



**ANYONE CAN HAVE A GREAT IDEA.
ENGINEERS CAN MAKE THEM HAPPEN.**

STUDENTS IN IMAGINE CUP COMPETITION COME SECOND IN VOTE FOR AIDS EDUCATION GAME

> *UofL Today*

Can a video game help end AIDS?

Three engineering students thought so. They developed a game that teaches about AIDS and its treatments and took it to the **Imagine Cup US finals** April 8-11 in Seattle, Washington. And by popular vote they came in second!

The Microsoft-sponsored Imagine Cup is “about using technology to tackle some of the world’s toughest problems,” according to the competition’s Web site. Categories come from the **United Nations Millennium Goals**. One of those goal areas is AIDS/HIV.

Team Mintrus from the **Computer Engineering and Computer Science** (CECS) department took the popular *Tower Defense* game format and turned it into an educational tool with their game called **Pandemic**.

How the team fared in the competition depended not only on what judges thought of Pandemic, but also on the popular vote — “as it happens in *American Idol*, but here in an academic context,” said **Rammohan Ragade**, CECS professor and team adviser.

People’s choice allowed individuals to cast one vote each day through April 9 for their favorite team.

> *Continued on page 3*

THIS ARTICLE IS GUARANTEED NOT TO CRASH, LOCK UP, OR REQUIRE A RE-BOOT DURING READING

The **UofL Cyber Defense Team** was one of 11 teams participating in the **Southeast Collegiate Cyber Defense Competition** (SECCDC) on March 8-10, 2011.

The team won first overall by winning in all three categories, and the team looks forward to competing in the National Finals in April.

A big thank you goes to **Crane Naval Surface Warfare Center** for sponsoring the UofL Cyber Defense Team.

The UofL Cyber Defense Team members are:

- **Eric McDowell**, Team Captain
- **Joseph Stigers**, Assistant Team Captain
- **James Gissendaner**
- **Henry John**
- **Paul Frederick**
- **James Corcoran**
- **Justin Cottrell**
- **Joshua Chase**
- **Jimmy Murphy**
- **Tu Nguyen**
- **Dr. Rammohan Ragade**, Advisor
- **Ron Lile**, Advisor

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SPEED STUDENTS HELP FINE TUNE CUTTING-EDGE TECHNOLOGIES

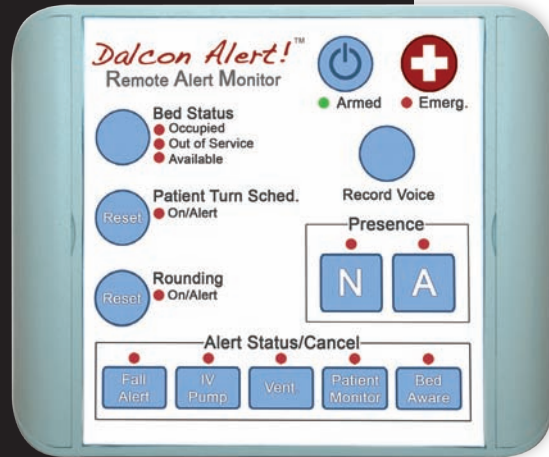
> *Dr. Andy Dozier, Ph.D.*

A recent NPR and *Boston Globe* article discusses in an investigative series how hospital staff can “tune out,” or not react with urgency to patient alarms. The *Boston Globe* article highlights the problem of nursing staffs in hospitals becoming desensitized to audio alarm signals in a hospital setting for periods of up to four minutes.

David Condra, who owns Dalcon, Inc., has developed a device that addresses this issue directly. It’s called the **Dalcon Remote Alert Monitor (RAM)**. Electrical and Computer Engineering students recently completed a senior Capstone design project for Dalcon that improved the RAM functionality.

These improvements (WiFi access, and an audio-alert feature) are now incorporated into the RAM. Another student team is working on a project for Dalcon this semester, which will add an RFID reading capability to the RAM. David is very pleased with our student’s performance on the previous project, and is looking forward to this semester’s project results. Success in these types of projects can be used to generate very favorable publicity for Speed School and our students.

In times of concern about medical costs, RAM provides a low-cost solution to these issues. This also bolsters the case for industry-sponsored senior Capstone design projects, since they address problems with realistic constraints and authenticity, such as reducing the cost of healthcare.



> *Dalcon Remote Alert Monitor*

Champaign, Miami of Ohio, and Ohio State University, to name a few. All these schools have been consistently Top-10 finishers of at least one of the Baja SAE competitions for the past several years. Needless to say, the competition was demanding.

The land rush start went off without any hitches, with the help of **Dr. Roger Bradshaw**, the interim chair of the ME Department dropping the gate lever. All 35 cars hit the track with a full head of steam. The track was dry and extremely fast this year, allowing the cars and drivers to be tested to their limits.

Within the first hour of the four-hour endurance race, approximately a third of the field had been knocked out of the race either by vehicle failure or inexperienced drivers pushing the vehicles too hard.

Louisville SAE car #88 was still moving, keeping a steady pace, staying on the top lap,

and avoiding troublesome cars that cause accidents and collisions. As the race progressed, more and more cars began falling out due to failure, while Louisville SAE maintained its pace and stayed alive.

