

EEVC NEWSLETTER

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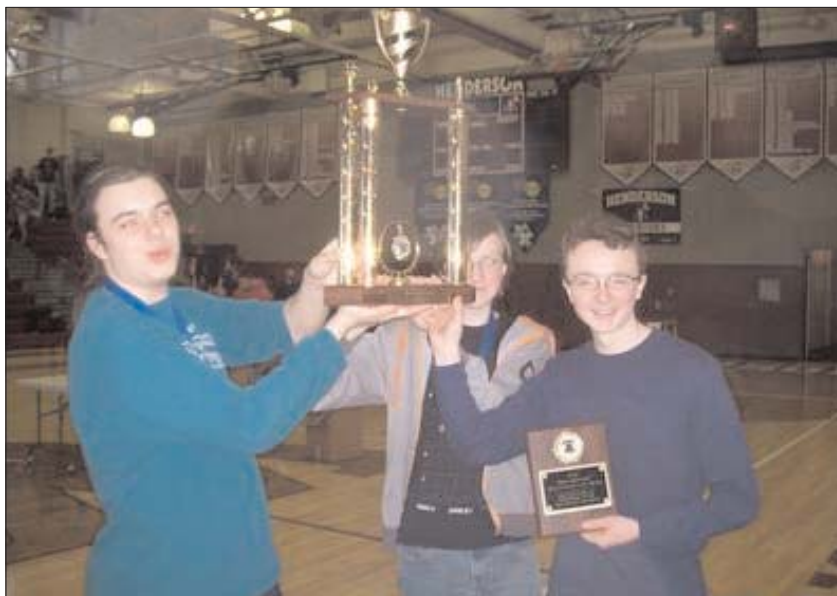
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EEVC AWARDS MEMORIAL PLAQUE AND ASSISTS AT ANNUAL PHYSICS OLYMPICS EVENT

The Physics Olympics were held at Henderson High School in West Chester, Pennsylvania Saturday March 17, 2018. Oliver Perry, Jim Natale, Alan Arrison and Carl Grunwald represented the EEVC, which sponsors the Ron Groening Excellence in Engineering Memorial



The Physics Goon Squad from Penncrest--Mark Dresden, Ben Knowler and Nathan Dole.

Award. A plaque is awarded to the high school team that created the best engineered electric vehicle at the competition.

The Physics Olympics consist of three meets held throughout the school year in which regional high schools compete. The schools competing this year were Interboro, Penncrest, Pennsbury, Radnor, Harriton, Cinnaminson and Henderson.

The Physics Olympics present a series of challenges, among them an electric vehicle competition, bridge building, and an event held in the gymnasium on the Saturday challenge that combines both athletic and academic skills that is popularly named the “Physics

Relay.” In this event students race to complete an athletic challenge while moving from one end of the gym to the other where they attempt to solve a physics word problem. The students then return to where they began at the other end of the gym to enable the next player on their team to begin the next leg of the relay. Examples of the athletic activities that must be completed before each problem

solving attempt include completing a successful pass and catch of a football, two successful volleyball volleys between teammates, and successfully navigating an obstacle course while kicking a soccer ball. A penalty task, such as a wheel barrel race or carrying a tennis ball on a plastic spoon, is assigned for the trip back to the other end of the gym if the problem is not solved within two minutes. The speed and accuracy in which both the physical challenge and the questions can be answered in each leg of the relay thus determine the winner of the event.

Another key event at the Physics Olympics is the Electric Vehicle Competition. This competition starts off the morning schedule of events. Students from each school rally and cheer behind their team's vehicle entries as they run to meet the demands of the course. Always a creative challenge, this year's electric vehicle competition seemed particularly daunting: to successfully drive a model electric vehicle around a circular track. The track was ringed on the inside and outside by a garden hose and gate timed using a track and field quality camera at the start and finish of the circular track. Scoring was divided into two tiers. Cars that completed one lap qualified for Tier 1 and were scored on elapsed time. Those who could not complete a lap were scored on the distance travelled before they stopped or ran off the track and were placed in Tier 2.

