Winter 1-2002

Engineering News

Cedarville University

CEDARVILLE UNIVERSITY
THE ELMER W. ENGSTROM DEPARTMENT OF
engineering News
Winter 2002

Cedarville Team Takes First at SuperMileage Midwest

A team of Cedarville engineering students took first place in the collegiate division of the 2000 Society of Automotive Engineers (SAE) Midwest SuperMileage Competition, held at the Eaton Proving Grounds in Marshall, Mich. Schools from the United States and Canada are provided a 3.5-Hp Briggs and Stratton lawnmower engine and challenged to design and build a one-person vehicle that will get super mileage. The teams are permitted to modify the engines; Cedarville's team used the cylinder, piston, and overhead-valve head from a Ryobi weed eater engine. They installed electronic ignition and a computer. Andy Vargo drove "Eklektos" to first-place by achieving 632.21 mpg, topping the performance of schools such as the University de Sherbrooke (Quebec, Canada) and the University of California at Berkeley. Cedarville had taken third place in 1995 by achieving 708 mpg.

The 2001 team made some improvements, but on the third lap an engine bearing came loose, allowing the fly-wheel to shift enough to shut down the electronic sensor that triggered the ignition.

The 2000 team that took "Eklektos" to first place with 632.21 miles per gallon: Dr. Larry Zavodney (advisor), Jeff Barrons (Caro, Mich.), Steve Page (Machesney Park, Ill.), Jonathan Fuge (Westland, Mich.), Steve Fox (Warsaw, Ohio), R.J. Bouwens (Wayland, Mich.), John Walker (Galesburg, Mich.), and Andy Vargo (Grapeville, Pa., driver).

Greetings from the Chair

Lawrence D. Zavodney, Chairman
The Elmer W. Engstrom Department of Engineering

There's excitement in the air at Cedarville these days. As you will see in this issue, our students are doing a phenomenal job with their involvement in design competitions, presentations that they make at professional society meetings, performance on the Fundamentals of Engineering exam, and other accomplishments. And, the Cedarville University Board of Trustees, at their January meeting, approved the new Bachelor of Science in Computer Engineering (BSCpE) degree program to begin in the fall of 2002. We are now waiting on approval from the Ohio Board of Regents.

Last year Tau Beta Pi, the national engineering honor society, installed its 221st student chapter at Cedarville University, making us the Ohio Nu chapter (the 13th in

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Micro Baja Sweeps Contest

Cedarville's Micro Baja team made an impressive sweep at the 1999 Micro-Truck Baja Competitions held in

Back Row: Dr. Clint Kohl (advisor), Arik Akerberg (Manchester, N.H.), Lindy Anderlini (Richland, Wash.), Jan-Harm Wolters (Holland, Mich.), Kristy Mandigo (Pulaski, N.Y.), Steve McClure (New Holland, Pa.), Nate Wright (Lubbock, Texas); Front Row: Chris Grigson (Schaumburg, Ill.), David Jouwstra (Lima, Ohio).

conjunction with the SAE International Truck & Bus Meeting & Exposition in Detroit, Mich. They came home

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Computer Engineering Coming to Cedarville

Starting in the fall of 2002, Cedarville will have a new bachelor of science of computer engineering (BSCpE) degree program. The Cedarville University Trustees approved this program in their January 2002 meeting. At the present time, we are waiting approval from the Ohio Board of Regents. Based on the U.S. Department of Labor projections for the 1996-2006 decade, computer engineering will be the fastest growing job market in engineering.

Computer engineering (CpE) is an outgrowth of the digital elective track in the electrical engineering (EE) program. Like EE, it is a discipline that is physics and mathematics intensive. The computer engineering program develops engineering problem solving skills and fine-tunes design techniques for electronic circuits, devices, and systems, but emphasizes digital electronics, microprocessors, computing algorithms, operating systems, processor design, and integrated computer system design.

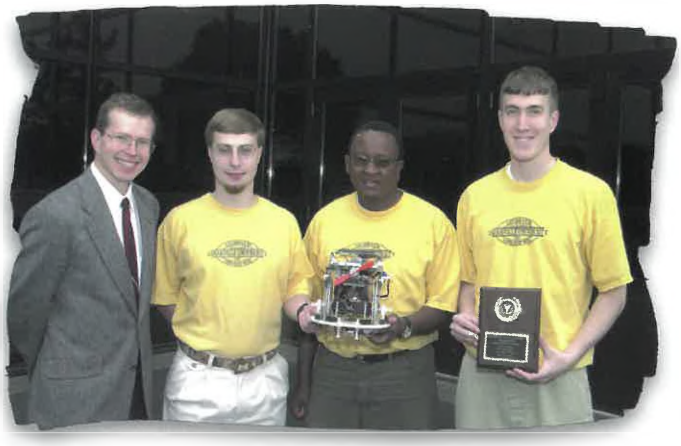
Like the present EE program, it is rich in laboratory (i.e., hands-on) experiences. Each student will develop additional depth in two elective courses in software or hardware topics. Computer engineers design and build computer hardware and develop software to solve engineering problems. If national trends are an accurate indicator, CpE will become the largest engineering major at Cedarville.

