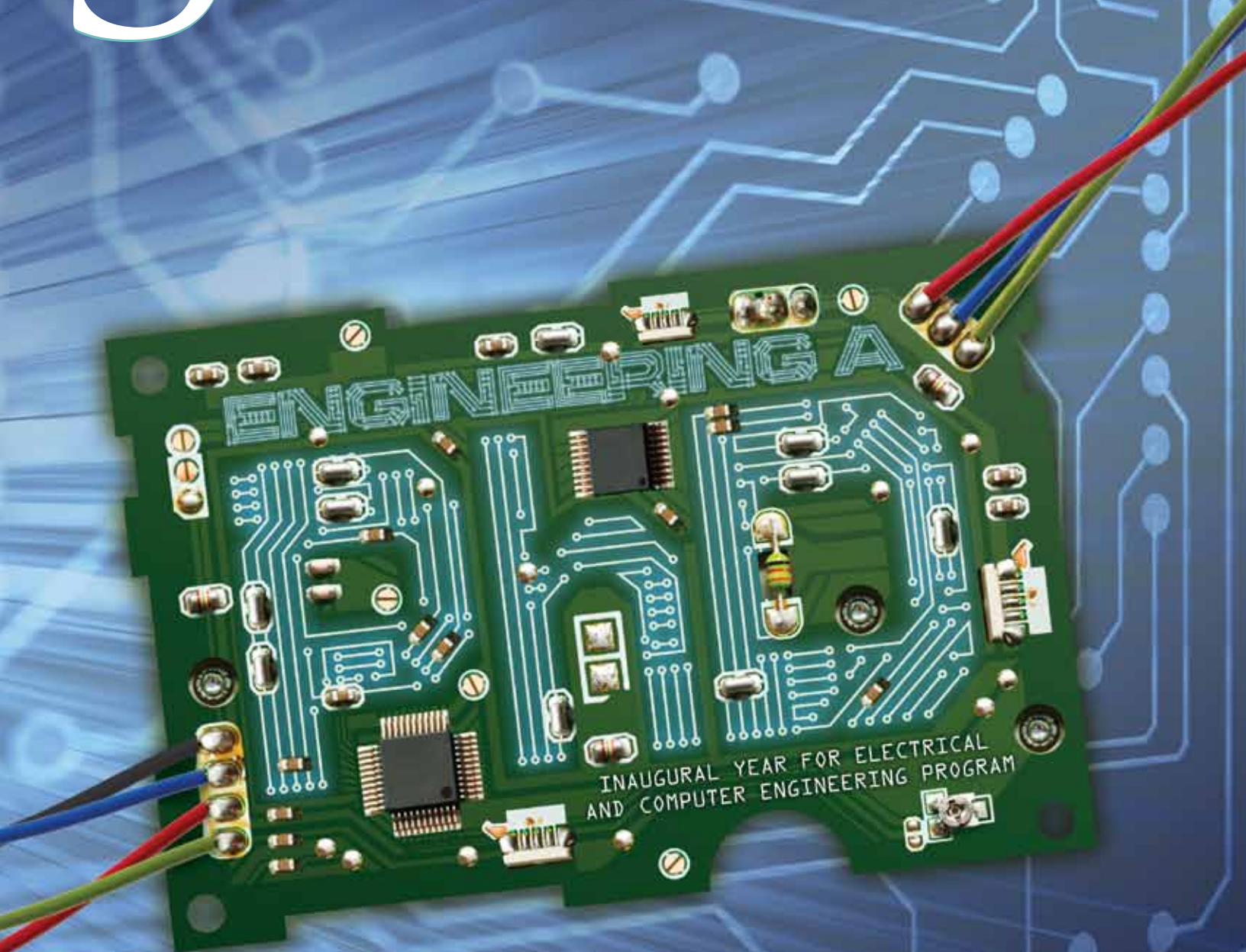


BAYLOR UNIVERSITY SCHOOL OF ENGINEERING & COMPUTER SCIENCE

SYNERGY

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DEPARTMENT CHAIRS
Donald L. Gaitros, PhD, Computer Science
Kwang Y. Lee, PhD, Electrical and Computer Engineering
William M. Jordan, PhD, Mechanical Engineering

EDITORIAL OFFICE
Synergy • Leigh Ann Marshall
One Bear Place #97356
Waco, TX 76798-7356
PHONE (254) 710-6826
FAX (254) 710-3839
EMAIL Leigh_Ann_Marshall@baylor.edu

WRITERS AND EDITORS
Casi Bowers, Leigh Ann Marshall,
Franci Rogers, Dana Wallace, Katie Whitmire

PHOTOGRAPHY
He Cui and the ICPC Digital Media Team,
Matthew Minard, Robert Rogers

DESIGN
Mike Minick

UNIVERSITY DEVELOPMENT
Kevin Ludlum, PhD
Executive Director of Development
One Bear Place #97356
Waco, TX 76798-7356
Phone (254) 710-6754
EMAIL Kevin_Ludlum@baylor.edu

