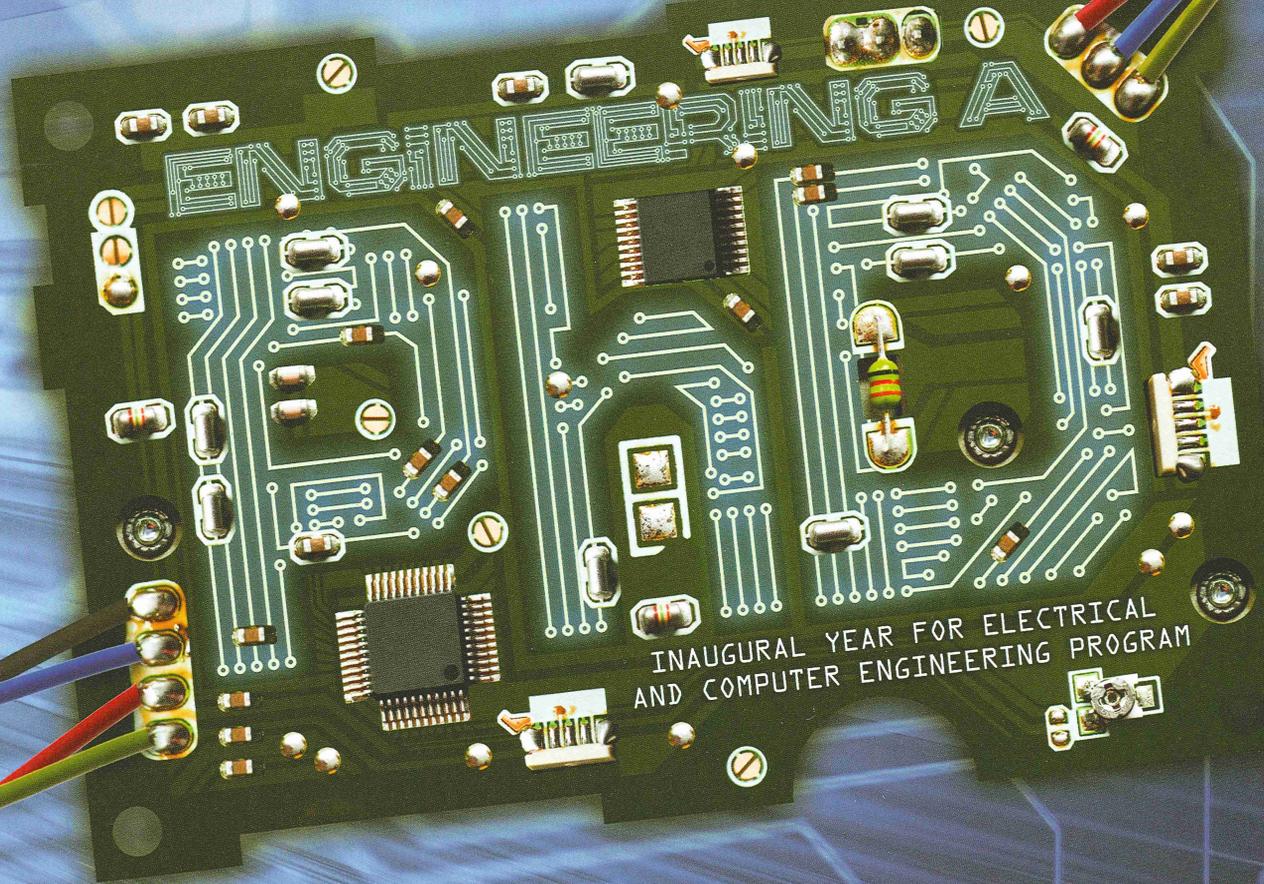


BAYLOR UNIVERSITY SCHOOL OF ENGINEERING & COMPUTER SCIENCE

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INAUGURAL YEAR FOR ELECTRICAL
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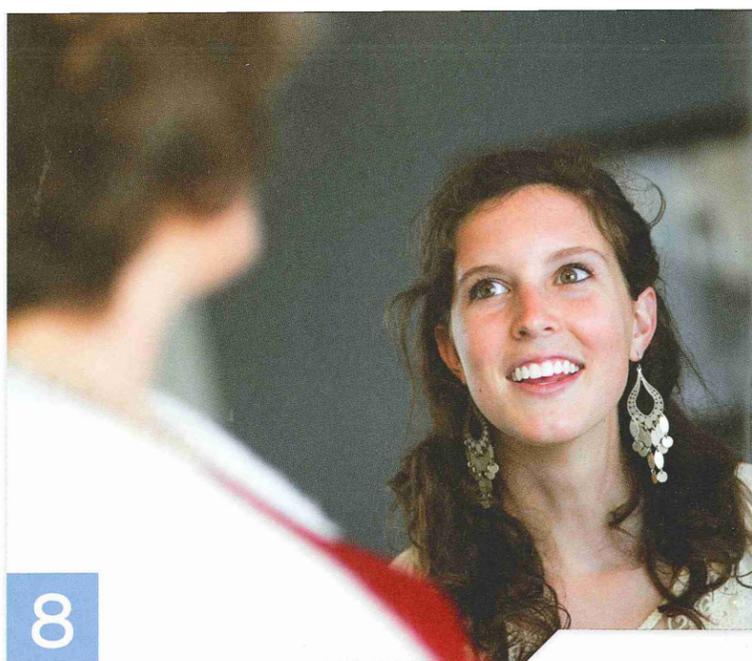
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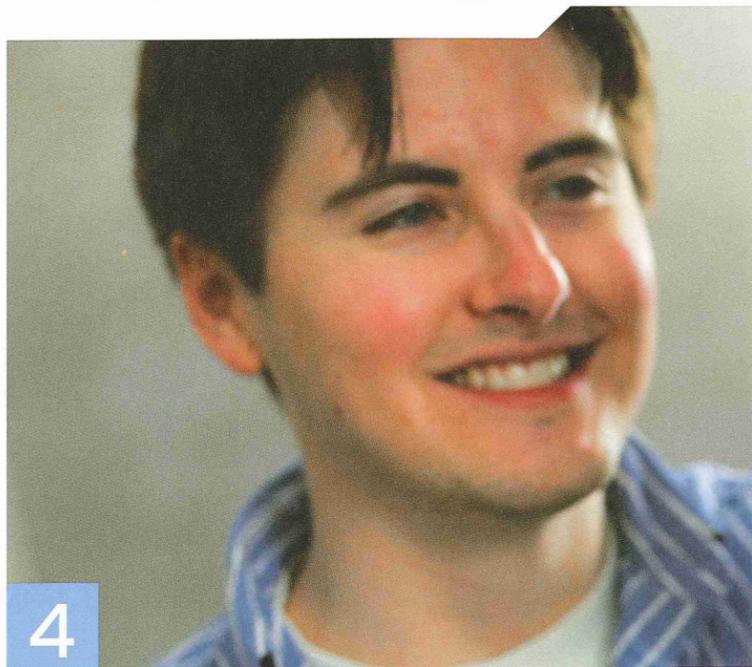