Resources for this new program are coming together. Two new EE/CpE laboratories are coming on line in the fall of 2002. A new CpE professor will be hired for the fall of 2002; he or she will join the present EE faculty, two of whom have their Ph.D. in CpE. Three new courses will be added to the existing courses offered in the EE and computer science programs. Additional faculty will be added as the program grows. A CpE senior design lab will be added in the summer of 2005 for the first class of seniors, who will graduate in 2006. We are now looking for donors to provide the necessary equipment for the new laboratories.

All students majoring in engineering (computer, electrical, or mechanical) and computer science at Cedarville University take digital logic design in their freshman year. This course has a weekly lab that meets for two hours. In the lab students simulate logic circuits on the computer and also build them. In the photo above, students are building their circuits on a prototyping board; they insert digital logic chips into sockets and then connect wires to the appropriate pins on the chips. Students test their circuits using modern laboratory equipment and instrumentation.

Fire-Fighting Robot Takes Fifth Place

In April 2001, three senior electrical engineering students traveled to Hartford, Conn. to participate in the Eighth Annual Trinity College Home Fire-Fighting Robot Contest. The contest is the largest public robot contest in the world, with more than 126 robots registered from around the U.S. and seven foreign countries.



Cedarville designed, built, and programmed a robot that autonomously navigates around a model house, finds the fire (a burning candle randomly placed in one of the four rooms of the house), and extinguishes it. The team earns points by completing the task as quickly as possible and overcoming a variety of obstacles and challenges. The Cedarville University team and their masterpiece, "Ye Olde Robot," competed in the senior division with 65 other robots and came in fifth, winning $75. Shown at left, team advisor Dr. Clint Kohl, associate professor of electrical engineering, poses with team members Nathanael Weygand (Chittenango, N.Y.), Roy Mwangi (Nairobi, Kenya), and Jerred Davis (Huntington, W.Va.).

Cedarville Second in Summit Challenge

Competing against teams from Delaware, Maryland, New Jersey, Ohio, Pennsylvania, and West Virginia, Cedarville University took second place at the Institute of Electrical and Electronics Engineers (IEEE) Region II 2000 Summit Challenge competition held at Penn State Behrend in Erie, Pa. The goal of this autonomous robotics competition was to collect steel ball "eggs" randomly placed on the playing field and deposit them into the "nest."

Simultaneously, an opponent's robot was also collecting "eggs" to deposit in his "nest." The winner was the team that got the most "eggs" in the allotted time. To make the challenge more interesting, the playing field has a pit in the center, capable of trapping robots. Robots are allowed to steal "eggs" from their opponent's "nest." And, a brass ball (worth 10 steel balls) is placed on top of a tall pole placed in the pit in the center of the playing field. Cedarville's robot was able to grab the brass ball without falling into the pit and deliver the ball to the nest.

Cedarville's robot featured a 10,000-gate Embedded Programmable Logic Device, four servo motors, lots of opto-electronic "eyes," a revolving wheel with magnets to collect the steel balls, and lots of tape. Cedarville students were able to design and build their robot for less than 10 percent of the cost of the robot that took first place.

Seniors Take First for Light Pole Work

A Cedarville senior design team recently won a first place award at a senior design competition at Ohio Northern University. Team members Jeff Olson (Grand Blanc, Mich.), Jeff Barrons (Caro, Mich.), and Toby Most (Lansing, Mich.) proposed a new light pole design that lowered the stress at the critical points around the reinforced hand-hole access opening. The team was advised by Dr. Bob Chasnov, professor of engineering, shown here congratulating the men.

ABET Extends Accreditation at Cedarville

Engineering programs must be accredited every six years by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). Cedarville's first class graduated in 1994, so we had the ABET team here as soon as possible—in the fall of 1994. Hence, we were due for our next visit in the fall of 2000.

For the visit, we prepared three self-study volumes. As part of the on-site visit, program evaluators examined student files and samples of their coursework, interviewed faculty, staff, and administrators, met with the Industrial Advisory Council, and toured the laboratories and facilities. We were notified in September of 2001 that Cedarville's accreditation was extended.

Goodbye, Quarters

Come fall of 2002, Cedarville will have something it has not seen since the mid-1960s. Like many other institutions, Cedarville will be switching to a semester calendar. This means that students will come to school for two 15-week terms instead of three 10-week terms.

Our faculty have been working very hard to convert the engineering program to semesters. Our biggest challenge was repackaging the extensive laboratory component. The new programs will have 140 semester hours.

Our faculty have also prepared transition plans for the students who started on quarters and will finish on semesters. We are offering special transition courses beginning Spring Quarter of 2002. All students who are on the regular plan of study will be able to complete their degree requirements in four years. All of the necessary courses will be offered when students need them. We certainly want to make this transition as smooth as possible.

