EEVC NEWSLETTER

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Now affiliated with EAA

EEVC "BEST CAR AWARD" PRESENTED AT THE PHYSICS OLYMPICS 2007

Oliver Perry

I represented the Eastern Electric Vehicle Club this year at the annual Physics Olympics final meet of the year, hosted by Penncrest High School in Media Pennsylvania. The goal of this year's "electric car" event was to design and construct an electric car capable of completing one lap around a circular track in the quickest time. The diameter of the outer edge of the track was about 25 feet, the inner wall, 17 feet. The space between the inner and outer hoses was about 4 feet. Both walls of the track were made from ¾ inch plastic garden hose.

Kathryn Lund, of Penncrest High School, with teacher James Ciccarelli pose with the winning car.

Several weeks previous to the meet the students were provided two small permanent magnet DC electric motors by their teachers, along with the guidelines, rules, and particulars relating to the event. The size of the car was restricted to about one foot in length. The students were limited to one pulley or gear per motor shaft and one connecting pulley or gear per drive wheel axle. Instead of utilizing gears or pulleys for mechanical gains in speed or torque the students were also allowed to place the drive wheels directly on the output shaft of the motor. The students could also opt to use only one of the two motors. A maximum of 9 volts from any combination of batteries was allowed per motor for electrical power.

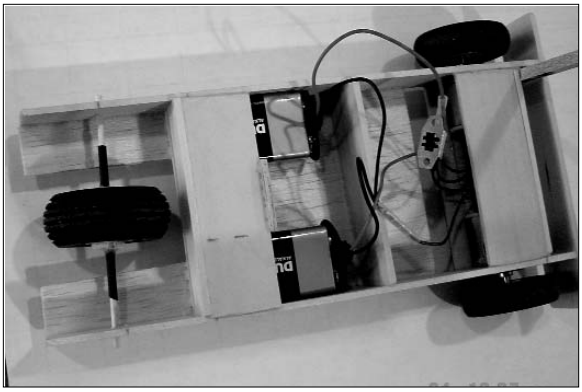
Electrical remote control parts were not allowed, nor were expensive roller bearing wheels. All parts of the vehicle, other than the wheels and axles, had to be of original construction. Toy cars parts were not allowed. Electrical switches, to turn the power on at the start of the race, were mandated. The switch had to be aligned in a direction perpendicular to the motion of the vehicle so that the student's hand would not give acceleration to the vehicle when the switch was turned on. Each car had to carry a 3x5 index card flag to start and stop the laser timer.

Ideally a car should be designed to make one lap around the circular track without hitting either the inside or outside wall. However since it was legal to make contact with either wall most students utilized the outer wall of the track to round the track. They attempted to design their cars in such a way that they would not lodge against the wall when making the curve. Several students succeeded in adjusting their steering angles with enough precision for their cars to make the lap without hitting against a wall. Unfortunately for them the race was based more upon speed than steering. To remain inside the walls, the cars had to be relatively slow. A fast car usually ended up against the outer wall because the slippery gym floor could not provide enough traction to hold cars in a curve.

The EEVC award for the best overall car is not based solely on performance in a contest, but on over-all design and construction as well. We look for a car that is designed and constructed to win that particular event. Simplicity, durability, and craftsmanship are all important factors. Often the winner of the event does not receive our award because their car lacks well crafted design and creative engineering. However this year's EEVC overall best car winner was also the winner of the event.

As one can see from the pictures, Kathryn Lund's car was clean, simple, and very well constructed.

Kathryn, as her mother told me, comes from a "family of car lovers." She belongs to a "Mustang" family. Her father drag races a ‘03 Mustang Cobra, presently getting times of 10 seconds in a quarter mile. Two other Mustangs sit in the Lund driveway, an ‘05 and a ‘93 GT.



The winner of the EEVC Award was elegant in its simplicity and faster than all the other cars.

Just as when designing a full sized dragster, to win with an electric model dragster one must try to minimize the weight of the car without losing strength, and maximize torque without losing traction. And in our case this year, students also had to consider how best to keep the vehicle in a circular path without lodging against the outer hose or flipping over it. Since most cars stood a great chance of hitting the outer wall, students should have designed their vehicles to withstand impact, strong enough to remain in one piece should they meet a barrier.

