

Inspiring Greatness in

Engineering and Computer Science

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Students Win First Place in Robotics Competition

A team of Cedarville University engineering students won first place in the American Society of Engineering Education (ASEE) Autonomous Robotics Competition on June 24, 2013.

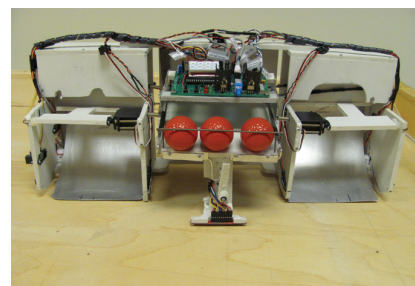
The annual competition is open to freshmen and sophomore engineering students and requires the team to build and program a robot to complete a specific task. The team is judged on the robot's performance and a poster presentation where they present their work and answer questions from competing teams. This year, the robots were required to collect orange golf balls, representing Atlanta's Georgia peaches in the competition's location-themed tradition. Cedarville's team was the only one to successfully gather all 12 balls in each of four rounds and, combined with an impressive poster score, won first place by 127 points, one of the largest margins in the competition's history.

The team was comprised of 14 freshmen and sophomore students who worked three hours every Saturday morning from August 2012 to May 2013 to build the robot. Two additional weekends during the summer were devoted to finishing the robot in time for the competition because of the difficult design.

"This was probably the most complex design we have ever made," said Dr. Clint Kohl, professor of Computer Engineering and the team's faculty advisor.

The team encountered some difficulties at the start of the competition, requiring hours of mechanical and software modifications the night before. Even so, the team was ready in time to perform and win despite the complications.

While the victory is important and exciting, Kohl said it is not what the competition is really about. "Winning is just frosting on the cake," he said. "It's really used to



develop students into better professionals and members of a team, using their gifts and talents to represent Christ well."

Next year's competition will be held in Indianapolis, Indiana, where teams will compete by racing their robots around a miniature track in honor of the Indy 500. Cedarville plans to compete again in 2014, said Kohl, and hopes to perform as well as they did in 2013.

"I hope we're up for it," said Kohl, "And I think we will be."

Solar Boat Team Dominates Solar Splash Competition in 2013

The Cedarville University Solar Boat Team won the Solar Splash Intercollegiate Solar Boating competition for the seventh time since 2004, turning in one of the most dominating performances in competition history.

In a rain-shortened and flood-threatened competition held in Cedar Rapids, Iowa, Cedarville scored 964 points to

outdistance Geneva College (746) and the University of Northern Iowa (744). Other notable finishers included Cal Poly Pomona (698), the University of Arkansas (476), and the University of South Carolina (263).

Cedarville's team captured first place in three of the four events: the Slalom, Sprint, and Endurance (continued)



races — a first time in Solar Splash history — while finishing third in Qualifying. The team had the best Technical Report among the field of 13 schools and was second in the Technical Display. Cedarville’s boat reached a top speed of 33 mph in the Sprint — 5 mph faster than its previous best speed.

When the team arrived in Cedar Rapids, the water was already overflowing the banks of the lake. After a heavy down-pour on the third night, the waters started to rise again and a surge was predicted to come down the nearby Cedar River. To accommodate the threat,

awards ceremony was held on Saturday at a different location.

2012–2013 Contributions: Cedarville’s 2013 Solar Splash team made incremental improvements to their existing boat and also invested a great deal of effort to improve the foundation for winning in future years. One of the greatest rewards for Dr. Tim Dewhurst, Senior Professor of Mechanical Engineering, and principal team advisor, is seeing the team members learn a skill outside of their comfort zone. “Being on the team helps students gain experience in a specialized area for which

model servanthood, perseverance, and diligence to see the task through. It’s not much like regular teaching, but it’s a winning combination.”

The team consisted of graduating seniors Neola Putnam, Dave Kemmenoe, Caleb Wagner, and Greg Dickert, as well as junior mechanical engineering students Joel Dewhurst and Joel Ingram and electrical engineering students Jacob Dubie and Jacob Walter.