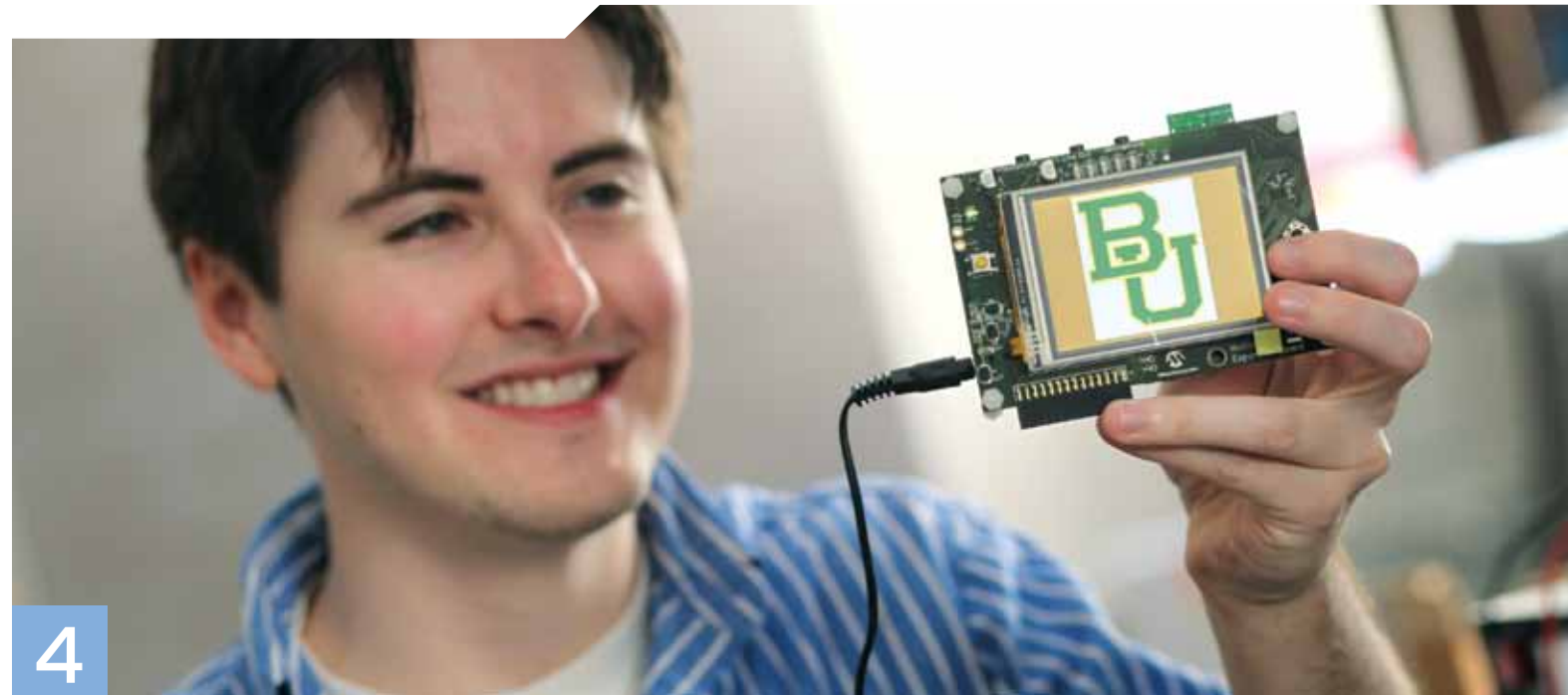


Synergy is a publication of the Baylor University School of Engineering & Computer Science that establishes a communication link to keep alumni and friends aware of the spirit of discovery at the School. Established in 1995 from programs dating to 1974, the School of Engineering & Computer Science has provided a quality education to more than 2,500 graduates in the tradition of excellence, a cornerstone of Baylor's heritage. Synergy is produced for the School of Engineering & Computer Science by Baylor's Division of Marketing & Communications.



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TAKE JUST ONE BABY STEP......or one giant step...at a time and it is remarkable how far one can go before reaching the celebration age of 16. Baylor's School of Engineering and Computer Science turns 16 this year, and it is indeed gratifying and remarkable to view the positive achievements to date...knowing full well more will be coming at an increasingly rapid pace.

One external measure of this recognition is the *U.S. News & World Report* ranking of predominately undergraduate engineering schools. One more baby step and we'll crack the top ten! In 2011 Baylor is nationally ranked No. 11, which is up one spot higher than last year. This recognition and ranking is well deserved for longstanding, as well as recent, initiatives. For example, Baylor has been the headquarters of the ACM International Intercollegiate Programming Contest since the late 1980s, which allowed the Baylor name and website to touch 25,000 contestants from 2,000 universities in 90 countries this year alone. Now that's global education!

Back home, the ECS Living Learning Center has been a leader and model among on-campus communities since 2004 and promotes serious intellectual pursuits while fostering success-oriented soft skills. This summer will mark the transition of the ECS LLC Faculty in Residence (FIR) from five-year stalwart Professor Cindy Fry, her husband, Joe, and their two children, to Dr. Ian Gravagne, his wife, Ann, and their three children. The value a FIR brings to the ECS LLC can hardly be understated. Dr. Walter Bradley (and wife Ann) was the first FIR at Baylor. Today, Dr. Bradley's pioneering research with composite materials using green coconut husk fibers, and the resulting startup company Whole Tree, will be one of the first occupants of the new Baylor Research and Innovation Collaborative (BRIC), for which ECS will be the anchor academic tenant.

Construction on BRIC is well underway at the long-abandoned 300,000 square foot General Tire plant and it is an impressive structure indeed. Not only will BRIC yield research innovations, it will be also an economic engine for the entire region, as well as a definite accelerator for ECS's first PhD program in electrical and computer engineering. One of the emphasis areas in this program is microwave circuits and systems, for which the third annual symposium involving graduate and undergraduate students was recently held on campus.

High water marks in student enrollment and quality indicate the demand is there for the innovative and quality programs ECS faculty, staff and students bring to bear. Our recent signing of a pre-engineering articulation agreement with the University of Mary Hardin Baylor, with whom Baylor has a 160+ year relationship, will help ECS attract students of high quality and character well into the future, and also seems metaphorically indicative of completing the circle between the old and the new.

We may be blowing out the birthday candles...but exciting things are otherwise igniting!

Ben Kelley

Dean Benjamin Kelley



Pass It On >>> By Shawn & Julia Sedate

Have you ever pondered how it happens that you end up where you do in life? The twists and turns of chance and fate that lead you down one path versus another? No? Me either.

I'm not prone to such reflective thoughts. However, I have found myself with a lot of thinking time on my hands lately. I started training for a marathon and found - to my surprise - you have to run a lot. My casual morning jog was just not enough. I had to train. And training runs give you time to think, to ponder questions that sometimes a busy life just crowds out.

On a recent long run, I started thinking about people that I owe something. Not people I owe money, but something else. People who've done something so immense, I cannot pay it back. My dad is one such person. Over many years, he's invested in me, my character, who I am. There are not enough years for me to pay him back. My mom is another - a beautiful and talented artist who gives her precious creations away. I can't offer to her anything remotely like what she's given to me. Then there's my beautiful wife Julia, who patiently year after year has given me inspiration, support, love...things I cannot repay. There are so many others...teachers, pastors, friends. Some whose names I don't even know like the stranger who stopped to help me when my car broke down. People who have given something to me that in this life I have no adequate way of ever paying back.

I would put Baylor on that list. Years ago, Baylor gave me a scholarship to come to the school at a time when I wouldn't have attended otherwise, as we couldn't afford it. But Baylor offered me a chance and that chance shaped me in many ways. I met the love of my life, made lifelong friends, learned the skills I needed to prepare me professionally and, along the way, discovered many amazing life lessons. The experience launched me on a career path that has been both rewarding and fulfilling. These are things that shape a person, that develop you. They did me. They are things for which I'm grateful and for which I can never repay.

So what to do with so many debts? So many people? My dad had the answer: don't give back to me, find someone else. Pass it on.