Greetings

(continued from front page)

Ohio). Tau Beta Pi recognizes character and excellence in engineering.

Engineering enrollments were the strongest yet with the freshman class of 2001. With 300 engineering students presently enrolled, Cedarville is now at the top of the list of the Council of Christian Colleges and Universities (CCCU) schools that offer four-year engineering degree programs.

The ABET accreditation team was here in the fall of 2000. Our accreditation was continued as a result of their very positive report issued last summer.

Cedarville University is switching to semesters in the fall of 2002. We are looking forward to a smooth change, as our faculty members have been diligently preparing a semester version of our program and transition plans for students.

In addition to the academic programs and the extracurricular design competitions in which our students participate, we sponsor a variety of activities throughout the school year. At the beginning of Fall Quarter, our Engineering Advisory Council met for their annual meeting. Every year businesses and companies visit our campus and interview students for post-graduation jobs and summer internships. In the aftermath of September 11 and the recession, many companies are not hiring like they did a year ago. It warmed our hearts to learn of one company who chose to visit Cedarville instead of Rose-Hulman this year. This action speaks volumes of the quality of our graduates in the workplace.

The annual Engineering Day open house is held in February; we invite prospective high school students to visit us, learn about our program, and see our laboratories. We also host a group of high school students from Springfield to visit Cedarville, see our labs, and learn about engineering. And, at the end of the school year we honor our graduates with a special convocation on the day before commencement.

In the midst of all the excitement, there are several things that do not change, and these are what make Cedarville a great place to get an excellent engineering education—a solid curriculum, small classes, and faculty who love students and have time for them. I hope that you sense in these pages that we are a nurturing environment that prepares graduates for life and an exciting career.

Laurence D Zavodney

Micro Baja

(continued from front page)

with eight of the 11 trophies! In the stock class, Cedarville took first through fourth places. They also won best design and fastest time in the stock class. In the unlimited class, Cedarville took first, fourth, and eleventh place and won best design.

For Micro Baja, students design and build model cars and trucks to navigate a treacherous track representing a variety of road surfaces and conditions. The vehicles are autonomous, but may have on-board computers.

Aero Design Team Finishes Strong

The Aero Design Team competed in the 2000 and 2001 SAE Aero Design Competitions with completely new airplanes. The goal of this annual competition is to see which plane can lift the most cargo. To successfully compete, the planes must take off in less than 200 feet, circle the field at least once, and then land in a 400-foot zone. The planes are remotely controlled.

Cedarville has competed in five of the last seven years and has finished in the top half each time. The 2000 competition was no exception, with Cedarville coming in nineteenth out of 38 flight-qualified entries. Their plane had an empty weight of 10 pounds and successfully carried 12 pounds of cargo.

The photo shows the two planes designed and built by the 2001 team for competition near the Kennedy Space Center. Each plane carried almost 15 pounds of cargo. As the plane (left in photo) circled to begin its landing approach, a sudden gust of wind caused the main wing to fail. Both planes finished the competition in the middle of the pack.

Team members: Kristy Mandigo (Pulaski, N.Y.), Jeremy Bossard (North East, Md.), Dan Cross (West Chester, Pa.), Brian Foote (Issaquah, Wash.), Nathan Foote (Issaquah, Wash.), and Dr. Hardy Hegna (advisor).

Cardboard Canoe Race Adds A New Challenge

Thirty-two Cedarville University teams braved the scattered showers of October 12 to showcase their canoe design talents in the 2001 Cedarville University Cardboard Canoe Challenge. Each canoe, built only of thin cardboard and plastic tape by a team of four students, was launched from one side of Cedar Lake and paddled to the other side by two of its designers in a race for the shortest time, much to the delight of the 2,000 spectators.

This year's winning team, consisting of Mary Todd (Oak Hill, Ohio), Daniel Congrove (Grand Haven, Mich.), Dustin Foster (Lucasville, Ohio), and Daniel Stephens (Moorestown, N.J.), crossed the lake in the "Moby Dixon" (named after Cedarville President Dr. Paul Dixon) in a speedy two minutes and 33 seconds, earning them scientific calculators as prizes.

Of the 32 canoes entered in the race, 28 were built by engineering majors. Students from other departments may compete for the prized "Cedarville Cup." This year, student teams from education, communication arts, the honors program, and language and literature entered the competition. Team members Nate Leman (Batavia, Ill.) and David Moore (Sanford, Mich.) from the department of education were the only ones who made it across without sinking. Ten of the canoes built by freshmen engineering students also sank either by taking on water, folding in the center, twisting, or capsizing.

The "King of the Lake" demolition dunking derby was a new attraction this year. The fastest 12 teams to successfully cross Cedar Lake were eligible contenders. When the ramming was complete, "The Perfect Lady" was the lone survivor; she was designed by Jason Auyer (Liverpool, N.Y.), Cameron Daigle (Pensacola, Fla.), Daniel Rogers, Jr. (Niceville, Fla.), and Walter Stokes (Marion, Ark.). "The Perfect Lady" was declared "King of the Lake," and its creators received trophies (graced by miniature cardboard canoes) and gift certificates for dinner at The Olive Garden.