There is always an argument to be made on behalf of "quick and easy" engineering procedures. Tape is cheap and makes for quick adjustments. Some tapes work exceptionally well. Frequently students are able to produce winning entries with "minute made" projects utilizing duct tape. Kathryn's car was not minute made. As you can see from the picture it was made of perfectly cut balsa wood sheets, framed and glued together with strong bonds. The wheels were the proper size, suitable to be mounted directly on the motors. The pit crew (consisting of Karen and her father) decided to propel the car with front wheel drive and steer the car with a single rear wheel. Karen told me that she calculated the size of the circular track and determined that the rear wheel should be turned six degrees in order to travel in the correct circular path. The father and daughter team angled the real wheel to as close to six degrees as they could manage.

Kathryn was aware that there were other means of keeping the car in a circular path. They could have chosen to use larger outside

wheels and smaller inside wheels, but that would have been much more difficult to manage. And, from my perspective, since the wheels were mounted on the motors it might not have worked anyway. The outside motor would have had to overcome more rotary inertia than the inside wheel. That might have proven to be counterproductive.

To maximize the power from the 9 volts per motor limit, the Lund Team decided to use a nine volt battery on each motor. They paralleled them to one main switch. The wiring was "elegantly" simple. No car had less internal resistance. One competitor placed his motors in series with two nine volt batteries in series to one switch, claiming it saved him from mounting two switches. He did not realize that one switch could still have been used to activate two parallel circuits at the same time.

Kathryn's dragster didn't have a name. For this article I gave it one. "Electric Mustang" shot out of the starting gate and raced around the circle faster than any other vehicle placed on the track. Its best time was 5.3 seconds. However the rear wheel steering did not keep the car off the outer rail as expected. The Mustang didn't seem to have enough traction to hold the turn on the slippery un-banked gym floor at such a high speed. The hose wall was needed to keep the car in the curve. The combination of the front bumper, which kept the outer drive wheel from making contact with the hose, and the rudder steering of the single back wheel, caused the car to glide around the track like a bobsled rounding a bend. The flat "low center of gravity" profile of the car body balanced the" high flying" index card. Some cars were top heavy and flipped over the outer hose.

The second best time recorded, 7.96 seconds, belonged to Michele Kim from Radnor. Robert Carey from West Chester East High School posted a time of 10.18 seconds. The forth best time of 10.74 seconds was recorded from the team of Matt Mawhinney and Dan Verbaro of Cinnaminson High School. The Cinnaminson car, very well designed, was our EEVC second best selection. Michele Kim's car was also considered.

For Olympic scoring, each team averaged their two best times. Kathryn's car ran several times and easily won first place for Penncrest. Kathryn's physics teacher, Mr. James Ciccarelli, says that Kathryn is an outstanding student. "Everything she does is top notch. She has a quiet reserved personality and possesses a tremendous work ethic." "She is systematic in her approach to her work and all business, all of the time." Mr. Ciccarelli is grateful for the opportunity to have such a great student in his honors level I physics class.

So what engineering college is this bright young senior going to attend? Surprisingly, she does not plan on enrolling in an engineering program. Karen says that most likely she will major in foreign language studies. She is in the upper 10 % of her graduating class and is seriously considering schools like The University of Pennsylvania. If Ford Motor Company, or some automotive company operating a plant in China, forecasts needs for qualified Chinese translators in 2011, perhaps they should work a deal with the "Mustang Family." Maybe even Chinese universities in Wuhan should consider recruiting such a talented student.

The Penncrest Lions kept their "legend" alive by winning another one of many consecutive meets. Saturday's meet was very closely contested. Kathryn Lund's first place in the 200 point electric car event made an important difference.

The PSE&G Cup presented by PSE&G of New Jersey for Team Electric Car Competition at the final Physics Olympics of 2007 goes to Radnor High School

Congratulations to physics teacher Mary Quinlan and her Physics Olympics team for winning the prestigious PSE&G cup for team electric car competition at the Physics Olympics Meet held at Pen-

Michele Kim and physics teacher Mary Quinlan represent Radnor High School.