Putnam, a member of Cedarville’s cross-country and track teams, was the pilot for the two-hour Endurance race. She incorporated her racing experience to drive aggressively and beat the nearest competitor by over a half mile and the rest of the field by over two and a half miles.

Dubie and Walter supported the team’s electrical needs by upgrading the battery test facility and data acquisition system. Ingram and Dewhurst used CAD/CAM software and the CNC mill to upgrade the Sprint drivetrain to eliminate a major flaw in the 2012 Sprint system.

The team dynamic also raised a unique relationship between students and faculty. “Working on this project gave me the opportunity to interact with the advising professors in roles that were more like a manager-employee or a mentor-mentee relationship than a teacher-student relationship,” Putnam said. “As students gain expertise in an area in which the professor may not be very familiar, the relationship becomes more similar to the interaction style found in a work environment, where our professors helped us progress by advising general approaches to problems and challenges.”

A video summarizing Cedarville’s performance in the competition can be found on the CUSolarSplash YouTube channel.

The Solar Splash Intercollegiate Solar Boating competition will be held in Dayton, Ohio, in 2014 (see related article).



the first Endurance heat was held a day early, and then the teams reconfigured their boats for the Sprint race and ran a Sprint heat late into the evening. As the events carried through the dinner hour, Cedarville’s team bought pizzas for the other teams and officials. This small gesture of goodwill was appreciated by the other schools — Cedarville was deluged with hugs throughout the evening. The teams returned to their lodging that evening not sure whether the competition would continue the next day or not. That question was answered at 1:20 a.m. when a call came for all teams to return and evacuate their equipment. By dawn, the road to the venue was a foot underwater and the competition was concluded. The

they don’t have extensive academic training,” said Dewhurst. “It’s new material for them, but it prepares them to embrace new projects enthusiastically and confidently in their future careers.” Dr. Gerald Brown, Associate Professor of Electrical Engineering, and electrical advisor for the team, has similar sentiments. “Real-world engineering problems don’t usually have ‘answers in the back of the textbook,’ and so the team has to research the material, apply sound design principles, work with suppliers to refine the design, and then build and test it. Sometimes as advisors, we manage the team like a manager would a group of engineers. Other times, we’re more like mentors in a master-apprentice relationship, and sometimes we roll up our sleeves and

Early in October, SEAM held its first-ever reunion in conjunction with Cedarville's homecoming celebration. Three graduates returned to share fellowship and excellent desserts with current student members. One of them was Travis Knipple, an electrical engineering graduate who serves the Haitian people wholeheartedly in relief ministries in the ongoing aftermath of the catastrophic earthquake.



Later that month a mechanical engineering graduate was able to meet with the group and share the service he renders in Southeast Asia. Since the late 1990s, he has intentionally developed engineering skills that enable him to influence workers of various cultures with the good news of Jesus Christ. He challenged the group to position themselves so God can use them, to posture themselves with attitudes that reflect Christ, and to pray.

At Cedarville's Missions Conference in January 2013, SEAM and IEEE co-sponsored a panel discussion consisting of missionaries of HCJB, TWR, SIM, Engineering Tech Team, and JAARS. SEAM president Sharon Grafton was a key organizer of the well-attended event and moderated the discussion. In March, SEAM was privileged to have two Cedarville engineering alumni who have

served through teaching or engineering in eastern Asia. One served through teaching physics, while the other plans to return to get a better grasp on local languages.

SEAM continued to produce solar rechargeable reading lights for Liberian pastors. Students worked to produce lights with a new housing and more efficient circuit design at a lower unit cost. Around 45 units of new and previous

design were taken to Liberia in May 2013 to share with pastors (and some Christian school teachers). SEAM also collaborated with Cedarville's Enactus chapter to begin a feasibility study of assembling and marketing the lights in Liberia.