Ball Aerospace & Technologies Corporation of Fairborn donated the prizes for this annual competition, and Tim Lawrence, director of systems engineering operations at Ball, presented the awards. Shurtape and Mead supplied the tape and poster board, respectively. RiversEdge Canoe Outfitters in Waynesville provided the life jackets, paddles, and real canoes for the rescue staff.

Copies of a nine-minute video that highlights this year's race may be purchased from the department office for $10.

Top: In the canoe race's new King of the Lake demolition dunking derby, "The Perfect Lady" came out on top. Here the team poses with their trophies and the remains of their no longer "perfect" vessel.

Second: Tim Lawrence, director of systems engineering operations at Ball Aerospace & Technologies Corporation, presented scientific calculators to the "Moby Dixon" team following their victory.

Third: Some of the teams who competed found that it was a great day for a swim, especially for those involved in the ramming frenzy of the King of the Lake demolition dunking derby.

Bottom: Dr. Larry Zavodney presents the Cedarville Cup to Dr. Phil Bassett, chair of the education department, and canoe designers David Moore (Sanford, Mich.) and Nate Leman (Batavia, Ill.), both education majors.

Cedarville's First-Time Entry in ASEE Car Competition Wins First

Cedarville University competed for the first time in the 2001 ASEE Battery-Powered Autonomous Car Competition and captured an impressive first-place finish! The event was part of the annual American Society of Engineering Education Conference held in Albuquerque, N.M. This competition was limited to freshmen and sophomore students. Students were to design and build an autonomous electric car that could go up and down hills, follow a curved black line along the course, and stop while going downhill. The student team was required to make a ten-minute PowerPoint oral presentation, provide a written handout of the circuit schematics and vehicle drawings, and a price list. Then, they had to race. Cedarville had the fastest time—13 seconds!

Since all engineering freshmen at Cedarville take digital logic design, our team of freshmen and sophomores were able to apply what they had learned to build a successful first-place entry. A complex programmable logic device made by Altera was used as the central controller. The car featured a bank of optical sensors ("eyes") across the front to allow it to "see" and follow the black line along the track. A shaft encoder on one wheel was used to sense the distance traveled, which allowed Cedarville to take a shortcut at the end of the track, saving about two seconds of time. Cedarville's car used two five-inch drive wheels powered by individual servo motor actuators (modified to rotate continuously). The car also had an impressive stopping capability; when it entered the STOP area of the track, it locked its wheels and screeched to a halt in one inch. Although somewhat risky, the six-volt servo motors were run on 12 volts to increase the speed. Every effort for improved performance was needed to win first place because the second-place time was just 0.13 seconds behind Cedarville. It was a close race.

For more details and photos go to: http://www.tc.cc.va.us/studorgs/vbeng/aseecar/ASEE2001/.

At right is the Cedarville Battery Powered Autonomous Car designed and built by freshmen and sophomore engineering students and entered in the ASEE 2001 event. The brains of the car are shown on the top circuit board. Students wrote their code and downloaded it into the Altera complex programmable logic device. Below the batteries are the "eyes" that see the black line marking the road to follow. The winning time of 13 seconds beat the second place team by 0.13 seconds.

The 2001 ASEE Autonomous Car Team: Bryan Horton (Wakeman, Ohio), David Corder (Beavercreek, Ohio), Bonnie Hammond (Bakersfield, Calif.), Bobby Cassity (South Shore, Ky.), Silas Gibbs (Galloway, Ohio), Dr. Clint Kohl (advisor), and Michael Walker (Ballwin, Mo.).

SEAM Becomes Official Student Organization

The Society of Engineers Aiding Missions (SEAM) exists to help engineers participate in world evangelization. Dr. Tom Thompson, associate professor of mechanical engineering, began this group in 1997 and serves as the faculty advisor. SEAM was recently recognized by the Student Government Association as an official student organization.

SEAM students regularly meet on campus to pray for engineers who serve in mission roles and to network with mission organizations who need engineering services. In the spring of 2001 several SEAM members traveled to HCJB World Radio's engineering center in Elkhart, Ind., to observe cutting-edge technical work being done in missions radio. Senior design teams from electrical and mechanical engineering are currently designing a new generation solar-powered, fixed-tuned radio receiver to specifications provided by HCJB. These radios will be used to spread the gospel.

Even prior to the official organization of SEAM, students had been using their engineering skills to aid missions work. For example, in 1994-95 a senior electrical engineering team designed and built a set of filters for a Trans World Radio (TWR) station in Albania. The filters helped control signal modulation. The station, formerly used by communists to jam radio signals during the Cold War, is now broadcasting the gospel.