So it occurred to me that if I can't find and repay the person who decided to give me that original scholarship, I can at least support the opportunity for someone else to attend this fine school. That's the primary reason Julia and I decided to set up a scholarship for students studying in the School of Engineering and Computer Science. To help someone in a small way that perhaps will shape who they become. We're fans of Baylor and believe in the mission of a Christian-based educational environment. It was a natural choice.

We're grateful to have the opportunity to give, grateful to have a University we support, and grateful for so many people who've shaped our lives along the way.

Looking Beyond 2012

Baylor strives to provide not only a high quality classroom education but a complete experience that, as the mission reads, "educates men and women for worldwide leadership and service by integrating academic excellence and Christian commitment within a caring community."

Such an effort - whether it's providing the best professors, cutting-edge academic facilities, smaller class sizes, diverse areas of study, chaplains in each residence hall, or opportunities to turn knowledge into service through mission trips - comes at a cost. President Starr has called on all Baylor alumni to demonstrate their love for the university and the students who are following in their footsteps by supporting the President's Scholarship Initiative, a \$100 million, three-year initiative to endow student scholarships for years to come.

For more information on how you can support the President's Scholarship Initiative and help ensure academically qualified students from all walks of life continue to find their place at Baylor, visit baylor.edu/extraordinarystories

How
Extraordinary
the **STORIES**

THE PRESIDENT'S
SCHOLARSHIP INITIATIVE



BRANDON HERRERA'S RESEARCH FOCUSES ON THE PROPERTIES OF CEMENT. HIS WORK, HOWEVER, IS ANYTHING BUT CONCRETE.

"THE INDUSTRY DOESN'T HAVE A METHOD OF DETERMINING HOW THEY'VE MIXED THINGS.

You've got cement trucks, and they've got hundreds of thousands of tons on a construction project. It's all guesswork," says Herrera, whose research involves ultra-wideband measurement systems, or measurements taken via an electronic pulse.

He predicts the industry could prevent \$56 billion annually in wasted cement with a more accurate system for calculating the strength and performance of concrete.

Herrera is one in a handful of students enrolled in the Baylor School of Engineering and Computer Science's new Electrical and Computer Engineering PhD program, a first for the school. He's formed strong partnerships with his professors and classmates, and he's passionate about his research. These are just a few of the reasons he continued on at Baylor after completing his master's in electrical and computer engineering.

Getting a PhD program together has been no easy task. "Identifying research focus areas, developing new courses and a new curriculum and securing research space and equipment are among the greatest challenges in launching a new PhD program," says Dr. Benjamin Kelley, Dean of the School of Engineering and Computer Science.

The research-based PhD program has two major areas of emphasis. The first is power and energy systems, which supplements human abilities and aids in physical well-being. This technology is related to health care, air transportation, energy production and national security. The second is complex and adaptive systems, which includes energy storage, power conversion and green energy systems. Both programs allow for collaboration among departments within the school.

Currently ranked No. 11 among universities with the "Best Undergraduate Engineering Programs" by *U.S. News & World Report*, Kelley says his dream is for Baylor ECS to prosper and grow and that establishing PhD programs are both a result of current and future success.

Regents approved the program in February 2010, which means more time for targeted student recruiting for the program's second year. Dr. Mike Thompson, Director of Graduate Programs for the Department of Electrical and Computer Engineering, says there's

already been "considerable interest" in the program, which requires students to complete 60 credits beyond their bachelor's degree.

In order "to turn the corner on research, you need graduate students who are around for some length of time like PhD students are," says Thompson. "By the time you get a master's student graduated, they know a lot, but then they're gone. It's hard to push a research agenda without having PhD programs." In order to grow the program, the department plans to hire 10 new faculty over the next 5 to 10 years, nearly doubling its size.

Thompson and other faculty members such as Drs. Steven Eisenbarth and Kwang Lee contributed to writing the PhD proposal and shaping the program, which included researching peer models at Rice, Duke and Notre Dame.

INTERDISCIPLINARY APPROACH

Winston Ewert has developed a healthy appetite for studying search algorithms through the No Free Lunch Theorem. "If you're using the computer to find something, and you don't know anything about what you're trying to find, then it doesn't matter what strategy you use. All strategies will work equally well," says Ewert.

He gives the example of a deck of cards lying face down on the table. There is no best strategy for finding the queen of spades because it could equally be anywhere in the deck.

The reason researchers can do useful searches is because they know something about the space they're searching and are able to exploit that knowledge, according to Ewert. That in turn allows searches to succeed either more quickly or with better results. "You try to look for a solution that works in your particular problem," he adds.

**"You try to look for
a solution that works in
your particular problem."**

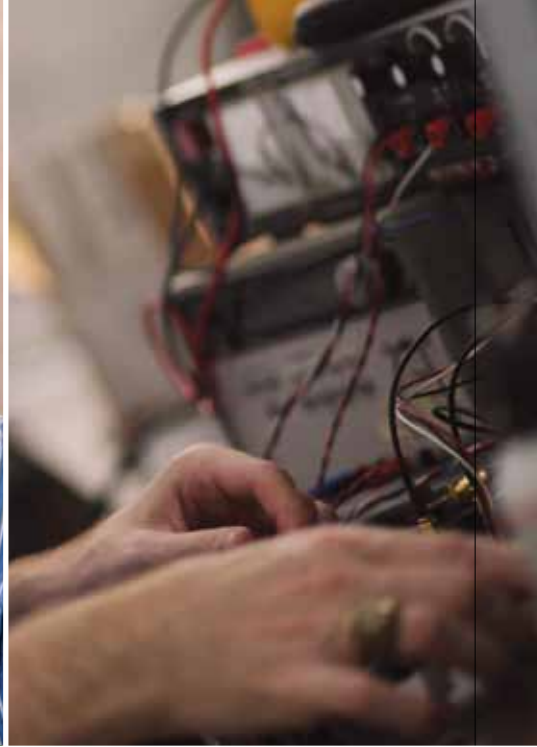
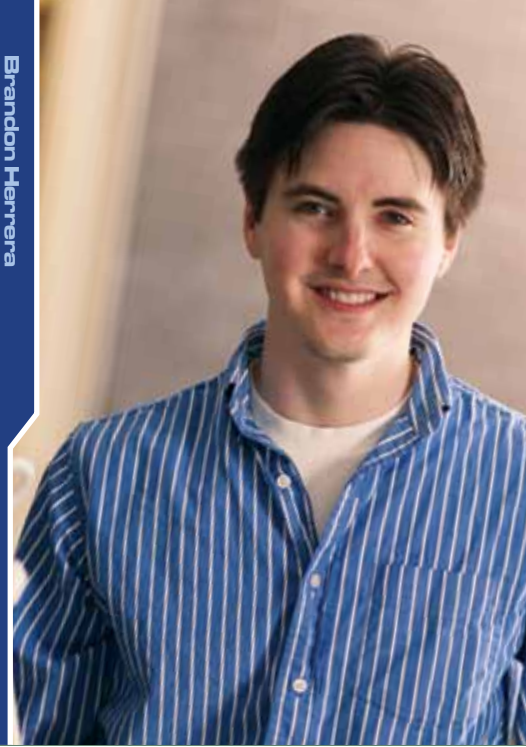
Ewert is a product of Baylor's computer science master's program and has joined the electrical and computer engineering PhD program, where his research is housed. "Both of the fields have a somewhat wide area of subfields in them, and they touch somewhere in the middle," says Ewert. "That's where I work."