At midnight, with the checkered flag waving, Louisville’s Car #88, *The Trooper*,

crossed the finish line with a total of 61 laps — three laps more than second-place Case Western, and six more than third-place Tennessee Tech. By the end of a demanding four-hour endurance race there were only eight cars still racing. Out of the three Midnight Mayhem races that UofL has hosted, this one was by far the most exciting, the fastest, the driest, and most carnage-filled yet. There were about 100 spectators, 350 collegiate team members representing 21 schools, and 50-or-so volunteers making sure all the cars were safe during the event — and for all those in attendance.

The numbers keep growing and growing . . . so we say: *Just wait until next year!*

Scott D. Cambron
Midnight Mayhem Race Coordinator
Research Engineer
Bioengineering Department
Mechanical Engineering PhD Candidate
University of Louisville

> STUDENTS IN IMAGINE CUP COMPETITION

— *continued from page 1*

“We got the idea for the Tower Defense game because all of us enjoy the genre,” said **Quinn Johns**, a senior from Prospect, Kentucky.

“The reason we targeted AIDS specifically is that after doing some research on the most pressing problems, we came upon an article talking about how some people are naturally immune to the disease and how doctors are trying to use that to cure the disease. We thought this new revolution was innovative, so we decided to do our part, as well.”

In Tower Defense games, players erect towers from which they defend against attackers. Pandemic takes

that concept to the human bloodstream. Players are immersed in the human body where they assume the role of the immune system in a battle against AIDS.

“As the player immerses him/herself into the game, the person encounters six individuals that contracted HIV/AIDS in different ways,” Johns explained. “The individual playing the game learns how the person got the disease, statistics about the disease, and how big of a problem it is, then delves into the actual Tower Defense game, which resembles the bloodstream. Upon victory in the game, a screen states the treatment the individual received, some of the treatment options available, etc.”

“Regardless of our placement, we want to polish the game to the point we can put it on the Windows marketplace and sell it. We’re currently looking at giving a large percentage of our proceeds to an AIDS-based charity to do our part in finding a cure,” Johns said.

Such competition is a good career stepping stone, Ragade said. Participants often are highly recruited by competition sponsors and corporate recruiters.

Besides Johns, UofL team members are **Matthew Dahl**, a junior from Louisville, and **Richard Paris**, a senior from Louisville. **Dar-Jen Chang**, CECS associate professor, is the team’s co-adviser. **Kazuna Nakama**, a student at Tribeca Media Arts Academy in Chicago, is the game’s artist and sound engineer.

> THIS ARTICLE WILL NOT CRASH

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While similar to other cyber-defense competitions in many respects, the SECCDC, as part of the CCDC, is unique in that it focuses on the operational aspect of managing and protecting an existing network infrastructure. While other exercises examine the abilities of a group of students to design, configure, and protect a network over the course of an entire semester, this competition is focused on the more operational task of assuming administrative and protective duties for an existing “commercial” network.

Teams are scored based on their ability to detect and respond to outside threats, maintain availability of existing services, such as mail servers and Web servers, respond to business requests such as the addition or removal of additional services, and to balance security needs against business needs.

SECCDC, as part of the CCDC, is a three-day event and one of the first competitions that specifically focuses on the operational aspect of managing and protecting an existing “commercial” network infrastructure.

SECCDC provides a unique opportunity for students and industry professionals to interact and discuss many of the security and operational challenges the students will soon face as they enter the job market.

> <http://louisville.edu/speed/computer/spotlights/uofl-cyber-defense-team-2011.html>

2010 MIDNIGHT MAYHEM

> *Scott D. Cambron*

On Saturday, September 25, 2010, most of the registered Baja SAE teams were enjoying the outstanding weather while watching the motocross bikes run on Podium1’s track during their race festivities for most of the morning and afternoon.

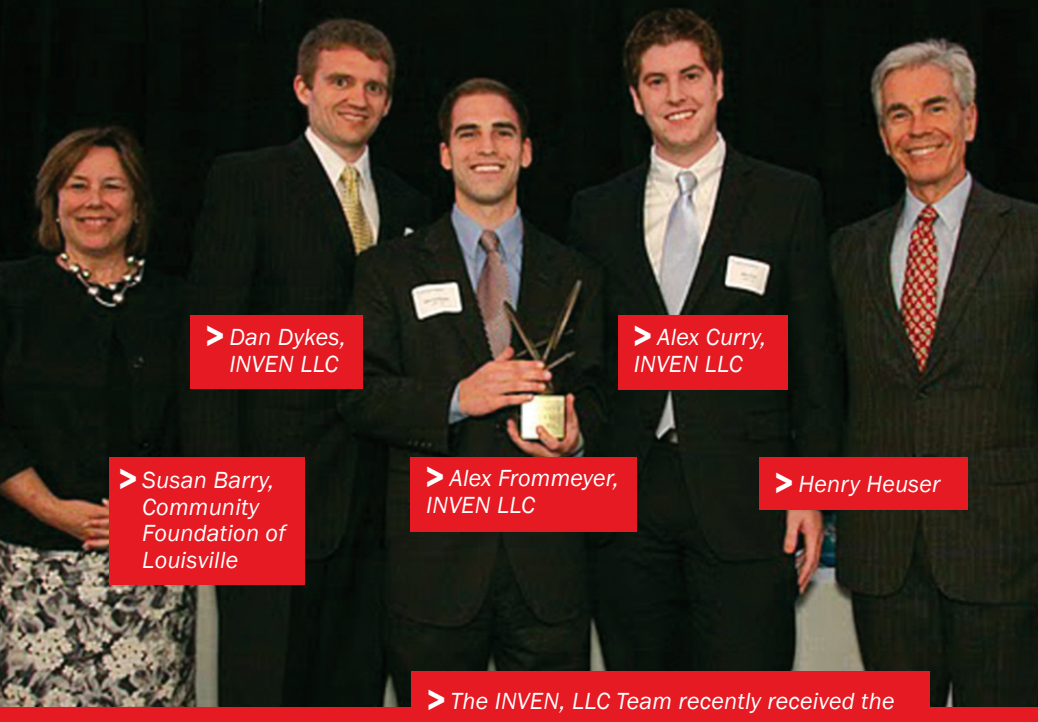
Louisville SAE, the host team, didn’t have that luxury this year. Earlier in the week during some test hours preparing for the Mayhem Race their hydraulic brake systems failed, potentially putting the UofL car out of the running for even making it into the race lineup. The UofL-SAE teams (Formula and Baja) pulled together as a unit and worked throughout the week and that long day to finally pass their brake test and complete