Mini Baja Team Makes a Mega Showing

2001 Team, Back Row: Mr. Jay Kinsinger (advisor), Hannah Ballou (Bucyrus, Ohio), Chuck Aman (Wyoming, Mich.), Nick Grisco (Roselle, Ill.), David Wolf (Grand Rapids, Mich.), Matt Herring (Taylor, Mich.); In Car: Jared Koverman (Cridersville, Ohio); Front Row: Torrey Adams (Quinnesec, Minn.), Ehren Brinkmeier (Lena, Ill.), Andy Billhartz (Veneta, Ore.).

The Society of Automotive Engineers (SAE) Mini Baja Midwest competition challenges engineering students to design and build an all-terrain dune buggy (powered by a Briggs and Stratton 8-Hp engine) that will survive the severe punishment of rough terrain. The vehicle competes in categories such as acceleration, hill climb, and sled pull, while appearance, structural design, and safety are also judged.

Continuous improvement is the theme for the SAE Mini Baja Team at Cedarville University. A completely new car was designed and built for the 2000 competition held in Milwaukee, Wis. Competing against 106 entries from as far away as North Korea, Cedarville took third place for the braking event and second place in the one-hour endurance heat. These accomplishments, along with high scores for the other qualifying events, put Cedarville in the front of the pack of 62 cars for the final three-hour endurance event. However, a drive chain failure during the final endurance event prevented the car from completing the race.

During a subsequent test drive, an exuberant freshman cinched the decision to build a new car for 2001. She launched off a jump at full speed. The car flipped and hit hard on the top of the roll cage, continued tumbling, and finally landed back on its wheels (a 360° somersault). She was not hurt, but the frame was bent beyond repair.

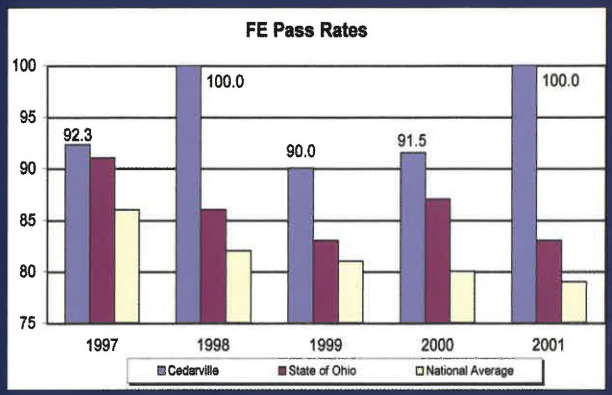
The 2001 team designed and built a new vehicle that incorporated some improvements based on lessons learned from the previous years. This year the competition was held in Dayton, Ohio. Cedarville ranked first overall for the "ride and handling" event. The car performed extremely well during the three-hour endurance race. With just a half hour remaining, another car crashed into the front wheel of Cedarville's car and broke the steering linkage. The team nursed the car back to the pit area and feverously made some repairs, but by the time they finished, the race was over.

The Mini Baja team has gained invaluable and practical engineering experience, and they have learned some important lessons in sportsmanship and humility.

Seniors Make 100%–Again!

Engineers who want to become licensed professional engineers must pass the eight-hour NCEES Fundamentals of Engineering (FE) exam, work for four years, and pass the eight-hour Professional Engineer's (PE) exam. One of our graduates, Kevin Sherd (BSEE '96), has earned his PE license.

The State Board of Registration allows seniors at ABET accredited schools to take the April exam if they are going to graduate before the October offering. Because Cedarville is an ABET accredited institution, we can offer the exam on campus. Almost all eligible Cedarville engineering seniors take the FE exam when it is offered in April.



Since we began offering the exam in 1997, Cedarville students have consistently scored above the state average, which has consistently been above the national average. The results of the past five years are shown in the chart. Cedarville has twice achieved a 100% passing rate on the exam, being the only school in 1998 and one of two in 2001. No school had 100% in 1999 or 2000. When the number of students from each institution taking the exam is compared, it is obvious that Cedarville has one of the highest participation rates in the state: 25% of the engineering students who took the electrical engineering exam in Ohio were from Cedarville. Congratulations, graduates!

Welcome to Dr. Peter Burban

Dr. Peter Burban joined the engineering faculty in the fall of 2001. Burban, who holds a B.S.Ch.E. from the University of Illinois (1980) and a Ph.D. from the University of Delaware (1984), serves as associate professor of mechanical engineering.

Dr. Burban has worked at Kinetico and Lubrizol in northeast Ohio. Prior to that he held a faculty position at the University of Minnesota and worked at Air Products & Chemicals in Allentown, Pa. He also consulted for 3M, Rockwell, and several start-up companies.

Evangelism has a special place in Dr. Burban's heart. He has been able to share the gospel with Ukrainians in their native language, and he is involved with the *Jesus* film outreach. Dr. Burban and his wife, Cynthia, home-school their daughters, Kristina and Stefanie.