Each school could enter more than one car and each car had five runs. Scoring was based on the best time or longest distance for each car.



Left to right: Jim Natale Al Arrison Carl Grunwald judging merits of student EV projects.

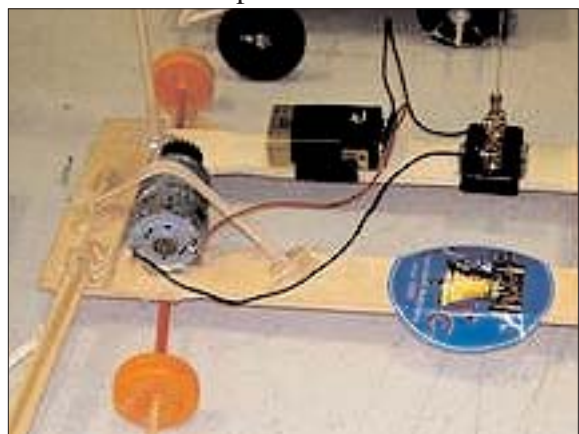
Eight vehicles from the various high schools entered the competition for the EEVC's Ron Groening Excellence in Engi-



EEVC members Jim Natale (second on right), and Carl Grunwald, right, chat with the team that won the EEVC Overall Best Car Engineering Award in honor of Ron Groening.

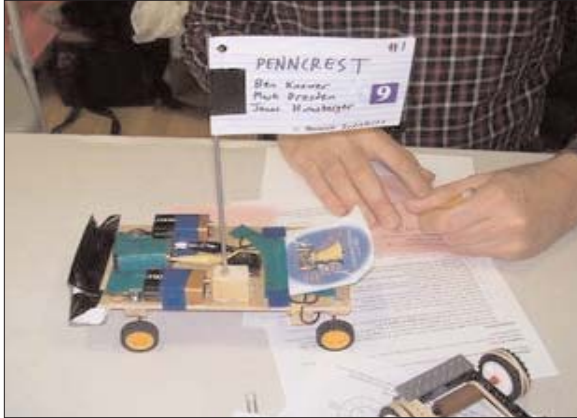
neering award, each with the EEVC logo proudly emblazoned on their vehicle. Alan Arrison and Jim Natale of the EEVC along with two teachers worked the registration table to check in and evaluate each entry.

The circular navigation requirement of this year's competition introduced a need for design elements that would not only propel but also steer the vehicle around the track. Four of the cars that entered the competition completed the timed part of the event by successfully navigating the full circle from the starting point to the finish. The cars employed various clever mechanisms to accomplish this, among them an extended fender on the side of one of the vehicles that enabled it to glide along the outside barrier of the track as it completed the circle.



One car featured an extended fender on the side that enabled it to glide along the outside barrier of the track as it completed the circle.

An interesting design aspect that Alan from the EEVC looked for in the cars but that



Penncrest's winning car.

was not directly employed by many of the designs was a “differential steering” that would have altered the steering angle based upon the relative rotational torque of the inner and outer wheels as the car moved around the track. This would have prevented overshoot, skidding and an occasional 360 wipeout as the vehicles moved forward across the track floor. One vehicle that had inner wheels smaller in diameter than the outer wheels may have attempted this design approach. Although a true differential steering mechanism may have been difficult to incorporate in a model electric vehicle, increased tire traction and a stable speed around the track could have helped to compensate in the vehicles that navigated the full circular track.

Penncrest High School’s electric vehicle was selected as the winner of the Ron Groening Excellence in Engineering Award. Penncrest’s vehicle exhibited several design features that enabled it to meet the challenge of the course. It was a compact and heavy vehicle, with a heavy wood frame and two batteries balanced on either side simply for ballast in addition to the 9 volt battery that powered the car. The heavy weight, combined with small rubber wheels, increased the traction of the car thereby preventing slipping as the car moved around the track on the slippery gym floor.