INAUGURAL YEAR FOR ELECTRICAL
AND COMPUTER ENGINEERING PROGRAM

by Dana Wallace



Brandon Herrera



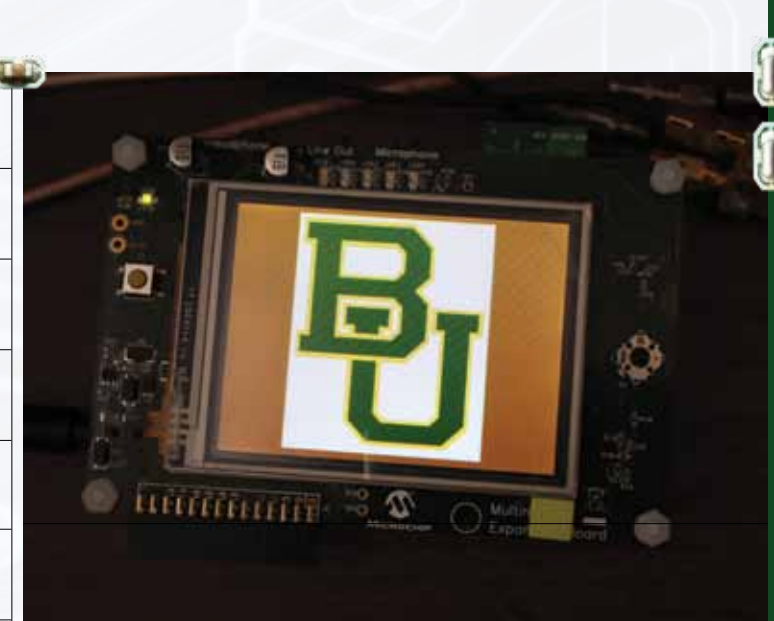
Expect a future filled with “new opportunities to grow those faith and research influences that will provide benefits to Baylor and the world beyond.”

THE FUTURE

The School has seen an increase in demand to enroll larger classes with better prepared students. “We are crossing an enrollment in the 800s on our way to 1,200-1,400 students,” says Kelley, adding that more PhD programs are also on the horizon. Expect a future filled with “new opportunities to grow those faith and research influences that will provide benefits to Baylor and the world beyond.”

With the addition of the most recent PhD program comes more faculty, which in turn adds the possibility of more electives. Thompson predicts that courses for students to specialize in - such as wind energy or power systems - will be added.

Baylor is also strengthening itself as a leading research university. “One of the areas Baylor comes up short when you look at comparing research schools is funded research,” says



Thompson, who believes that more and more external money from both government and industry will soon follow. “By increasing the emphasis on a fundable area, you naturally draw more research dollars toward Baylor.”

A high expectation has been set. “Baylor is investing a lot, so we’re going to try to perform,” says Herrera. “There is a large responsibility as Baylor moves toward ... a higher level of research in the sciences.”

The nature of work that’s never been done before is challenging. “You don’t know how you’re going to get the job done that day ... and so you keep trying. It’s creativity and ingenuity and a lot of luck and trial and error,” says Herrera, eagerly looking to the future of what his research in engineering at Baylor holds. “This stuff is hard, and we can accomplish it here.”

The interdisciplinary nature of his research makes him a great fit for the PhD program.

His work is theoretical; there will be no product that is born as a result. “It’s something that’s going on behind the scenes in many products you would be using,” says Ewert, who believes that being part of the inaugural class works in his favor by offering more flexibility with the program.

Also taking part in interdisciplinary work is Dr. David Jack, Assistant Professor of Mechanical Engineering. Jack has several areas of research that focus on carbon nanotube thin film conductivity. “The Air Force conceives of using this type of material for lightning strike protection for military aircraft,” says Jack.

Most aerospace applications with composite structures rely on a polymeric matrix, something that acts as an electrical insulator. The catch is that it burns or melts if struck by lightning. To solve that problem, copper mesh is typically placed around an aircraft. The drawback: It weighs a lot and is visible on radar.

“The nature of research is you don’t really know where you’re going.”

That’s where Jack’s work comes in. He’s searching for a lightweight material that can handle the electrical current and has been chipping away at the problem a little at a time. “The nature of research is you don’t really know where you’re going,” says Jack.

The mechanical side of his work focuses on the structural and thermal modeling of composite materials. Jack believes that having a doctoral program in electrical and computer engineering will greatly enhance the understanding of the electrical component of his research. “I can have [mechanical engineering] graduate students enter the PhD program,” Jack says, excited about the prospect for additional programs. It demonstrates to the world, “Hey, look out. We’re Baylor.”

OPPORTUNITY TO PARTNER WITH INDUSTRY

Baylor has joined forces with several area government bodies and organizations and will soon open the Central Texas Technology and Research Park at the former General Tire facility in Waco. The Baylor Research and Innovation Collaborative (BRIC) will be the first tenant located in the facility and provides graduate research space for the School of Engineering and Computer Science. In total, the facility has more than 300,000 square feet of space, with the ultimate goal of research and industry being located under the same roof.

“That’s the big idea,” says Herrera. “You have master’s or PhD students and through their work, they’ll invent something or have new technology. If it’s really good, you could just spin off a company right there.”

According to Thompson, with the research taking place through the BRIC, it will be easier to convince commercial tenants to locate there as well. “The BRIC should be able to help bring some ideas that the university can generate and transfer those into commercial products that help the economy in Texas,” says Thompson.