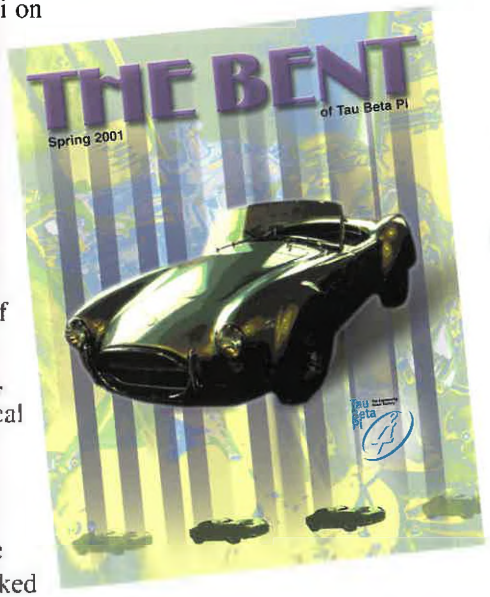
Tribute to "R.J." Bouwens

On September 5, 2001, junior mechanical engineering student Randall Joel Bouwens went home to glory. As an engineering student, R.J. had joined the SAE Supermileage Team in 1999 and 2000 (see photo on front cover). He was also a member of Alpha Chi and served as secretary for SEAM, the Society of Engineers Aiding Missions. He worked with Open Heirs, a street evangelism ministry, and tutored at the Dayton Chinese Church. R.J. participated in Getting Started and enjoyed intramural indoor soccer.

R.J. is survived by his parents, Randy and Pearl Bouwens (Wayland, Mich.), brothers Rychard and Robert (Rob is a 1998 mechanical engineering graduate), and sister Rebekah. R.J. will be remembered by his friends as a man who lived life to the fullest, served others with joy, and loved God with all his heart.

Ohio Nu Chapter of Tau Beta Pi Installed

Cedarville University's engineering honor society was installed as the Ohio Nu chapter of Tau Beta Pi on March 3, 2001. The University was featured in the Spring 2001 issue of Tau Beta Pi's magazine, *The Bent*, and its induction was documented in the Summer 2001 issue of the magazine.



Dr. Hardy Hegna, professor of mechanical engineering and TBP faculty advisor, commented, "It's a special blessing to see something we've worked towards for eight years come to fruition. It came into being on the strength of character and involvement of our more than 250 engineering graduates."

Tau Beta Pi Vice President Edward J. D'Avignon, Ohio Nu President Daniel C. Gulledge, Dr. Harwood A. Hegna, P.E., and Dr. Lawrence D. Zavodney, P.E. at the charter presentation.

To have a chapter installed with Tau Beta Pi, an institution must have all of its engineering degrees accredited and must graduate at least 40 engineers per year. Cedarville currently offers ABET-accredited bachelor of science degrees in both mechanical and electrical engineeering. The University awarded 58 engineering degrees in 2000.

The Tau Beta Pi Association seeks to mark those who have conferred honor upon their alma mater by distinguished scholarship and exemplary character as students in engineering, or by their attainment as alumni in the field of engineering. The association boasts more than 430,000 initiated members. Five Cedarville engineering professors are Tau Beta Pi members.

Solar Splash Team wins "Outstanding Drive Train Design" Award

Left: The 2001 Solar Splash Team received the Outstanding Drive Train Design award at competition in Buffalo, N.Y. Team members are Brad Nicol (Marysville, Ohio), Seth Lacy (Farmington Hills, Mich.), Greg Roth (Waterford, Mich.), Scott Smith (Ortonville, Mich.), David Drye (Bloomington, Ill.), Adam Yingling (North Canton, Ohio), John Hagley (Fraziers Bottom, W.Va.). Not shown are Joe Burke (Glen Ellyn, Ill.), Kevin Craig (Hatfield, Pa.), and John Scadding (Derry, N.H.). The faculty advisor was Dr. Timothy Dewhurst.

Solar Splash is a competition for undergraduate engineering students to design and build a one-person boat that uses energy from the sun as its source of power. There are limitations on the boat's dimensions and the power output of the solar arrays.

Cedarville has been participating in Solar Splash since 1997. The competition includes several events: a two-hour endurance race (average speed of 10-12 mph), a 300-meter sprint (with top speeds of 30-35 mph), a maneuverability event, and various design competitions. The races are scheduled in June during the summer solstice. The 2000 event was held in New Orleans; the 2001 competition was held in Buffalo, N.Y. and was part of the 100th anniversary celebration of the 1901 Pan American Exhibition that was in Buffalo.

The focus of the 2000 and 2001 Cedarville teams was to redesign and control the drive train. The Cedarville boat used an energy-efficient surface-piercing propeller; however, it caused an unwanted side thrust. To counter this, the team designed a steerable propeller shaft that transferred torque from the stationary electric motor to the steerable propeller shaft. At the heart of this system was a constant velocity (CV) joint from a Geo Metro. This complex but elegant design, combined with race-specific front rudders, made a significant improvement in steering the boat for 2001. The 2001 team was recognized with the Outstanding Drive Train Design award.