Solid gearing coupled the motor to the vehicle axle. The car featured a “pit adjustable” steering design, with two screws in the front of the vehicle that could be loosened and tightened to adjust the steering angle of the axle for an optimum fixed turn-

ing radius through the circular course. It had a Styrofoam bumper in the front and relatively tiny wheels that were smaller than the height of the garden hose that ringed the track. This prevented the car from “jumping the track” should too much momentum be gained in the turn. Although not a criterion for winning the EEVC award, their vehicle sported the fastest time in the event. The students added creative cosmetic touches to the vehicle that included a copyright by Tessamir Industries and a “How’s my driving?” tag line on the rear bumper. It also had a unique slick pushbutton switch mounted on the top for ease of starting.

This winning vehicle was put together by a team of students at Penncrest High School with the support of their Physics teachers Jim Ciccarelli and Anthony Lombardo. Students Mark Dresden, Ben Knowler and Nathan Dole enthusiastically accepted the EEVC award for the vehicle they had built and raced in the competition. Mark Dresden repeatedly credited the group effort for the win, including some students who could not make it to the event that day. The students and their teacher Jim Ciccarelli said that they had referred to themselves as the “Physics Goon Squad” as they were designing and building their vehicle. With a nickname that might just as easily be overheard on a football gridiron, the “Physics Goon Squad” left the gym with the EEVC Ron Groening Excellence in Engineering award and other trophies from the day’s competitions triumphantly in hand.

NEWS UPDATE

Europeans cool to EVs

A March 6 *New York Times* article by Neal Boudette reports a certain lack of enthusiasm for EVs in parts of Europe, at least on the part of luxury car buyers, much of it apparently driven by a combination of range anxiety, uncertainty about the availability and reliability of charging infrastructure, and problems with occasional power outages. “That type of sentiment presents a big challenge for Europe’s luxury carmakers,” says the article. “Many automakers, including BMW, Mercedes-Benz, Audi, Porsche and Volvo, are scrambling to produce lines of

electric, hybrid and plug-in models.”

If the EVs aren't selling, why offer them? The first answer is Tesla. Having sold in excess of 100,000 vehicles, the article says, Tesla must be considered a serious top-end competitor. And the second reason is the increasing regulation of tailpipe emissions. With diesel now in disgrace and facing possible bans in the future, electric is the only way left to meet the new standards.

Jaguar shows EV SUV



In that vein, on March 1 Jaguar showed the production version of the I-Pace SUV that it had announced in concept form two years earlier. The car is available to order now, priced from £63,495 in the UK. It features two motors with a combined 400 PS and 696 Nm delivering 0-100 km/h in 4.8 s; a 90 kWh Lithium-ion battery that delivers 480 km range, with EV navigation to ensure range-optimized routing; an aluminum frame; and 40-minute charging to 80 percent, with a 15-minute charge giving 100 km range.

More luxury, please



Not to be outdone, Pininfarina has announced a new electric supercar concept. Called the

HK-GT, it features a 20 kWh battery, four integrated PM motors with 2-speed transmissions, and a microturbine range extender. A torque vectoring system provides selective all-wheel-drive. Each wheel is powered and controlled by independent electric motors with electronics to provide superior control capability, improved vehicle handling performance and stability, and regenerative braking capability. Top speed is 250 kph (156 mph), 0-100 km/h acceleration is 2.9 s, maximum power delivery of the electric motors is more than 600 kW; all-electric range is 100 km (62 miles), while range with the turbine going is 100 km (625 miles).

And, of course, it has that sexy Italian body.

Promising battery developments

Two recent announcements on the battery front show some promise.