the safety inspection, with only about an hour to spare before the start of the race!

This year’s race lineup was expanded to 35 cars from 21 outstanding engineering schools from the region including **Tennessee Tech, Auburn University, Case Western, Purdue University, Illinois — Urbana /**



> *Car #88, The Trooper*



> Dan Dykes, INVEN LLC

> Alex Curry, INVEN LLC

> Susan Barry, Community Foundation of Louisville

> Alex Frommeyer, INVEN LLC

> Henry Heuser

> The INVEN, LLC Team recently received the Vogt Award at the GLI Signature Event.

RECENT U OF L GRADS' CONSULTING BUSINESS SET TO LAUNCH PRODUCT

> STEVE IVEY, STAFF WRITER

INVEN LLC HOPES TO HAVE DENTAL TOOL READY FOR THE MARKETPLACE BY THE THIRD QUARTER OF 2011

A startup company founded by three recent University of Louisville engineering graduates has won several state grants and is preparing to launch its first product.

The company, **Inven LLC**, was started by **Alex Frommeyer, Dan Dykes** and **Alex Curry**, who became friends at UofL's Speed School of Engineering.

The three immediately shared an entrepreneurial spirit, Frommeyer said.

To gain experience in the tech startup field, the three originally worked as consultants for product developers while in school.

Their client list quickly grew to more than 20 companies, helping them with the engineering aspect of product development.

"It was an ideal way to learn how to run a business, how you make and lose money, and all the challenges while we were still students," Frommeyer said.

"And it apparently filled a need in Louisville, helping companies find the fastest, cheapest, most efficient version of whatever it is they're making."

CONSULTING BUSINESS FILLED LOCAL TECH NICHE

Joel Embry, founder of **J.T. Embry & Associates LLC** at the Purdue Research Park in New Albany, was one of those consulting clients. His company develops products for the federal government, including locks and other security devices.

"A lot of larger engineering firms won't look at you unless you give them a \$100,000 retainer," Embry said. "Those guys were young and eager. They were a nice change of pace."

The Inven partners were able to use revenue from consulting to fund their own product-development aspirations. They remain the Louisville company's only three employees.

"We still do some of our consulting as a service provider. But, long term, we want to be in that (product-development) space for ourselves," Frommeyer said.

DEVICE MODIFIES WIDELY USED DENTAL TOOL

Frommeyer has several family members who work in dentistry, and he learned from them a common problem they have with root canal procedures. As a result, Inven is working on the **Intellidontic File**, its first original product.

The file serves as an attachment to a tool used by a majority of dentists across the country, Frommeyer said. It helps dental professionals set their working length once, rather than multiple times during a procedure.

The depth of the canal inside a tooth is measured to make sure the entire canal is cleaned after the nerve and pulp have been removed from a diseased tooth.

Joseph Morelli, an associate professor in the UofL School of Dentistry and adviser to Inven, said he plans to help the company with its clinical trials.

"They have a legitimate idea of improving the methods we use," Morelli said. "There is no way to predict right now, but I think their chances of success are pretty good."

GRANTS, AWARDS HELP FUND DEVELOPMENT

Inven's prototype has won attention — and prize money — from groups across the state.

The company won \$30,000 from the **Kentucky Enterprise Fund**, administered by the **Kentucky Science and Technology Corp**. It also has won \$10,000 each from the **Cincinnati Innovates Contest** and the **Business Innovation & Growth Center at Kentucky Highlands** in London, Kentucky.

Frommeyer said the company hopes to launch its Intellidontic File by the third quarter of this year. The business plan calls for it to be produced in Kentucky, but licensing the technology to an existing dental-device maker is also a possibility, he said.

"It depends on the production costs and overhead here," Frommeyer said. "Manufacturing it here gives us the brick and mortar for even further production and development. So if it makes sense, we'll do it."

