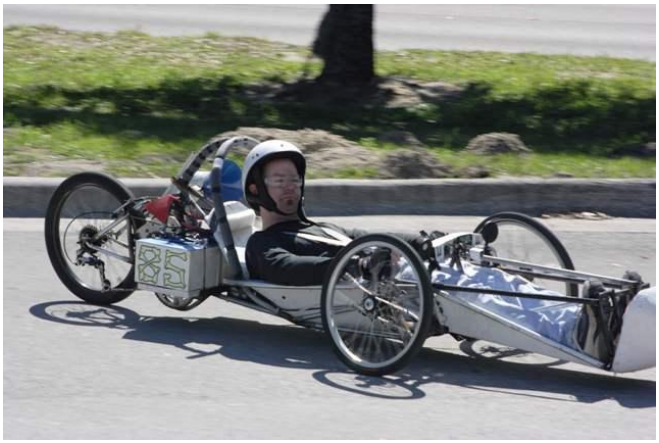

OK, this is supposed to be a build thread, so lets get to it. If I seem wordy it's because I want to explain everything as best I can to those who have never been exposed to this type of thing before...

First thing is to decide which type of car to build. Of course, we could build a conventional 4-wheel car, but since friction is a consideration, eliminating the rolling friction of one tire on the ground seems to be the way to go. The simple fact that probably more than 99% of all Electrathon cars are 3-wheeled lends credence to that practice. So.., with that in mind the next consideration is whether to make our 3-wheeler a cycle-car or a tricycle.

Folks who have ridden old Harley Servicar 3-wheelers know that, in a tight corner, those things will dive right over the front wheel and flip over at relatively low speed. The problem is that the high center of gravity (CG) transfers forward and outside the triangle formed by the three contact patches of the wheels. In order to stabilize a tricycle in a corner, it is necessary to get the CG down low and between the rear wheels so it won't dive over the front wheel. To do that, we need to stretch the wheelbase and move everything down and rearward. One of the winningest teams in Electrathon, Cloud Electric, successfully uses the tricycle configuration, but up in the Northwest they run mostly on long courses or ovals.

On the tight parking lot "road courses" we run most of the time here in Florida, quick handling is important. With a cycle-car configuration we can keep a shorter wheelbase for quick steering response, move the CG around pretty much at will to put components where we want them, and still not worry about the car having a tendency to roll over. I have video

of one of the Kennedy High School cars from Iowa actually smoking the rear tire in a tight turn and all 3 wheels stay firmly on the ground. So, it is a cycle-car style that we will build here.

I have an advantage in that I have done this before. The car below (also pictured in my initial post) was originally conceived by my students, the design refined by me and a former teaching assistant, and built by my students and me. That was in 2004. Since then, this car has proven itself to be reliable, consistent, and driver-friendly. The new car I am building here is similar to this, but with a few refinements I have learned along the way.

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