The first, reported in a March 3 article by Lee Golberg in *Product Design & Development*, reports that a small company called Solod Energy Systems in Woburn, MA, is working on a Li-ion cell with twice the energy density of conventional units, “while also being less prone to thermal runaway, fire, and some of the other unsavory behavior of most Lithium-based cells.” A white paper explaining the research is available at http://assets.solidenergysystems.com/wp-content/uploads/2017/08/24022118/SES_WhitePaper.pdf.

The second revisits a technology that gets revived every decade or so: the flow battery. Another Lee Goldberg article in *PD&D*, this one dated March 15, reports on the development of hydrogen-bromine flow cells at the University of Kansas. Researchers there have been working on carbon nanotube-based electrodes that increase power density by increasing electrode surface area, and on developing materials that can withstand the corrosive effects of the chemicals involved. More detailed information is available from the university at <http://news.ku.edu/2018/03/08/research-gets-closer-producing-revolutionary-battery-power-renewable-energy-industry>. And a basic article on how such a device works can be found at https://en.wikipedia.org/wiki/Hydrogen_bromine_battery.

LAWSUITS ON CLIMATE CHANGE By California Pete



A few months ago several California cities, including San Francisco, Oakland and the beach resorts of Santa Cruz and Imperial Beach in San Diego County, plus San Mateo, Marin and Santa Cruz counties, sued Chevron, ConocoPhillips, ExxonMobil and Shell, accusing them of creating a public nuisance by causing the sea level to rise. “The communities want the companies to cover the costs of constructing seawalls and rebuilding submerged roads and infrastructure,” said the *San Francisco Chronicle*.

A U.S. district judge recently ruled that those suits should be heard in federal, rather than state courts — a blow to the plaintiffs because “[t]he decision would keep the cities from using state precedents to advance their arguments.”

The cases have accordingly moved to federal court in San Francisco, and the judge there has issued an unusual order: he wants both sides to provide him with a “tutorial:” their best arguments on the reality or lack of reality of human-caused climate change. But he hasn’t asked for propaganda broadsides or exercises in spin, instead demanding answers to eight specific questions, says *The Chronicle*, including “‘What caused the various ice ages?’ Also: ‘Apart from carbon dioxide, what happens to the collective heat from tail pipe exhausts, engine radiators, and all other heat from combustion of fossil fuels?’”

This could get interesting.

Water rising, land sinking

While the Bay Area is rightly concerned with the inexorable rise in sea levels, there is also the problem of the land sinking. Much of the land around the Bay is fill, which was put in place to eliminate the salt marshes that used to ring the estuary and create land for farming and later for building. There was even a scheme (called the Reber plan, aka the San Francisco Bay Project) put forth in the late ‘40s by an actor, theatrical producer and schoolteacher named John Reber, that would have used dams to turn parts of the Bay into

freshwater lakes and the rest into dry land, with a shipping channel down the middle. After studies showed it was unfeasible the Reber plan was scuttled. But the filled land remains, and, over the years, has steadily subsided; it’s still sinking, according to a recent study by UC Berkeley and the University of Arizona, by as much as three quarters of an inch per year, says *The Chronicle*.

Bolt tops in Tesla land

Recent sales figures show that the best-selling EV in California is not the Tesla (despite the seemingly-endless supply of rich folks who want to make a statement) but the humbler Chevy Bolt, according to figures from the California New Car Dealers Association and Auto Outlook, Inc., and published in *The Chronicle*. “A total of 13,487 Bolts were sold or leased in California, compared with 11,813 Tesla Model S sedans. The vast difference in prices — the Bolt starts at \$36,620, while the most basic version of a Model S costs \$74,500 — may have something to do with the ranking.”

People walking out in front of cars

When I first came to California I was struck (word used advisedly) by the way pedestrians would walk blithely into traffic, looking neither left nor right. The laws here are pretty strict: a driver is supposed to stop for a pedestrian — even one who is still on the sidewalk but makes eye contact. Of course most don’t bother to make eye contact; they just walk into traffic. “It’s the drugs,” I would say. Now a study by the Governors Highway Safety Association confirms my suspicion: “States that legalized recreational marijuana between 2012 and 2016 had a collective 16.4 percent increase in fatalities in the first six months of 2017 compared to the prior year.”