SPEED DNA: EDUCATION, RESEARCH, AND TECHNOLOGY TRANSFER

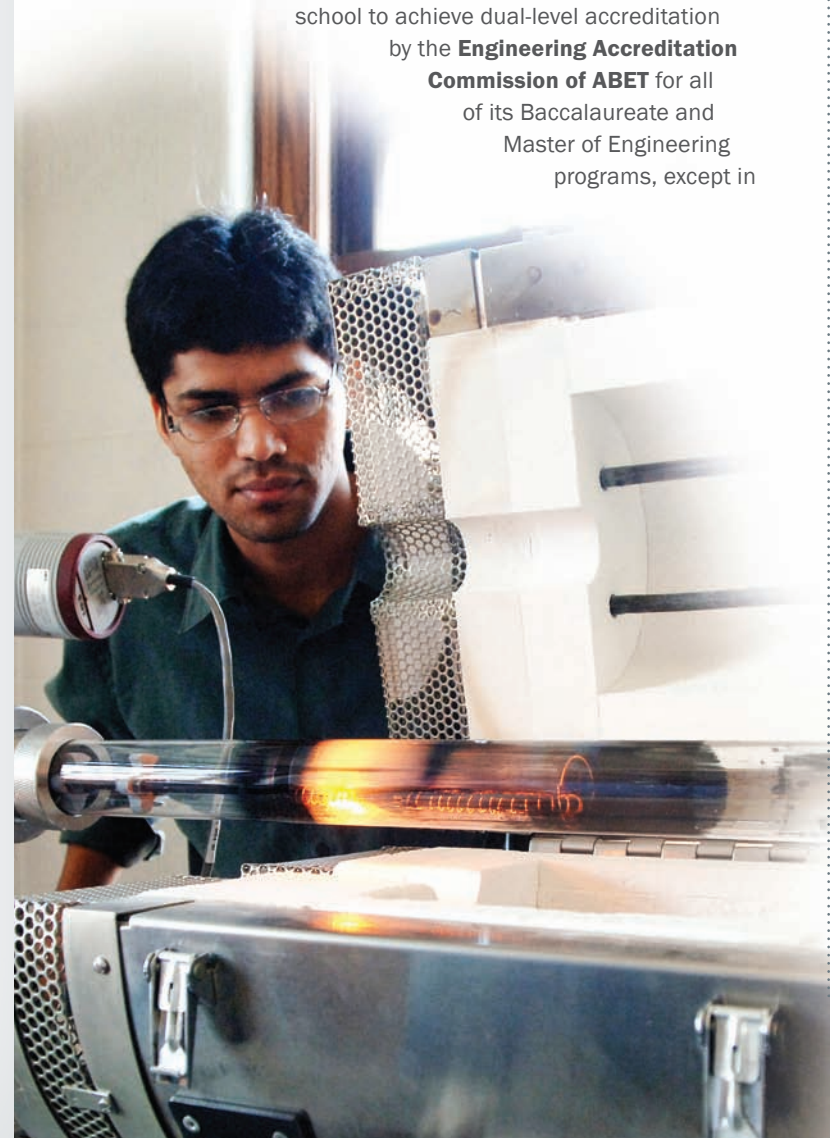
> Jim Smith

Long considered a flagship school at UofL, the **J.B. Speed School of Engineering** has educated several generations of engineers since its establishment in 1925. Students and faculty engage in research and scholarship that will extend knowledge, while assisting in economic development and growth of the regional and national economies through technology transfer. Speed was named to the **U.S. News & World Report** rankings of **best graduate schools in engineering for 2010**.

"Three alternating semesters of cooperative education are mandatory in all our baccalaureate degree programs, which sets us apart from most engineering schools," says Dean **Mickey Wilhelm**. "That means every Speed student graduates with one year of real work experience. A strong cooperative internship experience has been part of our educational philosophy since the school's inception."

With degree programs in seven engineering disciplines — Bioengineering, Chemical, Civil, Electrical, Industrial, Mechanical Engineering, and Computer Engineering and Computer Science — Speed is also the first engineering

school to achieve dual-level accreditation by the **Engineering Accreditation Commission of ABET** for all of its Baccalaureate and Master of Engineering programs, except in



Bioengineering which only began in 2005. Master of Science and PhD programs are also offered in all engineering disciplines except Bioengineering. The Baccalaureate degree in Bioengineering is accredited, and accreditation of the Master of Engineering in Bioengineering is anticipated in August 2011. Proposals for Master of Science and PhD programs in Bioengineering are in the works.

"Over the past seven years, we've more than doubled our research expenditures and are now at more than \$14 million. However, we know that adding more faculty positions, endowed chairs, and professorships, will enable us to move forward in achieving our strategic instructional and research initiatives," says Wilhelm.

"We're in an enviable position of having increased productivity in degrees granted and research grants and contracts awarded, but we are at capacity and we definitely need to expand our instructional facilities and research labs.

"Our current comprehensive capital campaign provides us the opportunity to assess our strengths, to define our priorities, and to identify the areas we need to develop in order to fulfill our mission. Because technological development is incredibly dynamic, it's difficult to adequately fund the needs of our current students and researchers. Thus, philanthropic support from the **Charting Our Course Campaign** is critical to our growth," added Speed School Dean, **Mickey Wilhelm**.

NEWS BYTES

> SPEED DEPARTMENT OF ENGINEERING SECURED **\$1.72 MILLION** IN FUNDING FROM THE DEFENSE LOGISTICS AGENCY TO SET UP THE **RFID TECHNOLOGY CENTER**. KUDOS TO **SUNDERESH S. HERAGU!**

> SPEED DEPARTMENT OF COMPUTER ENGINEERING AND COMPUTER SCIENCE PROUDLY ANNOUNCES THAT ITS STUDENTS WON **ALL THREE TOP SPOTS** IN THE **KAS GRADUATE RESEARCH COMPETITION**.