Over spring break 2013, several SEAM members traveled with electrical engineering professor Dr. Jeff Shortt to work on student-specific projects with the engineering staff of HCJB Global Technology Center in Elkhart, Indiana. In May 2013, six SEAM members traveled to Liberia, West Africa, to work on technical projects with ELWA, a Christian radio, hospital, and school ministry. They built solar hot water panels, installed security light poles, delivered solar reading lights, experienced culture, and worshipped with Christians of Liberia.

Society of Women Engineers (SWE) started another exciting school year in 2013 by welcoming 10 new female freshmen to our department, which makes a total of 40 female engineering and computer science students.



The annual service project was a "Blast Off" project for Perrin Wood Elementary School students. The SWE students helped the elementary students build water rockets to stimulate their interests in engineering. Both the kids and Cedarville's students had a lot of fun. Many thanks to Dr. David Gallagher for all the soda bottles he saved for us.



Malia Amling, a senior SWE member, won first place in the Student Research Paper Contest at the Math, Engineering, and Science Undergraduate Research Conference (MESCON). The paper titled "Low-Cost Implementation of Vehicular Platooning using PIC Microcontroller and Diversified Sensors" is under the funding of NASA OSGC scholarship and advised by Dr. Vicky Fang.



Another big event of this year is that six of the SWE officers and seniors were able to attend the SWE annual conference in Baltimore, Maryland

Visit cedarville.edu/engineering or call 1-800-CEDARVILLE (233-2784) for more information.

Cedarville Grad Places First at Engineering Competition



Zachary Young, a 2013 graduate of Cedarville University, earned first place at the American Society of Mechanical Engineers (ASME) Old Guard Oral Competition held in San Diego, Calif. Students from throughout the world competed in this competition, including students from universities in the United Arab Emirates, the United Kingdom, India, Columbia and Mexico as well American schools such as the Milwaukee School of Engineering and Yale University.

For the competition, each student prepared for a 15-minute technical presentation and five-minute question-and-answer session on an aspect of engineering, preferably

about something they themselves were directly involved in. Zach presented on his senior design team's project, which involved collaboration between Cedarville's engineering department and the school of pharmacy. His team (Zach, Jonathan Meade and Nathan Wright), led by its faculty advisor Dr. Timothy Norman, developed and built a device for use in pharmaceutical research that allows scientists to perform research on cells and have the cells respond as if they were still in the human body.

According to Young, Cedarville's engineering program was foundational in preparing him to present in this

competition. "It gave me the technical fluency to fully comprehend all the facets of the project, the confidence and mannerisms to ensure my delivery was clear and not distracting and the critical thinking required to quickly and concisely answer all the questions asked of me."

Cedarville's engineering faculty believes that proper communication and public speaking skills are nearly as important as the concepts of engineering themselves. The many reports and presentations assigned through the first three years of the program have proved to be invaluable to students like Young.

Contending in this competition also proved to Young that the education he received at Cedarville was truly excellent. "The main thing I learned there was how world class Cedarville's engineering department is. Here I was, an average Cedarville student, competing against students from huge research institutions, Ivy League schools and schools from across the world," said Young.

Young is currently preparing to start work for Northrop Grumman in its Professional Development Program.

Tau Beta Pi

Last spring five of our engineering juniors were recipients of Tau Beta Pi (TBP is the National Engineering Honor Society) \$2,000 scholarships for use during their senior year. The recipients were Malia Amling (EE), Joshua Fleming (EE), Christopher Fox (ME), Jacob Miller (ME), and David Yoder (ME). TBP awarded a total of 364 scholarships to students representing 242 university chapters. Dr. Hardy Hegna is our chapter advisor.

SEAM Report 2013

The Society of Engineers Aiding Missions (SEAM) student organization was very active during the 2012–13 school year. SEAM held meetings with several engineers involved in world evangelization or human relief efforts, built and distributed more solar rechargeable reading lights, and did engineering work projects with HCJB in Indiana and ELWA in Liberia, West Africa.