“All other states experienced a 5.8 percent decrease.”

So if you come to California watch out for stoners walking into the path of your car.

And don’t park in San Francisco, where there are more than 30,000 car break-ins a year (about 3.5 per hour) reported to police — and since nothing much is ever done about it, probably many more unreported.

No Fur Here

The San Francisco Board of Supervisors has just passed an ordinance banning the sale of new fur garments in the city, joining West Hollywood and (of course) Berkeley, which have already done so. The new law, set to take effect next year, still allows the sale of used fur garments. So far no word on mandatory veganism.

Leaf batteries to light up Japanese town

On March 22 Nissan announced that it was teaming with affiliate 4R Energy Corp. to provide the town of Namie, Japan, still suffering from the aftereffects of the 2011 tsunami that destroyed the Fukushima Daiishi nuclear power plant, with off-the grid street lighting. The new streetlights will be powered by solar panels and used Leaf batteries.

NOTICE ON DUES

Annual dues are \$20 with electronic delivery of the Newsletter, or \$25 for a printed copy. Make checks payable to EEVC and mail to James Natale, 3307 Concord Dr, Cinnaminson NJ, 08077, or pay via PayPal to www.paypal.me/EEVC.

COMING EVENTS

Sustainable Living Expo

April 13, Kintnersville, PA. <https://www.peace-youth.org/2018-sustainable-living-expo>

WCX: SAE World Congress Experience

April 10-12, Detroit, MI. <http://wcx18.org/>

Electric Vehicles 2018

April 11-12, Berlin. www.idtechex.com/electric-vehicles-europe/show/en/

Green Transportation Summit & Expo

April 17-19, Tacoma, WA. <https://www.eventbrite.com/e/green-transportation-summit-expo-tickets-36660048191?discount=EMC30>

Montreal Electric Vehicle Show

April 24-27, Ottawa. <https://emc-mec.ca/ev2018ve/>

EEVCongress

March 14, Geneva, in the framework of the Geneva International Motor Show, March 8-18. <https://www.gims.swiss/en/>

Junior Solar Sprint

May 19, Drexel University. <https://www.phillysolar.org/junior-solar-sprint/>
Movin' On, the international summit on sustainable mobility (successor to the Michelin Challenge Bibendum)

May 30-June 1, Montréal. <https://movinon.michelin.com/en/>

European EV Batteries Summit

June 20, 21, Munich. www.wplgroup.com/aci/event/european-electric-vehicle-batteries-summit/

National Junior Solar Sprint

June 22 – 26, Atlanta. www.usaeop.com/programs/competitions/jss/

American Solar Challenge 2018

July 6-22, beginning with the Formula Sun Grand Prix, then across North America. americansolarchallenge.org/the-competition/american-solar-challenge-2018

Intersolar North America 2018

July 9-12, San Francisco. www.intersolar.us/en/home.html

The MAGLEV 2018 Conference, together with MTST 2018 Conference

Sept 5 - 8, St. Petersburg, Russia. <http://russmaglev.com/en/>

National Drive Electric Week

Sept 8-16, nationwide. <https://driveelectricweek.org/>

Electric & Hybrid Vehicle Technology Expo & Conference

Sept 11-13, Novi, MI. <https://evtechexpo.com/>

Electric Vehicle & Plug-in Hybrid Vehicle Exhibition

Sept 26-28, Tokyo. <https://10times.com/evex>
SAE Range Extenders for Electric Vehicles Symposium

Nov 14-15, Dearborn, MI. www.sae.org/events/rex/

MEETING SCHEDULE

Meetings are held in Room 49, Plymouth-Whitmarsh High School, 201 East Germantown Pike in Plymouth Meeting, PA, and begin at 7:00 p.m. Meetings in July and August to be determined.

April 11

May 9

June 13