Above: Adam Yingling drove Cedarville's boat in the two-hour endurance event. The goal is to complete as many laps as possible. Solar cells provide some of the electricity to the motor. The strategy for this race is to drive as fast as possible to completely drain the batteries in exactly two hours. Going too fast will drain the batteries prematurely and going too slow will leave some charge in the batteries. The driver must monitor the current flow from the batteries and adjust the speed for optimum performance.

Cedarville Ranks Internationally in Computer Design Competition

A Cedarville University design team ranked among the top 20 of more than 180 teams from around the world at the first IEEE Computer Society International Design Competition (CSIDC). The CSIDC 2000 Health Care Information-Appliance Project challenged undergraduate students to create a compact, special-purpose computer-based device which would help people become more involved in their own health care.

The information appliance (also called a medical data device) developed by the Cedarville team allows patients, doctors, and medical personnel to quickly retrieve any part of a person's medical history, including physical features, contact information, allergies, and existing medical conditions. Additionally, with the proper authorization, the handheld device allows access to a complete summarized medical history or complete medical records for any particular day.

As one of the top 20 teams, Cedarville University ranked alongside institutions from Bulgaria, Canada, China, Colombia, Czech Republic, Hong Kong, India, Lebanon, Mexico, Poland, Russia, Slovakia, and the U.S. in the competition.

Cedarville's team members included electrical engineering majors Roy Mwangi of Nairobi, Kenya; Jonathan Neu of Logansport, Ind.; and Micah Thierry of Wilmington, Ohio. Also on the team were Phil Ausfahl, a management information systems major from Peoria, Ill., and Jud Neer, a mathematics major from West Liberty, Ohio. The team was advised by Dr. Tom Wailes, associate professor of electrical engineering.

Elliott Follows Footsteps of WISE Interns

Jennifer Elliott was the Society of Automotive Engineers WISE intern for the summer of 2000. She spent 10 weeks in Washington, D.C., learning from industry and government SAE members.

At the end of the summer, WISE interns must submit a completed policy paper. Elliott's paper highlighted the need for more math and science teacher training and recruitment on the K-12 levels and increased emphasis on curriculum enhancement. Her research focused on sponsored legislation which was dedicated to these issues.

Originally from Wheeling, Ill., Elliott majored in mechanical engineering and graduated in 2001. She was the seventh Cedarville student to be selected for a WISE internship in nine years. Elliott is currently employed by OPEX in Moorestown, N.J. as a mechanical engineer.

Lutes Honored

An electrical engineering major from Lombard, Ill., Jennifer Lutes was named a recipient of the Faculty Scholarship Award at the 2001 commencement for maintaining a 4.0 GPA throughout her college career. She is shown here with University President Dr. Paul Dixon.

In addition, Lutes was named an Institute of Electrical and Electronics Engineers (IEEE) College Chapter Outstanding Student. Lutes joins four other students from local institutions in this honor.

Lutes is currently employed as a nuclear engineer with Lockheed Martin in Lombard, N.J.

Denlinger Honored as Staff Member of Year

Each year the student body selects one staff member to be awarded for his or her quality service and dedication to students. The 2001 recipient was David Denlinger, mechanical engineering technician in the Elmer W. Engstrom Department of Engineering.

Mr. Denlinger has been at Cedarville since 1993 and is known for the way he patiently assists students with their engineering projects. He was joined by his wife, Barbara, and their family to receive his award and mantel clock during chapel. A special luncheon was held in his honor. Congratulations, David!

Alumni Corner

Lonnie Nolt, a 2000 engineering graduate who lost his lower leg in September 1999, has taken a job with Ohio Willow Wood, a Mount Sterling, Ohio, company that makes prosthetics. Nolt was quoted in the February 26, 2001 issue of *Design News* concerning his employer's award-winning prosthetic foot, the Pathfinder. The article mentions Nolt in the last paragraph, which states:

As much as mechanics and materials matter to engineers, amputees care far more about a foot that feels as natural as possible. Lonnie Nolt cares about both things. A research engineer for Ohio Willow Wood and an amputee for the last year-and-a-half, he recently began using a Pathfinder after trying a succession of less advanced foot designs. And he immediately noticed that Pathfinder eliminates the "dead spot" or bumpy transition between heel and toe loading. "That makes a huge difference in comfort," he says, "It's like the difference between walking with a ski boot on and walking in tennis shoes."

SWE Assists the Hungry

At Cedarville University, student organizations used Hunger and Homelessness Awareness Week as a special opportunity to heed God's call for selfless giving (Matthew 25:35-46).