During September there were three SEAM meetings featuring different missionaries. First, the group had a video conversation via Skype with 2010 mechanical engineering graduate Elizabeth Flow, who works in Kenya with LIMBS International, an organization that enables nationals to manufacture low-cost prosthetic knees.

On another occasion, Stephen Miller presented his years of work providing engineering solutions for water distribution and medical missions in South America and around the world. He described challenges and listed resources for students interested in such services in a meeting jointly held with the ASME section. On a third occasion, Dale Harlan of SIM discussed the ministry of providing tools for people to secure their own clean water in places like rural Bolivia. He demonstrated a pump built simply out of readily available materials such as PVC pipe and testified how the Lord led him as an engineer to serve people cross-culturally. The pump has become the basis for a mechanical engineering capstone senior design project for the 2013–14 school year.

Few universities — Christian or not — offer the modern facilities, extensive hands-on experiences, and one-on-one faculty interaction that characterize Cedarville’s programs. The rigorous classroom experience combined with a campus environment openly committed to Christ prepares our graduates to find jobs in a wide range of engineering and technology fields or to succeed in graduate school.

Faculty

- Robert Chasnov, Ph.D. (Chair)
- Sam SanGregory, Ph.D. (Assistant Chair)
- Gerry Brown, Ph.D.
- Timothy Dewhurst, Ph.D.
- Vicky Fang, Ph.D.
- David Gallagher, Ph.D.
- Seth Hamman, M.S.
- Hardy Hegna, Ph.D.
- Darren Holland, Ph.D.
- Jay Kinsinger, M.S.
- Clint Kohl, Ph.D.
- Tim Norman, Ph.D.
- George Qin, Ph.D.
- Keith Shomper, Ph.D.
- Jeff Shortt, Ph.D.
- Thomas Thompson, Ph.D.
- Timothy Tuinstra, Ph.D.
- Tim Yao, Ph.D.
- Larry Zavodney, Ph.D.

Majors

- Computer Engineering (B.S.Cp.E.)
- Computer Science (B.S.)
- Electrical Engineering (B.S.E.E.)
- Mechanical Engineering (B.S.M.E.)

Minors

- Biomedical Engineering
- Computer Science

Special Programs

- Cooperative Education Program
- Engineering Honors Program

Internships

Cedarville’s Career Services staff will help you prepare for your career through discipline-related experiences, or internships. You will have an advantage in a competitive job market because of real-life, hands-on experience. Students in our department have enjoyed internships with organizations including:

- 3M
- AFIT & Advanced Navigation
- Air Force Institute
- Amazon.com
- Avetec
- BAE Systems
- Ball Aerospace
- Belcan Corporation
- BMW
- Boeing
- Booz Allen Hamilton
- CAT
- Century Engineering
- Comcast Media Center
- Cummins
- Honda Research and Development
- John Deere
- Microsoft
- NASA Glenn Research Center
- Northrop Grumman
- Procter & Gamble
- Reynolds and Reynolds
- Rockwell Automation
- Toyota
- Wright-Patterson Air Force Base

Greetings from the Chair

Greetings! I am excited to be the new Chair of the Elmer W. Engstrom Department of Engineering and Computer Science at Cedarville University. I have been at Cedarville since 1991, when the very first class of engineering students was in their sophomore year. For the past 23 years, I have watched in awe as God has brought



faculty and students into our department. I have been the coordinator for the mechanical engineering (ME) curriculum for the past 12 years and served alongside Drs. Zavodney and SanGregory as Assistant to the Chair and Associate Chair.

As you read through this newsletter, praise God with us for His wondrous works. He created us in His image and in His likeness. He has given engineers and computer scientists the

skills needed to conceive new ideas, design and fashion unique tools, improve the works of predecessors, and do all of this to God’s honor and glory.

For example, our solar boating team is once again the international champions of the Solar Splash competition ... the seventh time over the past 10 years! Their acclaim offered them the opportunity to invite the competition committee organizers to look into using Dayton, Ohio, as the next venue for the competition. God blessed, and the decision was made to hold the 2014 Solar Splash competition in our backyard.