“Innovation doesn’t happen by accident,” adds Dean Kelley of Baylor’s increasing role in technological progress. “Creating an environment where students and faculty have the resources they need to pursue meaningful new engineering and computing advances is leading toward ever-increasing important technological innovations.”



Winston Ewert



Dr. David Jack

A young woman with long brown hair, wearing a black and white striped short-sleeved shirt and green pants, is sitting on a wooden chair and smiling.

Julie Moczygemba

Surviving and *Thriving* in a Male-Dominated Field

"I WAS ALWAYS THE ONLY GIRL IN MECHANICAL ENGINEERING, and I would encourage girls who are in that position now to realize that when other students see a woman in a male dominated world, they tend to have much respect for you. There's no need to feel intimidated. You have different strengths because you are a woman."

These are the words of Yasaman Shirazi, who graduated from Baylor in 2008 with a Bachelors of Science in mechanical engineering and a minor in biomechanics. While some may shy away from accepting the challenge of pursuing a degree in a male dominated field, she finds that women provide a perspective that is incredibly helpful - and needed - in this burgeoning field.


"I think as women, we sometimes pay more attention to detail and are free to be more artistic," she said.

Shirazi is currently working on her doctorate in orthopedic biomechanics at Texas A&M and, like many other women who have chosen this exciting path, encourages young women to pursue their dreams.

Students who choose a rigorous major in the School of Engineering and Computer Science (ECS) will face challenges but some young women entering the field face a challenge because of their gender alone. While Baylor University's population is over 50 percent female, the ECS program is predominantly male - with only 18 percent female students. The trend translates to Baylor's ECS instructors, as only 10 percent of the faculty are female, and the workforce where about 10 percent of employed engineers are female.

A woman with short brown hair and glasses, wearing a red top and a white cardigan, is sitting and smiling.

Dr. Carolyn Skurla

A woman with long brown hair, wearing a white short-sleeved top, is standing with her arms crossed and smiling.

Kathryn Brune

Women in the ECS

by Franci Rogers

"It's true that there are simply fewer women in the program, but the ones who are here have been very successful," said Senior Lecturer in Computer Science and Assistant Dean of Engineering and Computer Science Cindy Fry. "As with any student, once they find confidence and determination, they tend to do very well."

One of those determined students is Kathryn Brune, a junior from Sugarland, Texas who is working on her major in mechanical engineering and minor in math.

"I love it here. Everything I've been involved in, I've been welcomed with open arms," she said.

Brune came to Baylor first to Line Camp, and was undecided about her major, and described herself as shy.

Now, she's a Community Leader in the ECS Living and Learning Center and has been a Line Camp leader in the ECS section where she has been able to be a role model for young women just entering the program. She can tell them first-hand about sometimes being the only woman in the classroom.

"My advice is that you can't focus on that, because then other people will," Brune said. "It's unnecessary and unimportant. I really

don't notice it as much. Sometimes the boys notice it and comment that I'm the only girl in the class. That's usually the first I notice!"

After a summer internship at an engineering firm with all male engineers, Brune realizes that after graduation she will likely face the same gender ratio in the workplace.

"There will be people in my life who will test me," she said. "But that's ok. I'm confident in what I know."

Senior Electrical and Computer Engineering major Julie Moczygamba, from Plano, Texas, has also oftentimes been the only woman in a classroom full of men.

"In my graduating class, there is only one other girl in ECE," she said. "But it's always worked out ok. When I was younger, I think guys sometimes wondered if I could keep up. But I learned that I knew what I was doing. And it's fun when you can outsmart them. Sometimes I think they don't expect it."

Moczygamba has noticed that she does approach projects from a slightly different way than her male counterparts.

"As a woman in this field, one thing that is different is group projects," she said. "I find myself always being the one organizer. I'm the one who sets the schedules and the deadlines. It's always appreciated by the other people in the group, but I'm always the one. And I think it's the same for a lot of other women. We just naturally want to create structure and organization, and so it falls to us."

As a freshman engineering student (leaning towards mechanical engineering, but still undecided), Dana Reed has started to feel some of the pressure of being in a field that is male-dominated.

Originally from Hayward, Calif., Reed became interested in engineering after her sophomore year in high school, when she did an internship with a civil engineer who happened to be a woman.

"She was a great example, and the whole experience gave me a lot of resources," Reed said.

Another place Reed finds resources is right in her own dormitory. Reed is part of the North Village Residential Community and highly recommends the experience to incoming students in the field.

Baylor has several Living Learning Centers of this type, which are residential communities organized by academic discipline or program. Students not only live with other students who are studying the same subjects, but also with resident faculty members and their families.

The ECS-LLC, which was Baylor's first living-learning center, is

located in the North Village. The community started in 2004 with 40 students and has grown to more than 270 students. Assistant Dean Cindy Fry is the faculty-in-residence, and lives there with her family.

"I like the idea of community, and knowing the people I'm living with are engineers too, and going through the same things as me," said Reed.

Because she has no female professors right now, she appreciates the guidance of the upperclassmen in her dorm.

"I know I can always go to Kathryn [Brune] if I'm having any kind of an issue, even in a class," Reed said.

Diana Joseph had a similar experience during her time at Baylor, living in the LLC.

"Being in the LLC gave us an opportunity to see someone who really is doing it all," Joseph said. "A lot of us dream of being mothers and wives, as well as engineers, and I actually got to see Cindy Fry pull that off, seemingly flawlessly."

Joseph is now in graduate school at Cornell University, studying biomedical engineering. She graduated from Baylor in May 2010.

Her first experience with a female professor was her first engineering professor at Baylor, Dr. Carolyn Skurla, associate professor of mechanical engineering.

"She was a tough professor, but I learned so much from her. Her class showed me that a woman really can succeed in what looks, from the outside, like a man's world."

During her time at Baylor, Joseph founded Delta Leaders, a program that matches incoming freshmen with upperclassmen of the same gender and in the same field. The upperclassmen contact the freshmen even before they set foot on campus, and meet with them regularly once the school year starts.

That kind of mentoring is also what Baylor's chapter of Society for Women Engineers brings to students.

"Not everyone can be a part of the LLC, and really this organization has the same objectives," said Fry. "There are going to be times when they hit bumps, and it's good to know there are other women who have the same or similar problems. They find out they don't have to do it by themselves. And the cool part for me is that I get to watch them be mentored by their peers, go through all of it, and come out on the other side."



Assistant Dean Cindy Fry

"There will be people in my life who will test me, but that's ok. I'm confident in what I know."





Charles Baylis

by Franci Rogers

Seeing a project from inception to completion is something that appeals to Charles Baylis. And it's one of the things that attracted him to Baylor.