THE SPEED ENGINEER

Mickey Wilhelm
Dean Speed School

Jimmy Ford
Executive Director
Alumni Association

Jason Amore
Director of Major Gifts
Speed School

Jason Diffenderfer
Director of Development
Speed School

Brett Jeffreys
Editor

MEET THE ALUMNI

KAY BALL

> 1990 Graduate

Kay Ball has over 24 years of experience including design, construction, and implementation of strategic initiatives of the Louisville Water Company including the Main Replacement Rehabilitation program, the County-wide Extension Program, and currently serves as Manager of the Advanced Treatment Technology / Riverbank Filtration Program.

Her experience includes budgeting, program planning, project management, public information, and Wellhead Protection. Kay is active in the American Water Works Association, currently serving as Chair-elect of the Kentucky Tennessee AWWA section.

In addition to AWWA, she has participated in the Kentucky Water Resource Commission, the American Society of Civil Engineers, the American Groundwater Association, and River Fields. Kay is married, has five children and two grandsons. Kay has a degree in Civil Engineering from the University of Louisville Speed Scientific School.



> The American Society of Civil Engineers honored the Louisville Water Company with its 2011 Outstanding Civil Engineering Achievement Award.

NEWS BYTES

> ARTHUR ABDULIN, ALEKSEY FADEEV, AND ALEKSEY ASHIKHMIN WIN \$25,000 AWARD

Computer Science and Engineering doctoral student Arthur Abdulin and recent graduates Aleksey Fadeev and Aleksey Ashikhmin won \$25,000 from **Hearst Magazines** and the **Direct Marketing Association's Analytics Council** for developing a computer model that better predicts the percentage of magazine copies that will sell on newsstands. More than 700 teams from almost 60 countries entered the competition in October 2010.

PAUL WIELAND

> 1987 Graduate

Paul Wieland, 87S, has published a book, *Crossing the Threshold: Advancing into Space to Benefit the Earth*. Stories from his career at NASA as well as space activities that directly address 21st Century challenges are covered.



Paul Wieland is a professional engineer (P.E.) who earned degrees in botany and mechanical engineering from UofL. From 1983 to 2005 he was a NASA civil servant at the **Marshall Space Flight Center** in Alabama, working primarily on developing the environmental control and life support systems for the International Space Station and other space missions. In 1991 he was a founding member of the **Institute for Advanced Studies in Life Support**.

From 1989 to 1991, pursuing his interests in sustainability and energy efficiency, he founded and ran **Wiseland Products**, the first paper company in Alabama to carry recycled paper products; he served as a technical adviser to the **American Lung Association Health House® '96** project in Huntsville, Alabama, to demonstrate that it's possible to build an energy-efficient house with good indoor air quality. Later, he renovated three 60-year-old houses to meet the Health House criteria. And in 2009 he became a **LEED-Accredited Professional**. He also converted an F-250 diesel pickup to run on waste vegetable oil.

Paul enjoys hiking and camping, contra dancing and swing dancing (he founded the **Huntsville Swing Dance Society** in 1995), and making pottery (he was a co-founder of the **Tennessee Valley Ceramic Arts Guild** in 2008).

ERZA L. CLARK

> CHE, Junior



Ezra L. Clark, a junior undergraduate CHE student at the University of Louisville, was named a **2011 Scholar** by the highly prestigious **Barry M. Goldwater Scholarship and Excellence Program** for his research in the area of advanced energy materials toward renewable energy conversion and storage. Ezra was nominated for the highly competitive award based on his academic accomplishment and innovative scientific research.

NEWS BYTES

> GOVERNOR BESHEAR ANNOUNCES NANOTECHNOLOGY FIRM TO CREATE SEVEN HIGH-TECH JOBS IN LOUISVILLE

Kentucky Governor Steve Beshear recently announced Louisville-based NaugaNeedles LLC will create seven new high-tech and technical-support jobs, paying an average annual salary of more than \$62,000, exclusive of benefits.

NaugaNeedles is a supplier of high-performance, cost-efficient custom probes for use in scanning probe microscopy, as well as for nano-force and nano-bio sensors in research and industrial applications. The company was founded in July 2007 to develop and commercialize a platform technology discovered at the University of Louisville's **Electro Optics Research Institute** and **Nanotechnology Center**.

> www.nauganeedles.com

For the past two years he has worked with **Professor Mahendra Sunkara's** research group within the **Conn Center for Renewable Energy Research**.

Ezra has undertaken numerous research projects exploring the use of nanotechnology in energy-conversion applications. His current and past research efforts within the Conn Center include the synthesis of metal oxide nanowires of different metal systems over large surface areas and in bulk quantities for use in lithium-ion batteries, electrocatalysts, and solar cells.

In addition to research, Ezra enthusiastically shares his interests with his fellow students and motivates them to think about energy issues and the impact of renewable energy sources.

He and a group of students from the Conn Center founded a student organization at UofL called **Renewable Energy and Energy Efficiency Club (RE3)**, for which he currently serves as president. RE3 intends to promote student interest in renewable energy through an engaging lecture series and hands-on activities for students and community members alike.

RE3 currently encourages student participation in the **Mickey R. Wilhelm Solar Flight Competition** and the **UofL Solar Decathlon Team**. Ezra himself has been a key participant in both of the above team activities.

Ezra intends to pursue a PhD in chemical engineering. Ultimately he wants to apply his knowledge and training toward a successful career in renewable energy research and technology advancement. Until that time, Ezra continues his innovative work with Dr. Sunkara and his fellow researchers at the Conn Center and enjoys his experiences as a UofL student.