Two other first-place competition finishes are highlighted in these pages: the 2013 ASEE Robotics team, which traveled to Atlanta, Georgia, with an autonomous vehicle that did the best job “picking peaches,” and a 2013 graduate from the ME program, Zachary Young, who presented his senior design project in San Diego, CA against 12 other international regional contestants.

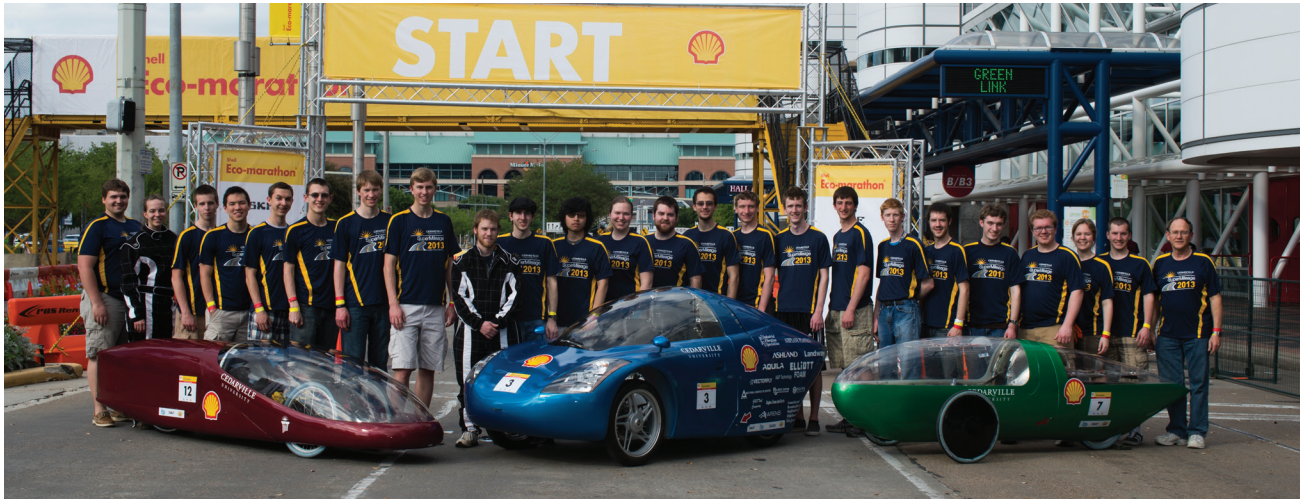
Yes, it’s been a great year for our competition teams, but it’s also been good watching our students perform well in the classroom. The freshman class of engineering majors was once again tasked with designing and constructing a cardboard canoe that would sail two occupants across Cedar Lake. Most were successful! Popsicle sticks were distributed to the sophomore engineers this year to use in the construction of a truss that would withstand load. The winning team’s structure held off 907 pounds before succumbing to the load! Seniors in engineering and computer science programs completed the goals set for them by their faculty in their two-semester long capstone senior design course.

Newspapers were once sold on the streets to the cries of “Read all about it!” We encourage you to do the same with this year’s Elmer W. Engstrom Department of Engineering and Computer Science newsletter.

May God bless you as you serve Him,

Bob Chasnov, Ph.D.
Chair, Elmer W. Engstrom Department of
Engineering and Computer Science