The Radnor High School team, winners of the PG&E Team Electric Car Racing Cup.

ncrest High School, Saturday Feb 24th.

A decade ago PSE&G, the electric and gas utility serving Southern New Jersey, provided an award called the PSE&G Team Electric Car Racing Cup that would be passed on to the winners of the annual Physics Olympics Electric Car event, traditionally held in February. It was first presented in Cinnaminson High School in New Jersey, and Cinnaminson High School was the first team to win it. Kevin Merrill, the Cinnaminson Physics Olympic Team coach, was asked to present the cup this year to Radnor, as a reminder to everyone that the cup originated in New Jersey. Kevin was also singled out as the only Physics Olympics coach in our league to actually have competed in the Olympics both as a student participant and a coach.

Although Kathryn Lund won the top spot in the Olympic Electric Drag Car Event for Penncrest High School with her "Electric Mustang," other members of the Penncrest team were not able to provide sufficient support to win the team cup. Kathryn's entry was the only car from Penncrest that succeeded in making one trip around the track. The team cup goes to the school that succeeds in scoring with the most different cars. Radnor managed on its last of five runs to complete the circle and register a time with a second entry. As Mary Quinlan, Radnor's outstanding veteran physics teacher (who was responsible for running the electric car event this year) mentioned at the electric car registration, "This was a disappointing year for qualified entries." Generally it takes more than two different cars to win the team cup. The challenge of making the circle at high a speed proved to be more daunting to the teams than expected. Radnor High School claimed the cup this year, taking it away from Penncrest High School who has held it for the past several years. Michele Kim's time of 7.96 seconds was a great time. But it was the "not so great time" of 38.39 seconds, for Liz Mansfield's car, a different car, that gave Radnor the team cup! Congratulations Radnor!

UPDATE "21ST CENTURY AUTOMOTIVE CHALLENGE

Oliver Perry

Paul Kydd continues to work tirelessly at organizing the Drive to the Shore component of our joint EEVC and BCIT sponsored event, scheduled for Saturday, June 9th, the first day of the weekend automotive challenge. Competitors will have chance to enter their diesel, bio-diesel, gasoline, or hybrid vehicle, in a 100 mile drive that will test fuel economy. The mpg measured will be determined by both driving skills and the onboard technology.

The Tour de Sol battery powered and solar assisted competitive aspect of the competition will be determined the same day with a shorter mileage runs, an autocross, and hill climbing event.

In the evening we plan on having an awards ceremony to recognize all participants, especially those who do well. We hope to pay tribute to the past American Tour de Sol and its volunteers, and to possibly announce a new direction, if NESEA is planning one.

At this point approximately three past TdS (Tour de Sol) teams have shown interest in attending the event. A college team from India has asked questions regarding entering a student built hybrid. No participant has officially signed up to date. Anyone reading this article who wants to become involved, be sure to contact me (Oliver H. Perry) at 609-268-0944 for further information.

Sign of the Times

A great deal is happening around the world regarding alternative energy transportation. Electric and hybrid car technology is no longer front page news. Opportunities for promoters to invest in wind, bio-fuel, solar, and alternative forms of energy are common-

place today. Political fights (on the state and national level) over which alternative form of energy is the best to promote are beginning to take place in the public forum! Those who favor a hydrogen highway are being bitterly challenged by the electric battery advocates. And arguments around the world are waging over whether sugar, corn, or switchgrass would best produce ethanol. Articles in the *Wall Street Journal* indicate that large amounts of capital are currently funding shifts in future energy acquisition. It is no longer a better idea to promote green energy; governments and large corporations are actually taking steps towards achieving sustainable green energy. George Bush, whom many in the "green stream" love to hate, is roving the globe pushing ethanol as one of the means to reducing American's oil addiction. Al Gore showed us that movie topics like "Global Warming" can win Oscars for actors who once were political losers. Who would have ever thought that? (And, a political loser may become a long term winner, including President Bush.)

Telling you as it is, not what is hoped.