GIVE AN ANNUAL GIFT

> YOUR CONTRIBUTION TO UOFL'S COMPREHENSIVE CAMPAIGN HELPS WHERE THE NEED IS THE GREATEST — STUDENT SCHOLARSHIPS, TEACHING, RESEARCH INITIATIVES, AND COMPUTER LABORATORY UPGRADES. GO TO **CHARTINGOURCOURSE.ORG** OR CONTACT **JASON AMORE** AT **502 852.4756** TO DISCUSS YOUR PHILANTHROPIC PLANNING.

WITHOUT ENGINEERS BLUETOOTH WOULD BE A GUM DISEASE.

> Dr. Heather Rypkema adjusts a sample in the UTAS lab.

NEW! ULTRAFAST TRANSIENT ABSORPTION SPECTROSCOPY FACILITY

Starting in 2011, an **Ultrafast Transient Absorption Spectroscopy** (UTAS) system will be available at the Conn Center for Renewable Energy Research at the **University of Louisville** funded by the **DOE EPSCoR** program.

This system is the only one of its kind in Kentucky and enables the measurement of ultrafast kinetic processes that are initiated by light ranging from the ultraviolet to the infrared. A time resolution of <30 femtoseconds can be achieved for the investigation of fast electron transfer, proton transfer, short-lived intermediates, and other femto- to picosecond timescale phenomena.

These measurements are crucial for characterizing advanced materials used in development of solar cells and energy-storage devices. The facility is in a dedicated, secure lab and is open to students and faculty. The DOE EPSCoR program funds a group of investigators from UofL and UK who are focused on basic research on nanoscale materials and architectures for solar energy conversion to electricity and fuels.

The system was designed and constructed at **Clark MXR, Inc.**, specialists in innovative ultrafast laser micromachining and spectroscopy solutions. **Dr. Bill Clark**, president and CEO, explains the system's concept.

"What you see at a dance club with a strobe light is a progression of stop-motion images of the dancers on the dance floor. You know that their motion is continuous, but the duration of the strobe is much shorter than the time it takes for them to change position, so it appears as if they are frozen in time with each flash of the strobe. Their progression is observed by successive flashes of the strobe, during which their position changes as they dance to the music."

Dr. Clark continues, "The UTAS facility we are setting up in the Conn Center

at the University of Louisville will allow scientists to do something similar with chemical reactions, but with the 'strobe' light having a time duration measured in a millionth part of a billionth of a second."

This extremely short timescale is important because chemical reactions occur much faster than the motion of dancers. Collaborating scientists at the Conn Center will be able to use this tool to study how chemical reactions occur, conceptually in the same manner that successive flashes of a strobe show the progression of the dancer's position. With this knowledge, they can think about ways to make materials more efficiently, or with better properties.

The importance of this technology was recognized by the Nobel Committee when they awarded the **2000 Nobel Prize in Chemistry** to **Professor Zewail** at Caltech." **Dr. Mahendra Sunkara**, Technical PI for DOE EPSCoR (**E. Grulke**, main PI), describes the effect this system will have across the state.

"This UTAS facility will enhance the infrastructure for performing basic research necessary to advance projects in energy conversion and biological medicine.

"This facility is the only one of its kind in a 200-mile radius and these capabilities will elevate Kentucky scientists to a new level. This system allows us to study various energy-conversion processes, such as electron transport and transfer across material interfaces. This system will bring new collaborations not only between DOE EPSCoR investigators, but with faculty and researchers from universities across the region."

Dr. Bruce Alphenaar, UofL Professor of Electrical Engineering and Conn Center collaborator, describes some of the work his research group will undertake. "Using the dual output of the ultrafast laser system, we plan to

develop a far-field microscope capable of imaging nanometer scale particles or fluorescent tags with subdiffraction limit resolution. Resolution (defined as the ability to produce a distinct image of two objects very close to each other) is normally limited by diffraction to be on the order of the wavelength of light (>200 nm for visible light). In the proposed technique, two overlapping laser beams are used to simultaneously excite and bleach the fluorescence of nanometer scale particles. A regularly shaped excitation beam is super-imposed on a donut-shaped bleaching beam. The fluorescence is confined to the donut zero, with all particles on the periphery being bleached. This produces a factor of 10 improvement in resolution."

Dr. Alphenaar continues, "The system has many potential applications for users both on and off campus. Researchers in the Bioengineering Department and in the Medical School will be able to use the system for sub-100 nm biological imaging, well beyond the capabilities of standard confocal microscopy. Material scientists in Chemical Engineering and Electrical Engineering departments will be able to use the system to obtain nanometer scale maps of the local material properties such as impedance and dielectric constant, or to detect vacancy centers or defect states. Scientists in Chemistry, Physics, and Electrical Engineering studying nanometer scale materials can use the system to spatially analyze nanoparticles, nanowires, and nanotubes."

"The Chemistry Department at UofL is approaching completion of a search for a new faculty member who will make use of the femtosecond laser system," added **Dr. Richard Wittebort**, Chair of Chemistry. "This new faculty member will use the unique capabilities of this instrument to establish a

laboratory aimed at unraveling fundamental chemical processes relevant to solar energy production, biomedicine, and national security."