Shell Eco-Marathon Team Continues to Grow



Thank You to Our Sponsors and Donors

- **Ashland Chemical** of Dublin, Ohio, donated polyester resin and fiberglass mat used to make the molds.
- **The Elliot Company** of Indianapolis, Indiana, donated urethane foam from which the body of the Urban Concept car was made.
- **Airplane Plastics** of Tipp City, Ohio donated the plastic and blew the windshield for all of our Supermileage vehicles for the past 19 years.
- **Industrial Fiberglass Specialties, vInc.**, of Dayton, Ohio, donated resin, fiberglass mat, fiberglass cloth, gel coat, wax, mold release, shop space, and technician support and helped us make the molds and fiberglass bodies.
- Engineering Consultant **Eric Jensen**, formerly an engineer with Delphi of Dayton, Ohio, assisted the team designing the steering, suspension, and wheel alignment.
- Engineers **Ben Puterbaugh** and **Brandon Bordner** from Showa R & D of Sunbury, Ohio, designed and built coil spring/shock absorbers for the suspension.
- **Earl Harper**, the father of one of the team members, assisted the team fabricating, fitting, assembling, and painting the body

Cedarville University's Efficient Vehicle Team entered three vehicles in the 2013 Shell Eco-Marathon-Americas competition. Cedarville students have competed in the SAE Supermileage competition from 1991 through 2010 and in the Shell Eco-Marathon-Americas competition since it was brought back to the Americas in 2007. This year's race occurred in April 2013. Teams from 36 universities and 44 high schools brought 133 vehicles from North America, Mexico, and South America and descended on Houston, setting a new attendance record.

Cedarville entered three vehicles — two in the Prototype Division and one in the Urban Concept Division. Vehicles in the Prototype Division are smaller and typically have only three bicycle wheels and bicycle brakes, and they are so sleek and aerodynamic and low to the ground that drivers have to lie down to drive them. They look like airplanes without wings and do not have a steering wheel, lights, or trunk space. They are powered by small motors. In contrast, the Urban Concept Division vehicles are much larger and are required to have four wheels, a conventional steering wheel, headlights, taillights, turn signals, brake lights, windshield wipers, trunk storage space, and exterior rearview mirrors. The Cedarville team also used three distinct types of drivetrains this year: an internal combustion engine, a battery and solar cell-powered elec-

tric motor, and a hybrid gasoline-electric drive train.

Urbie – An Urban Concept Division Vehicle

Urbie had some things that needed fixing at competition, including the brakes, which failed to hold the car on the 20-degree ramp. The team was able to get through inspection and onto the race track, which was not an insignificant accomplishment. During the race, the coupler slipped and prevented the team from starting the engine. As a result, Urbie did not finish the race.

Sting – A Prototype Division Vehicle

The car ran fine at competition, taking fourth place overall. Among the U.S. colleges, Sting took second place.

Gold Lightning II – A Prototype Division Vehicle

In Houston, the car passed inspection after a few changes were made. The team was able to complete several runs. However, during engine warm-up before the race, weights on the centrifugal clutch hit the edge of the idler-sprocket bracket at high engine speed, and the clutch was broken and the bracket and crankshaft were bent. That ended Gold Lightning's runs. Up to that point in the race, the team had achieved 1,390 miles per gallons of gasoline, which was good for fourth place overall and first place in the collegiate division of U.S. schools.

Cedarville Competes in SAE Aero Design 2013

Cedarville's 2013 team was made up of a senior design team and an underclassman team. Both teams competed in the Micro Class Division of the Aero Design East competition held in Fort Worth, Texas, in March 2013. The overall team score is based on a written design report, oral presentation, and flight score. Teams can achieve a high flight score by having a high payload fraction and a low airplane empty weight. Teams must follow design constraints defined by the SAE.

The underclassman team earned third place in presentation, fourth place for their design report and sixth place overall. The senior design team earned second place in design, getting beat by Georgia Tech by only 0.2 points. They placed seventh overall.

The Cedarville senior team flew its hybrid glider while the underclassman team flew its traditional design with innovative features. Both teams experienced flight round losses due to unexpected failures in a very windy first day (with wind gusts

up to 35 mph). In one round, the underclassmen had a motor fatigue and fell off just feet short of the finish line. They also experienced a loss of a speed controller on another flight, also just short of the finish line. In a last "fourth-place winning" flight round, the team lost its horizontal elevator on the ground just after a remarkable flight and landing. Clearly this team had plenty of room to lift and move up in the rankings. Having seen the agony of defeat with last year's glider, the senior team clearly demonstrated the strength of its launcher by shooting its loaded plane up in the air only to have the motor kick on and take the plane through the course very convincingly. The plane held up even with the 35 mph gusts. Under these conditions, the wings were flapping. The team also had its failures, all of which were associated with the launcher making it difficult to test the capacity of the plane within only five rounds of competition. The team was unable to reach maximum placement.