At a time when what you and I have been pushing for is literally coming to past, Paul Kydd and I are finding that our event, "The 21st Century Automotive Challenge," a spin off of the American Tour de Sol, is having great difficulty finding enthusiastic participation. Our event, thus far is not showing signs of becoming a "New Year's Bowl Game," celebrating the coming of a new age of transportation. In fact it almost seems to be the opposite. Now that change is coming, events like ours no longer create the stir they once did.

Shocking that I would put this in print? Is it advisable for a president of this organization to admit in this newsletter that few people want to bring their electric and hybrid cars to our event? Just when it seems as if the tide of public and corporate opinion may be changing, is it wise for the president of the EEVC to publicly admit that few EV and hybrid enthusiasts want to participate in an electric and hybrid cars event? (I have been called the "Wise Old Owl" by some in the past, but lately more referred to as the burned out "Old Ollie!")

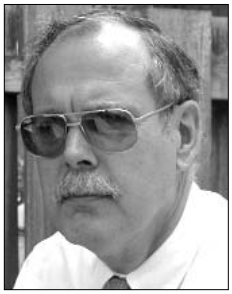
I never could, like a GM representative, tell you how great SUVs are for the country, the economy, the atmosphere, and your pocketbook. So why should I pretend we are going to have a great "21st Century Automotive Challenge" when all signs indicate otherwise. We will be in Burlington County with a few vehicles. If you don't like crowds, join us. And, the truth is, good change is coming whether we have a successful event or not.

Maybe news of our event will be more upbeat next month. Although I have not spoken with those actively helping promote this event, I have been thinking of making a few shifts in paradigm to create more participation. Stay tuned.

REMINDER: NO JULY OR AUGUST MEETINGS

As we did last year, EEVC is taking a break from monthly meetings during the summer months. We'll see you at the regular time and place in September.

CALIFORNIA, LAND OF PROGRESS?
By California Pete



California seems intent on maintaining its reputation not only as a land of technical innovation (Silicon Valley, Lawrence Livermore Labs, etc.) but also of what we may delicately call a little more liberal (or licentious) attitude than most — even when it doesn't intend to.

On the technical front, local utility Pacific Gas & Electric has asked the Federal Energy Regulatory Commission for permission to spend $3 million on a study of the feasibility of harnessing the power of ocean waves (There's a reason the Beach Boys sang about the surf around here). A story by Tom Abate in the *San Francisco Chronicle* for March 1 says that if everything works out as hoped PG&E might then go ahead and build a pair of 40 MW generating facilities.

How green is my silicon

A March 4 story in the *Chronicle* by staff

writer David Baker discusses how Silicon Valley, long home to semiconductor, Internet and other such businesses, is reinventing itself as the "Green Valley," with major investments happening in alternate energy as well as the highly-touted stem cell and recombinant DNA research. More than $3 billion in venture capital went into green technology last year, and a fifth of that to Silicon Valley firms. Baker cites Solazyme, which has fiddled with the genome of some common algae to cause it to produce oil; others work on ways to get ethanol from corn stalks and switchgrass, and still others are developing more efficient and less expensive photovoltaic devices. And as mentioned last month, BP has given UC Berkeley and the University of Illinois $500 million to create an Energy Biosciences Institute.

On March 6 *Chronicle* staff writer Keay Davidson picked up the same thread, discussing ways that scientists are trying to harness the enzymes in the digestive systems of termites to break down cellulose and lignin so they can be fermented to ethanol. Davidson also talks about a solar power plant under construction in the Mojave that will use 20,000 37-foot-wide reflective dishes to focus sunlight on an equal number of Stirling engines. Expected output is "at least 500 megawatts."

Now on to lasciviousness. For years San Francisco has wondered what to do with an old armory in the Mission district, which has been empty since 1970. Built in 1912, it's on the National Register of Historic Places. Over the years there had been proposals to build apartments, office, even an Internet switching facility, but opposition from neighbors prevented any of it from happening.