"I LIKE TO BUILD THINGS," said Baylis, assistant professor of electrical and computer engineering at the School of Engineering and Computer Science, about his becoming a Baylor faculty member. "Knowing the PhD program was on the horizon was appealing to me."

When he came to Baylor from the University of South Florida in 2008, the new doctoral program was still in its developmental stages. Baylor's Board of Regents formally approved the research-oriented program last February, and Baylis and his colleagues now have the building blocks they need to begin the program.

Additionally, Baylis's mission includes teaching students, from the undergraduate levels through the PhD program, to better understand his area of expertise: wireless and microwave.

"It's an exciting research area as a whole, because these are relatively new applications we're talking about," he says. "Think of everything that is wireless: cell phones, Bluetooth, radar systems. It touches almost everything and everyone."

One of the research areas Baylis is focusing on is the joint optimization of circuit and waveforms for radar and

communication transmitter power amplifiers. Because regulatory constraints on the frequency spectrum worldwide are becoming tighter, it is necessary to reduce the spectral spreading that occurs due to nonlinearities in the amplifiers and waveform issues. In addition, the amplifier must be operated with as high power efficiency as possible. While the circuit and waveform optimization problems have been considered separately, this research considers joint optimization to find the best solution.

It's an exciting research area as a whole, because these are relatively new applications we're talking about.

To that end, Baylis and his team are presently working on the characterization of amplifiers as nonlinear time-invariant periodicity preservation (TIPT) systems to connect the waveform and circuit characteristics. The desired end result of this work is development of the radio frequency (RF) technology necessary for applications such as cognitive radar and dynamic spectrum access, where transmitters must reconfigure in real-time to use various available bands of spectrum.

"The military, for example, is running out of space [on the spectrum] to run radar," he said. "So we are working on, and the FCC [which regulates use of the spectrum] is considering using, dynamic spectrum access. That would essentially divide pieces of the spectrum, and if you're not using your piece, someone else can use a part of it."

With that change in the use of the spectrum comes technical challenges.

"Now we need to have circuits that can change themselves and adapt," he says. "We would change the spectrum in real time. It's an exciting way to think about solving the problem."

Baylis is also excited about the way these real-life problems can benefit his students, while helping the industry.

"Our programs, both educational and research, are industry-advised," he said. "We work closely with 10 to 13 institutions, both governmental and private industry, through their participation on The Wireless and Microwave Circuits and Systems Advisory Board."

This, Baylis says, benefits not only the students who will be learning cutting edge information, but the industry has a supply of well-informed, up-to-date potential employees after graduation.

This interchange between industry, research and teaching is what Baylis considers the perfect blend for himself.

"God opened a door for me here at Baylor. The thing that attracted me to being a faculty member is all of the above," he said. "I love doing research and could have gone to work as a researcher in industry, but I wouldn't have that interaction with students. I love that moment when the light bulb comes on for them. Here I have both. That's the uniqueness of a university setting. I love what I do here."

Wireless and Microwave Circuits and Systems Program

The Wireless and Microwave Circuits and Systems (WMCS) program was launched in 2008 by Drs. Charles Baylis and Randall Jean, along with several collaborating faculty. WMCS is an industry-advised education and research program targeting the important areas of wireless and microwave technology.

The Wireless and Microwave Circuits and Systems Advisory Board was formed in 2009, consists of representatives from industry, academia and government, and advises the WMCS program in the areas of education/curriculum, research and outreach/development.

Representatives on the board include a number of leaders in the industry including Agilent Technologies—a Corporate Partner through a significant in-kind equipment donation to establish the WMCS Teaching Laboratory; Anritsu, Applied Wave Research; the Naval Research Laboratory; Texas Instruments; National Instruments; the University of Texas at Dallas; Alcon Laboratories; SMSC; TriQuint; Raytheon; WaveAngle; Robots-4-U; and TEM Consulting.

As part of the overall program, The Mini-Symposium on Wireless and Microwave Circuits and Systems is held annually in conjunction with the WMCS Advisory Board Meeting. This event serves to bring together students from several universities with practicing engineers in the wireless and microwave industry. It features technical presentations from industry members, a student research poster session and an industry panel session during dinner allowing for question-and-answer as well as discussion.

This event has quickly developed into a statewide student-industry interaction opportunity and includes participation from Baylor University, The University of Texas at Dallas, The University of North Texas, The University of Houston and The University of Texas at Arlington. Additional collaboration with other institutions of higher learning is on the horizon and will provide additional opportunities that will be beneficial to the industry, academia and student development.

WMCS is currently developing new partner – both corporate and individual – relationships to assist with operating expenses for fiscal year 2011-12. These funds will play a crucial role in attracting interest in the program by providing for equipment and conference travel needs.

For further information, contact Charles_Baylis@baylor.edu or (254) 710-4306.

Baylor School of Engineering and Computer Science, UMHB Sign Agreement



BAYLOR UNIVERSITY'S SCHOOL OF ENGINEERING AND COMPUTER SCIENCE and the University of Mary Hardin-Baylor in Belton have signed an articulation agreement that allows students to start their engineering studies at UMHB and transfer to Baylor after three years.

Called the Young Engineering Students (YES) program, the agreement will offer students, who have completed three years of engineering classes at UMHB and have an interest in engineering, the opportunity to transfer to Baylor. Once at Baylor, students will spend about two years finishing their degree requirements. When the student completes the program, they will earn two degrees: a bachelor of science degree in engineering science from UMHB and an accredited bachelor of science in engineering degree from Baylor. Students may choose to pursue a bachelor of science in general engineering, mechanical engineering, or electrical and computer engineering.

"We've been interested in starting a pre-engineering program at UMHB for a number of years," said Dr. Bill Tanner, chair of the department of computer science and engineering at UMHB. "There is a shortage of engineers in Texas and this program will help address that need. The affiliation between the two schools makes for an attractive recruiting point, because

students know they will get a personalized undergraduate experience at UMHB and the chance to complete their degrees at a nationally recognized engineering school at Baylor."

At UMHB, students will take basic courses, such as English, history and religion, as well as prerequisite courses in mathematics, science, computer science and engineering. Students also will be expected to maintain a strong grade point average to qualify for admission to the engineering program at Baylor.

Administrators at Baylor's School of Engineering, which was ranked 11th in the nation by *U.S. News & World Report*, said the entire program will take about five years to complete. Currently, there are about 30 students signed up for the program.