Despite setbacks, team members conducted themselves well. They



were truly examples of Christ's love. They helped several teams get their planes back in the air, including teams from India, University of Cincinnati, University of Michigan, and Georgia Tech. In fact, the propeller that Georgia Tech won the competition with was from Cedarville. Team members from the undergraduate team disqualified themselves in potentially a fourth-place winning flight after they realized that the flight judge was not aware that they had lost the elevator on their plane and had counted their flight successful. Cedarville can be proud of the integrity displayed by its students.

ACM Contest 2013

On November 9, 2013, two teams of Cedarville students traveled to Cincinnati to compete in the East Central North American Regional Programming Contest, part of the ACM International Collegiate Programming Contest. The regional contest was composed of 126 teams from 61 colleges and universities throughout Indiana, Ohio, Michigan, half of Pennsylvania, and the regions of Canada to the north of these states.

Cedarville's top team placed eighth overall in the region, its second best showing ever. Cedarville was the top team in Ohio for the second year in a row, and for the fifth time in the past seven years. The team was again the top CCCU school in the region. Also for the second year in a row, it was the top team at the Cincinnati site. The regional contest is split across four

different sites, and about 30 teams were at the Cincinnati site. The contest director at Cincinnati introduced the team with, "It should come as no surprise to anyone that our top team is from Cedarville University."

The only schools that had higher placing teams than Cedarville were Carnegie Mellon University, University of Michigan, Waterloo University, and the University of Toronto. Note: Several of these schools had multiple teams ahead of Cedarville; this is why Cedarville was the eighth place team but the fifth-place school. Some Ohio schools that Cedarville placed ahead of were Ohio State, University of Cincinnati, University of Dayton, Wright State University, Miami University, Ohio University, and Ohio Northern University. Schools outside Ohio Cedarville placed ahead of



included Purdue University, Notre Dame University, Penn State University, and University of Pittsburgh.

Competing for Cedarville were Daniel Andrews, Jonathan McClain, Jonathan Proctor, Matt Schoenwald, Josh Sommers, and Jay White.

Solar Splash Coming to Dayton in 2014

Cedarville University has been selected as the host school for Solar Splash for the 2014 competition as well as for 2015 and 2016. Dr. Tim Dewhurst, a member of the Solar Splash Technical Committee and the Dong Solar Challenge Ambassador to America, will oversee the local event organization, and senior Media and Applied Communications major Allie Brown, under the supervision of Dr. Jim Phipps, will serve as event coordinator as part of her capstone senior project.

Melink Corporation of Milford, Ohio, developers of Cedarville's new 2.1 MW solar field, intends to develop a consortium of solar energy related companies to provide significant funding for the event and to promote solar energy throughout the U.S.

The race venue will be in Eastwood Park in Dayton, otherwise known as the Dayton Hydrobowl. The Dayton Hydrobowl, once on the circuit for Open-Class Thunderboat



racing, still is a race venue for the American Power Boating Association where high-speed hydroplanes compete. Dayton has a great history of invention and boat racing. Great Dayton inventors include Charles Kettering (inventor of the electric starter, leaded gas, and numerous other automobile related devices) and Edward Deeds, who teamed with Kettering on many inventions including that of the electric cash register. More so, Dayton

is home to the Wright Brothers, first in the development of powered flight. Sites close-by Eastwood Park are a result of the Wrights' work. The Museum of the U.S. Air Force, almost next door, is an impressive display of the development of flight from the Wright Brothers to supersonic aircraft; and nearby Huffman Prairie is where the Wright Brothers did a lot of their testing.



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