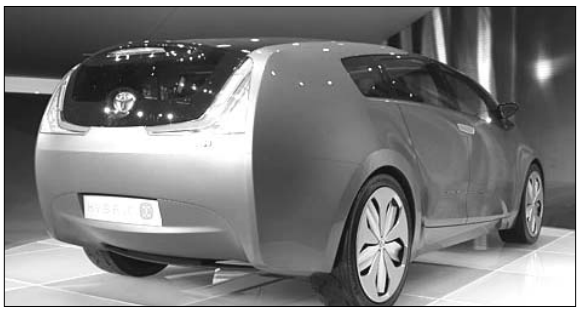
Then a few moths ago a private company came in and paid $14.5 million for the place. It was only after the purchase that it was revealed that the buyer was a pornography company that planned to use the 200,000 square foot stone building as a set for bondage films.

Not long after that Mayor Gavin Newsom declared a day to honor a 40-year old company that makes gay films. It was only after the proclamation had been made that someone clued in his honor that the films the company makes are not sensitive love stories but — you guessed it — gay porn.

BIG DOINGS AT A LITTLE AUTO SHOW

The Geneva Auto show, held March 8 to 18, is not the largest car show, but it has some interesting green (or greenish) vehicles on display, including the Acura Small Hybrid Sports Concept from Honda and the Toyota Hybrid X. The Honda (above) is billed as providing a preview of the design direction for the successor to the Acura NSX. It probably isn't all that fuel-efficient, since it uses a front-mounted, V-10 engine and a new high-performance, rear-wheel-drive based version of Acura's exclusive Super Handling All-Wheel Drive™ (SH-AWD™), but although Honda didn't give any performance figures it could probably go like a rocket — and look good while doing so.

The Toyota Hybrid X (below) is a little less extreme,being basically a tricked-out Prius with some nice amenities and a 5-inch wider body, but it looks OK as well.



SOLAR HOME TALK ON TAP

The Philadelphia Solar Energy Association will feature Mike Strizki and the Hopewell Project at their monthly meeting, Monday, March 26th, at 6:45 PM in the sun room at the Philadelphia Free Library, next to the Logan Circle in Philadelphia. Mike will show slides and discuss the technology of the only

truly self-sustaining solar/hydrogen fuel cell home in North America (see *EEVC Newsletter* November 2006). Any EEVC member interested in attending may receive directions by calling EEVC president Oliver Perry at 609-268-0944.

On February 7 CNBC aired a spot in which "Money Honey" Maria Bartiromo interviewed Mike and Peter Winslow, CEO of Renewable Energy International. It's getting hard to find on line, but for a while it should be available by doing a Google search on bartiromo strizki, then clicking on Cached.

NEWS UPDATE

On March 2 the South Coast Air Quality Management District Board awarded $2.6 million for the development and demonstration of 30 plug-in hybrid electric vehicles using Ford Escape and Toyota Prius hybrids.

Quantum Technologies will receive about $2 million to convert 20 new Ford Escape hybrid vehicles and Hymotion will receive about $560,000 to convert 10 new Toyota Prius vehicles. During the five-year program the vehicles will be demonstrated at up to 15 sites throughout the four-county area.

BMW, DaimlerChrysler look at hybrids

EVA-DC president Dave Goldstein comments on a Reuters story that ran in *Automotive News*: "DaimlerChrysler, which has been lukewarm on Hybrids, even though they are building a token number of Sprinter PHEVs in cooperation with EPRI, has just announced an alliance with BMW, another Hybrid laggard. Basically, its a Weak (as opposed to Plug-In) hybrid 'baby step' involving an 'electric rear axle.'

"This is an approach that was suggested previously by EVA/DC's Ron Olesch as a possible bolt-in conversion for a truck, van or SUV. Once installed, it could be configured as a PHEV as well as a Weak Hybrid. It's basically just a matter of batteries and onboard electronics."

Electric hydrofoil surfboard

Gizmag reports that a company called Inventist is working on an electrically-powered hydrofoil surfboard called the Hydroglider. A hydrofoil is a watercraft with underwater foils that cause it to rise up out of the water as speed increases, greatly reducing drag. Inventist claims that the Hydroglider, which is driven by an electric motor and powered by a Ni-MH battery, can reach 25 mph and run for two hours on a charge.

GE funds lithium-ion battery company

On February 14 General Electric announced that it had provided a $40 million series D equity round to A123Systems, a young company working on lithium-ion batteries. This follows a 2006 investment of $13 million by GE's Global Research Center for a joint initiative to develop a zero-emissions hybrid fuel cell bus.