Baylor Engineering Partner Named a 2010 CNN Top Ten Hero

Harmon Parker, an engineer who has worked closely with Baylor University's School of Engineering and Computer Science to build pedestrian bridges in Africa has been named a CNN Top Ten Hero for 2010.

In 2006, Parker and a team of Baylor engineering students partnered to build a 130-foot-long pedestrian bridge over a river that divides a community in West Pokot, Kenya, for most of the year. The bridge saved the villagers more than 2.4 million

miles of walking as they traveled to the market, schools and medical care. At the dedication of the bridge, Parker was able to share in Swahili that the bridge was a gift from God, and that the team was just God's means to bring it to them. Dr. Walter Bradley, Distinguished Professor of Mechanical Engineering at Baylor, led the Baylor engineering team to the successful completion of the project while in Kenya.

"Harmon is a hero not just because he does wonderful things to serve the poor but because he takes significant personal risks in this service and has on many occasions had to pay a significant price for his service," Bradley said.

As a Christian developmental worker in Africa over the last 20 years, Parker's most notable contribution came when he saw the dangerous river crossings they make on a daily basis to attend schools, markets, health clinics and to visit family in other villages. As the demand for more bridges grew, he created "Bridging the Gap" in 2003 to construct footbridges that keep these people out of treacherous waters. Over the past 13 years, he has built more than 45 footbridges in Kenya.

Baylor Accepted into Largest Particle Physics Research Laboratory in the World

As the world's most powerful subatomic particle collider gathers data, Baylor University scientists will now be there to analyze the information.

Baylor has been accepted into the Compact Muon Solenoid (CMS) experiment at the European Organization for Nuclear Research, known as CERN, near Geneva, Switzerland.

CERN is the world's premiere particle physics laboratory and houses the Large Hadron Collider, which is the largest, most complex and powerful particle accelerator ever built. CERN has gained recent



(Photo) European Organization for Nuclear Research near Geneva, Switzerland

notoriety in its search for the Higgs Boson, a particle predicted to exist that could explain how the universe came to be, how it functions and the origin of mass.

"This is very important to us because it is going to be a long-term research project," said Dr. Jay Dittmann, associate professor of physics at Baylor, College of Arts and Sciences, who helped present the proposal. "Joining the CMS Collaboration at CERN is the future of our high-energy physics research program here at Baylor. We expect the CMS experiment to run well into the next decade."

In addition to searching for the Higgs Boson, the CMS experiment seeks to understand what dark matter is, exactly, and how the universe came to be. Baylor researchers and their graduate students will mainly be involved in data analysis, but will also conduct data monitoring. While Baylor researchers and students will, at times, travel to Switzerland to conduct research, a significant part of the work will be done remotely here at Baylor.

Baylor Study Finds Bones Degrade and Fracture Differently Under Certain Environmental Conditions

A new Baylor University study looking at the different fracture properties of bones at various stages of degradation has found that bones degrade and fracture differently under certain environmental conditions like sun, shade or in water. The Baylor study also found that some postmortem fractures look like they occurred perimortem - at or near the time of death - under some specific environmental conditions.

Led by Dr. Lori Baker, associate professor of anthropology, archeology and forensic science at Baylor who helped lead the study, the results were as follows:

- The rate at which the bones degrade greatly varies depending under which environmental condition they are exposed.
- The biggest degradation change to the fracture properties of the bones happened in the first two weeks since death regardless of environmental condition.
- Forensic anthropologists know that if a bone break occurs postmortem, there will not be any fracture lines. If there are fracture lines, the break occurred perimortem. However, the study found that at four weeks, if the bones were left in the sun or shade, the breaks had fracture lines. This conclusion shows that even though the researchers knew the break happened postmortem, it appeared to have occurred perimortem.
- The bones would fracture into a few large pieces up to four weeks. After four weeks, the bones would break into many, much smaller pieces.

Baylor Ranked 15th Among 'Tech's Most Powerful Colleges'

Which schools do the best job crafting technology leaders?

In answering that question, Stanford and MIT probably spring to mind; maybe you think of Duke or Cal-Davis. Do you include Baylor in your list? You should.

Thomas E. Weber, former bureau chief and columnist at the *Wall Street Journal*, tackled that same question recently in a feature for *The Daily Beast*, a news site led by former editors from *The New Yorker* and the *Wall Street Journal*. Sure, he included the usual suspects (Stanford was No. 2, MIT No. 5, Duke No. 6 and Cal-Davis No. 17). Right there in the mix? Baylor University, at No. 15 - ahead of prominent names like Pitt (No. 18), Rutgers (No. 19) and even the University of Texas (No. 20).

Rounding up Baylor Research Efforts

While it will still be quite some time before the Baylor Research and Innovation Collaborative (BRIC) is up and running, that doesn't mean the university is sitting around just waiting for that day to begin research efforts. To the contrary - there are more research projects going on than we can keep up with. Here are just a few recently announced studies:

- Chemistry and biochemistry professors Dr. Kevin Pinney and Dr. Mary Lynn Trawick received a \$200,000 grant from the Cancer Prevention and Research Institute of Texas to study a series of potential anticancer compounds that have recently emerged from Baylor's on-going cancer research program.
- Using a new search method he adapted for use on the seafloor, geology professor Dr. John Dunbar and his research team found a potentially massive new source of hydrocarbon energy called methane hydrate, a frozen form of natural gas, in a portion of the Gulf of Mexico. The U.S. Department of Energy has awarded Dunbar more than \$115,000 to continue researching the site.
- A Baylor study led by biology professor Dr. Ryan King and funded by the Environmental Protection Agency found that concentrations of phosphorus above 20 parts per billion (ppb) are linked to declines in water quality and aquatic plant and animal life, demonstrating with certainty that too much phosphorus does indeed cause problems for many Texas streams.

AROUND THE LAB

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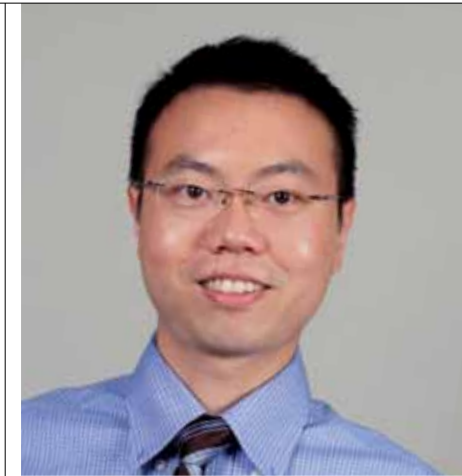
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Dr. Deify Law
Assistant Professor,
Mechanical Engineering

Dr. Deify Law received his BS and MS degrees in mechanical engineering from Iowa State University (ISU) in 2003 and 2005, respectively, and his PhD degree from Virginia Polytechnic Institute and State University (Virginia Tech) in 2010.