The Society of Women Engineers chose a canned food drive for the Salvation Army in Springfield, Ohio, as their vehicle for mercy. "All of the organizations were given a list of shelters that had specific needs. We were unsure of the mission/needs of some of the organizations, but we knew that the Salvation Army needed the type of food that we had decided to collect and was reputable," shared then-senior mechanical engineering major Jenny Elliott (shown above). "This is one of the first times the Society of Women Engineers has participated in a campus-wide event such as this, and I think it was a positive experience that we hope to continue in the future. We collected several boxes of canned goods and were excited to see the generosity of both faculty and students."

Cedarville Ethanol Vehicle Challenge Team Honored

The Cedarville University Ethanol Vehicle Challenge team has been recognized by two prestigious groups: *Car and Driver* magazine and the Ohio State Senate.

The February 2000 issue of *Car and Driver* magazine featured the University's participation in a contest sponsored by General Motors, the U.S. Department of Energy, and Natural Resources Canada.

The team received a citation from the Ohio State Senate, which documented their success, determination, and motivation in the Ethanol Vehicle Challenge competition. While in Columbus to receive their citation, the group displayed their ethanol-converted Chevrolet Silverado and Chevrolet Malibu at a Biofuels Workshop.

OhioENGINEER Features Caddy Teams

Two senior design teams recently took on the challenge of designing a bike caddy for a handicapped child in the Cedarville community.

Because current bike caddies on the market are geared for small children, the Cedarville students saw the need for a custom-made caddy for Mitchell Minor, a 10-year-old Cedarville resident immobilized by severe cerebral palsy. The young engineers set out to provide Minor with a strong and supportive yet comfortable riding device.

Jason Covill (Reamstown, Pa.), part of the team of James Murdock (Brighton, Mich.), Matt Plaatje (West Chester, Ohio), and Shane Sevo (Belleville, Mich.), gave a technical presentation (with computer simulated motion) detailing his team's caddy design, analysis, and fabrication. The presentation took first place in the Old Guard Oral Presentation of the 2000 American Society of Mechanical Engineers (ASME) Region V Student Conference.

The second team, composed of John Cushman (Xenia, Ohio), Jon Geiger (New Carlisle, Ohio), and Dan Nichols (Addison, N.Y.), presented its caddy to Minor in the fall of 2000. Surgery had prevented Minor from using or trying the caddy earlier.

The bike caddy project made the cover of the *OhioENGINEER* (Vol. 60, Issue 3) and was included in the November 2000 issue of the *Baptist Bulletin*.

Pictured in the *OhioENGINEER* cover photo are Taylor, Mitchell (seated), Craig, and Carrie Minor; students Jon Geiger and John Cushman; Mr. Jay Kinsinger; and Dr. Larry Zavodney.

Faculty Notes

• **Dr. Sam SanGregory** received the 1999 Myrl B. Reed Best Paper Award for his paper "A Fast Low-Power Logorithm Approximation with CMOS VLSI Implementation." He presented it at the 1999 Midwest Symposium on Circuits and Systems.

• In 2000, **Dr. Clint Kohl** was promoted to associate professor and awarded tenure.

• In 2001, **Dr. Robert Chasnov** was promoted to professor; **Dr. Timothy Dewhurst** was awarded tenure; **Dr. Harwood Hegna** was promoted to professor; and **Dr. Thomas Thompson** was promoted to associate professor and awarded tenure.

• In 2002, **Dr. Timothy Dewhurst** was promoted to professor; **Mr. Jay Kinsinger** was promoted to assistant professor; and **Associate Professor Dr. D. Jeff Shortt** was awarded tenure.

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Convocation Honors Students

Faculty, staff, family, and friends honored the engineering class of 2001 at their convocation ceremony on June 1, 2001. The guest speaker was Dr. David Burhnam, president of Burhnam Ministries International. His message was titled "Experiencing God's Presence" and very appropriately emphasized God's presence at all times in our lives, even in the dark, lonely, and hard times.

Engineering graduates were recognized for their special achievements and strengths at the June 1, 2001 convocation ceremony. The Outstanding Mechanical Engineering Design Team Award went to the Formula SAE Aerodynamic Body Design Team of Matthew Snyder (Beavercreek, Ohio), Stephen Mattick (Terre Haute, Ind.), Jeff Powell (Cincinnati, Ohio), and Jeff Jordan (Ashburn, Va.). Dr. Hardy Hegna and Dr. Larry Zavodney presented the award.

All students were recognized for their unique strengths and character. Special honors were the Outstanding Senior Design Award, given to Jeff Jordan (Ashburn, Va.), Timothy Sutton (Fayetteville, N.C.), and Nathanael Weygand (Chittenango, N.Y); Outstanding Mechanical Engineering Design Team Award (shown above); and Outstanding Electrical Engineering Design Team Award, given to the Fire-Fighting Robot Team of Jerred Davis (Huntington, W.Va.), Roy Mwangi (Nairobi, Kenya), and Nathanael Weygand. Jennifer Lutes (Lombard, Ill.) received a custom-made oak mug rack to display the one dozen 4.0 mugs she received during her four years at Cedarville. She is the first Cedarville engineering student to graduate with a 4.0 GPA for all four years.

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