A123Systems makes high power lithium-ion batteries that use a doped nanophosphate lithium-ion technology to provide higher power density, longer life, better safety, and a much faster recharge. The Company, founded in 2001 by scientists from MIT, supplies batteries to Black & Decker for a new line of high-performance, cordless power tools, and is working on a wide variety of consumer and commercial applications.

GE increases wind farm investments

GE Energy Financial Services announced on February 15 that it is investing $270 million in wind farms in California, Illinois, New Mexico and Pennsylvania. The company is investing along with a subsidiary of Charlotte, N.C.-based Wachovia Corp. in six wind farms owned by affiliates of global investment and advisory firm Babcock & Brown.

All of the wind farms have either been completed or will be completed by the end of April, except the Pennsylvania operation, expected to be finished by December.

EU vows 30% cut in greenhouse gas

An article by James Kanter in the *International Herald Tribune* online reports that European Union ministers have pledged "to ramp up their own targets if industrialized countries like the United States made similar efforts."

The article reports that German environmental minister Sigmar Gabriel said that "European governments would be ready to cut emissions by 2020 to 30 percent below

1990 levels, from a current pledge of 20 percent— but only if other heavy polluters joined in."

Companies getting on board too

On February 20 a Reuters story by Joanne Morrison reported that "more than 100 corporate heads, international organizations and experts set out a plan ... to cut greenhouse gas emissions, calling on governments to act urgently against global warming."

"The group, which includes executives from a range of industries including air transport, energy, and technology, called on governments to set targets for greenhouse gases and carbon dioxide (CO_2) emissions. "

Companies involved include General Electric, Ford, Toyota Motor North America, Goldman Sachs and Wal-Mart.

Another ban on incandescent bulbs

Last month we reported that a California Legislator had proposed banning household-type incandescent light bulbs in favor of compact fluorescents and other high-efficiency devices. It seems that others have heard about it and decided to emulate the proposal. On February 20 *Business 2.0* reported that the Australian government will phase out traditional bulbs by 2010; this will, the government said, cut greenhouse gas emissions by 4 million tonnes by 2015.

DOE funding 13 Solar Energy Projects

On March 8 U.S. Department of Energy (DOE) Secretary Samuel W. Bodman announced the selection of 13 industry-led solar technology development projects for negotiation for up to $168 million (FY'07-'09) in funding, subject to appropriation from Congress. As part of the cost-shared agreements, the industry-led teams will contribute more than 50 percent of the funding for these projects for a total value of up to $357 million over three years.

The Solar America Initiative aims to bring down the cost of solar energy to make it competitive with conventional electricity sources in the U.S. by 2015.

The teams selected for negotiation have formed Technology Pathway Partnerships (TPP), which include companies, laboratories, universities, and non-profit organizations to accelerate the drive towards commercialization of U.S.-produced solar photovoltaic (PV) systems. These partnerships are comprised of more than 50 companies, 14 universities, 3 non-profit organizations, and 2 national laboratories. DOE funding is expected to begin in FY'07, with $51.6 million going to the TPPs.

COMING EVENTS

21st Century Automotive Challenge
June 9-10, Burlington County, NJ. For information contact Oliver Perry, 609-268-0944, perrydap@aol.com, or visit www.eevc.info.

Fuel Cell 2007
June 14th - 15th, Rochester NY. Contact Marsha Hanrahan, marshah@infoweb-com.com or go to www.fuelcell-magazine.com/fc_2007 conf_index.htm

Duryea Day #42
Sept. 1, Boyertown, PA. Call 610-367-2090 or go to www.boyertownmuseum.org.

Panasonic World Solar Challenge
October 21-28, Australia. CAll 61 8 8463 4500 or go to www.wsc.org.au

Michelin Challenge Bibendum 2007
Shanghai, Nov 14-17. Contact mail.challengebibendum@fr.michelin.com, www.challengebibendum.com

MEETING SCHEDULE

Meetings are held in Room 49, Plymouth-Whitemarsh High School, 201 East Germantown Pike in Plymouth Meeting, PA, and begin at 7:00 p.m.

April 14

May 9

June 13

September 12

October 10

November 14

December 12