His doctoral research focused on utilizing the computational fluid dynamics

(CFD) approach to simulate and model the two-phase gas-liquid flow dynamics inside an airlift reactor. He successfully implemented the bubble closure models into a CFD code and validated them with experiments. In addition, he generated three-dimensional (3D) structured grids with an in-house FORTRAN code to simulate the 3D gas-liquid flows of the complex geometry of the airlift reactor using the same CFD code and validated them with experiments.

He joined the faculty of Baylor University in August 2010, where he is a thermo-fluids lecturer in the department of mechanical engineering. His teaching interests are in the areas of thermo-fluids and CFD methods for thermo-fluids applications. He is interested in equipping students with thermo-fluids knowledge so as to understand the underlying fluid dynamics phenomena and to meet the energy and fluids-related challenges of the country in the next 50 years.

Prior to joining the faculty at Baylor University, Dr. Law worked for five years as a graduate research assistant and one year as a graduate teaching assistant at both institutions mentioned above. He helped teach a junior-level mechanical design and a senior-level thermo-fluids system design courses, at ISU and Virginia Tech, respectively. He also participated in a number of American Society of Mechanical Engineers (ASME) conferences during his graduate studies.

On the spiritual side, Dr. Law is a firm believer in the Lord Jesus Christ through faith and God's grace for 10 years and counting. He believed in the Lord while he was pursuing his undergraduate studies by attending a college Christian fellowship. He has experience in leading Bible studies as well as assisting a local pastor in serving local and international groups of people. Most importantly, he is excited to work with the great people at Baylor University to help advance Baylor's mission "to educate men and women for worldwide leadership and service by integrating academic excellence and Christian commitment within a caring community."

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Patrick Lea

Assistant Professor,
Mechanical Engineering

Mr. Patrick Lea returned to his alma mater in the fall of 2010 from Longview, Texas, where he worked as an engineer for Eastman Chemical Company and Westlake Chemical Company.

He began his career with Eastman Chemical Company in 1978, after earning his MS in Civil Engineering from Texas Tech

University. Before earning his MS, Mr. Lea graduated from Baylor University in 1974, earning a BS in Biology.

Through Eastman Chemical Company, Mr. Lea held various positions such as civil job engineer, project engineer, project manager, small project team leader and supervising civil engineer.

Between 1997 and 1999, Mr. Lea worked as a Principal Civil Engineer in the Engineering and Construction Division. His major projects include B-51 Polyethylene Applications Lab Expansion, site preparation and rerouting of underground piping for Co-generation Plant, and Cast Film Extruder In Polyethylene Applications Lab.

In 1999, he moved to the Polyethylene Research and Development Division as a Polyethylene Tech Service and Development Engineer.

Westlake Chemical Company purchased the three polyethylene plants at the Longview facility from Eastman in 2006. Because Westlake had no engineering department to support these plants, Mr. Lea was assigned the task of building an engineering department and creating the process for executing capital projects. He worked at Westlake in this capacity for three years before returning to Baylor, where he currently teaches Introduction to Engineering.

Mr. Lea is a professional member of the American Society Of Civil Engineers, Technical Association of the Pulp and Paper Industry, and is a Texas Licensed Professional Engineer.

His research includes topics in the fields of both biomedical and mechanical engineering. He has been part of two publications, co-authoring *Fundamentals of Extrusion Coating PET*, and authoring *Evaluation of the Potential Performance of Hospital Buildings in Windstorms*.

Mr. Lea and his wife, Paula, and two children – Amy Lea Wiles and Jay Lea – are all Baylor graduates. He has two grandchildren and enjoys golf and reading in his spare time.

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ALUMNI UPDATES

1986

Lance McCutchen (BS, Computer Science) wrote "Although my first job coming out of Baylor back in 1986 was writing Fortran 77 code, I moved over into networking six months later, something I've been doing ever since. I've now been the Director of Network Services for the Arlington ISD for the last 10 years, a position I have enjoyed immensely." *Email: 4mac4@sbcbglobal.net*

1995

Justin York (BS, Computer Science) works for Hewlett Packard in Houston. *Email: justin.york@hp.com*

Scott Lee (BS, Computer Science) and his wife, Rachel, welcomed twins, Abigail Page and Madelyn Grace, on Jan 5, 2011. *Email: slee@texlife.com*

2003

John Slack (BSME) attends the Air Force Test Pilot School (TPS). He wrote, "The critical thinking and engineering judgment I learned at Baylor has no doubt helped me achieve my professional goals." *Email: John.Slack@edwards.af.mil*

2005

Steve Maule (BSECE/MSECE) is currently a software engineer at L-3 Communications in Waco. *Email: steve@maule-family.com*

2009

Melanie Hawkins (BSME) works at MEI Technologies, Inc., as a Payload Safety Engineer in the Houston, Texas, area. *Email: mel.hawkins86@gmail.com*

Andrew Montgomery (BSECE) works as an Applications Engineer at National Instruments in Austin, Texas. *Email: ajmontgomery7@gmail.com*

2010

Diana Joseph (BSE) will earn a Master of Engineering in Biomedical Engineering from Cornell University later this year. *Email: drj28@cornell.edu*

Teresa Lopez (BSME) works at ExxonMobil in Houston, TX. *Email: Teresa_Lopez@baylor.edu*

Gilbert Narvaez III (BSME/MSME) is a Product Validation Engineer at Cummins, Inc, in Indianapolis, IN. *Email: gilberto.narvaez@cummins.com*

Sam Strickling (BSME) now works at National Instruments in Austin, TX. *Email: Sam_Strickling@baylor.edu*

Please stay in touch.

If you would like to let alumni and friends of the School of Engineering and Computer Science know about recent events in your life, please contact us:

One Bear Place #97356
Waco, TX 76798-7356
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Dr. Ian Gravagne, associate professor of electrical and computer engineering in the School of Engineering and Computer Science, is the Faculty-in-Residence for the Engineering and Computer Science Living-Learning Center (ECS-LLC). He earned a B.S. degree in electrical engineering from Rice University and went on to complete a M.S. degree and receive his Ph.D. in electrical engineering from Clemson University. He and his wife Ann have three children - Gina, Lydia, and Ray. Dr. Gravagne has also served as the director of the Engaged Learning Group program since 2009.