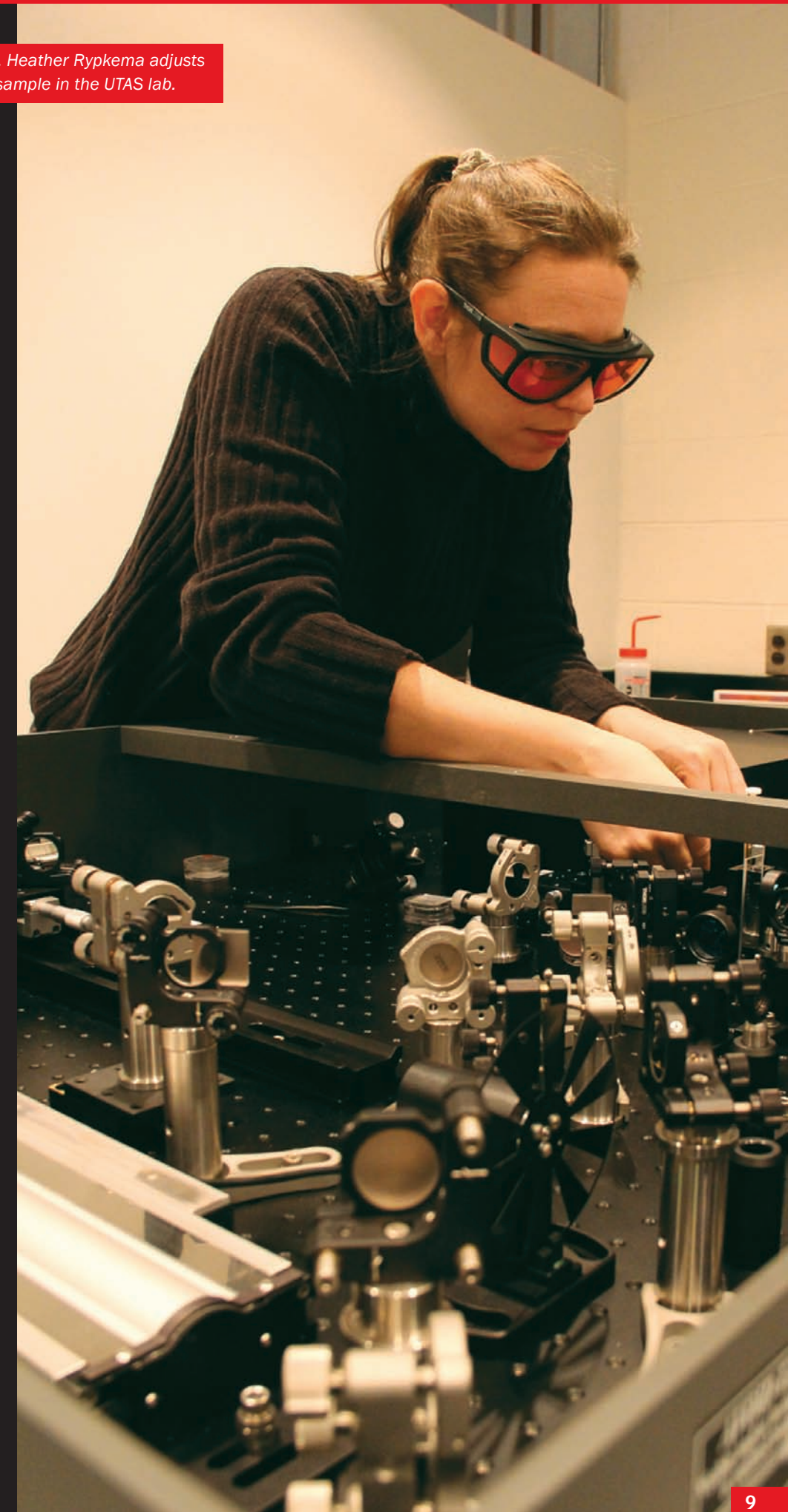
Dr. Heather Rypkema, an Assistant Professor in Chemistry and a primary user of the system, explains the significance of the UTAS system for research. "The new ultrafast laser facility at UofL represents the state of the art in femtosecond spectroscopic technology. Less than a decade ago, this technology would have been accessible only to experts in lasers and ultrafast optical processes, but today this powerful tool can be utilized by researchers in fields ranging from medicine to materials science.

"The system will allow us to initiate a chemical or physical process with a pulse of light lasting only 30 femtoseconds. To give an idea of just how fast this is, consider that 30 femtoseconds relative to 1 second is roughly the same as 1 second relative to a million years. This astonishing time resolution will allow us to observe the transformation of molecules and follow the motion of electrons. The system was designed and constructed to provide versatility for a wide array of applications. Processes can be initiated by light ranging from the ultraviolet to the infrared, while spectral changes may be observed throughout the visible spectrum and beyond."

Dr. Rypkema continues, "The new UTAS facility at UofL's Conn Center will not only be a major asset for scientific research in the state and throughout the region, but it will also provide a venue to bring researchers from diverse fields together and open new channels of collaborative research."

The Conn Center is pleased to offer this new advanced characterization facility to researchers across the state and throughout the region.

> Interested users can contact **Dr. Mahendra Sunkara** at mahendra@louisville.edu



KTAP PROJECT

➤ Russell Harpring | MEngE Student

Background

The **Family Support Division at the Kentucky Cabinet for Health and Family Services** (CHFS) provides benefits (KTAP – **Kentucky Temporary Assistance Program**) to needy families in three main forms: medical insurance, food stamps, and cash benefits. The main branch for Jefferson County is located in the old L&N Building, and the Family Support Division encompasses the third and fourth floors of the building.

Earlier this year, industrial engineering students, **Cory Colmore**, **Kristin Final**, and I did our Capstone Design project trying to understand why the system is slow and offer suggestions for improvement. Most of the time was spent collecting data, and the team found out that the average client wait-time is around 90 minutes, with the actual time in the system being a little over 120 minutes. The team did not get to implement any ideas they had for improvement, but did get to give a presentation exclusively to management at the CHFS.

After the meeting, I expressed interest to our project coordinator in continuing this project and implementing some of the suggestions we presented, and CHFS agreed.

Since beginning the project, work has been conducted alongside **Dr. Rod Barber** and **Dr. Stacy Deck** of the **Kent School of Social Work**. Drs. Barber and Deck have been researching caseload trends and have been working to restructure the Kentucky Works Program, which allows clients to receive education or a trade skill, then work or volunteer a certain number of hours per week to receive cash benefits. Drs. Barber and Deck believe the work and research done on my end can be tied into their project and will be useful for future studies.

Goals

As popular as process improvement is in manufacturing, healthcare and other service industries, it has not yet taken hold in various departments of government. The most recent research was conducted by **Vicki Grant**, of **IBM Center for Business of Government**, who conducted a case study looking at the way Louisiana used Lean principles to reshape its welfare system after Hurricane Katrina hit New Orleans. The implementation was successful and processing times are faster now than they were before the disaster. I believe it is possible to achieve the same results here, using slightly different methods.

The vision for my project is to create a valid simulation model of KTAP of Jefferson County in detail, which will give all members involved a complete understanding of the system. The model will be loosely based on the model my team used for our Capstone project, but will be refined. The data will be collected from real clients, and will be categorized based on how clients enter the system (scheduled versus unscheduled). Also, I will be collecting data based on service types. For example, the amount of time a case worker spends with a client depends on what types of services they are applying for.

By finding patterns in the system, we could identify strategies for more effective services. With the model, we will be able to experiment with real-time data to determine how the process can be improved, whether it is adjusting staff between floors, a better layout, reduction in paperwork, and more. My ultimate goal for the whole thesis project is to reduce wait times for the system on the whole, while not overwhelming the caseworkers with more work.

Current Work

So far, the first half of the process has been mapped out step by step, using Lean language to label each step as value added, non-value added, or waste. This covers time the clients enter the system up until the time the clients are called back by their case workers. Paperwork must be filled out and unscheduled clients must be assigned to a caseworker before waiting to see their respective case worker.

For the simulation model, Arena has been used to create a valid depiction of the system, with the help of **Dr. Gerald Evans**. The simulation model is a preliminary process to show the path the client can take from the moment they enter the door until they reach the waiting room. Data are still being collected for the rest of the process, so the model will be updated with the rest of the information in time. The model takes into account three different entity types, chosen by scheduling procedures, one being a scheduled client, another being a “walk-in” (an unscheduled client who is active in the system), and the last being an “intake” (an unscheduled client who is inactive in the system).

Data collection has consisted of reading reports generated by management personnel, physically walking the system and doing time studies of real clients. I have sat in on interviews

between clients and case workers to analyze it from a process point of view, and find similarities and differences that occur across interviews and variance between case workers. This is a time-consuming process, as each interview lasts anywhere from 20 minutes to an hour.

Future Work

As more data and information are collected, the simulation model will be more valid and complete. With a good representation of the system, the model can be reviewed by management personnel and Drs. Barber and Deck to fully understand the current process. The model should be flexible enough to make changes on the spot and determine the effects on the actual system.

Another endeavor for the spring semester is guiding the Capstone team during their project. I’ve conducted research on waiting room software and believe it could be very useful for CHFS. All the computers are networked together, so I believe it would be beneficial to have a sign in a kiosk and have a program that automatically assigns clients to case workers, and notifies the case workers that the client is waiting for them. However, since this is not a main part of my project, I will only act as a resource to the team, helping them get oriented in the building and be able to give them assistance with their project.



Computer Science and Engineering doctoral student **Arthur Abdulin** and recent graduates **Aleksey Fadeev**, and **Aleksey Ashikhmin** won \$25,000 from Hearst Magazines and the Direct Marketing Association’s Analytics Council for developing a computer model that better predicts the percentage of magazine copies that will sell on newsstands. More than 700 teams from almost 60 countries entered the competition in October 2010.





SPEED VIEW

PRIME DIRECTIVE

Sometimes in *academe* we become so involved with research, scholarship, technology transfer, seeking philanthropic support, and so forth, that we can take for granted our Prime Directive as an engineering educational institution.



And that is to produce outstanding graduates who will excel in the profession, and who will solve many of the problems that confront society now and in the future.

The articles in this issue of *Speed Engineer* illustrate the successes of our students, and by inference we can glimpse very bright futures for them.

I congratulate these students, as well as many others whose achievements may appear in future issues of this publication. They make me proud, and remind me that our faculty and staff are executing our Prime Directive very well indeed.

On a personal note, I am voluntarily stepping down as Dean on August 31.

However, I plan to remain on the faculty for a few more years before retiring. I want to thank the administration, faculty, staff, students, alumni, and donors for entrusting the leadership of the Speed School to me for the past seven and one-half years, and for all the

support they have provided in moving the Speed School forward, even in an environment of economic recession and annual state budget cuts.

> Mickey Wilhelm
Dean
University of Louisville
J.B. Speed School of Engineering