Synergy is a publication of the Baylor University School of Engineering & Computer Science that establishes a communication link to keep alumni and friends aware of the spirit of discovery at the School. Established in 1995 from programs dating to 1974, the School of Engineering & Computer Science has 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.



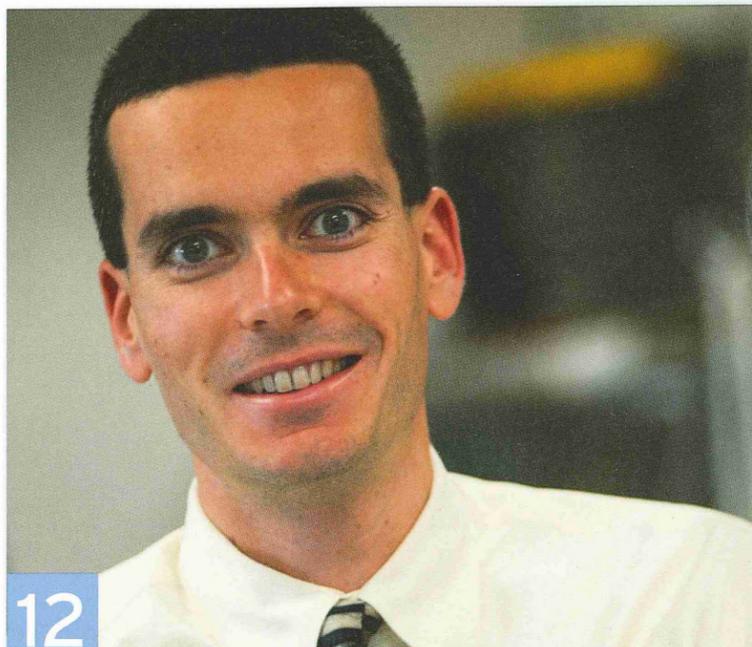
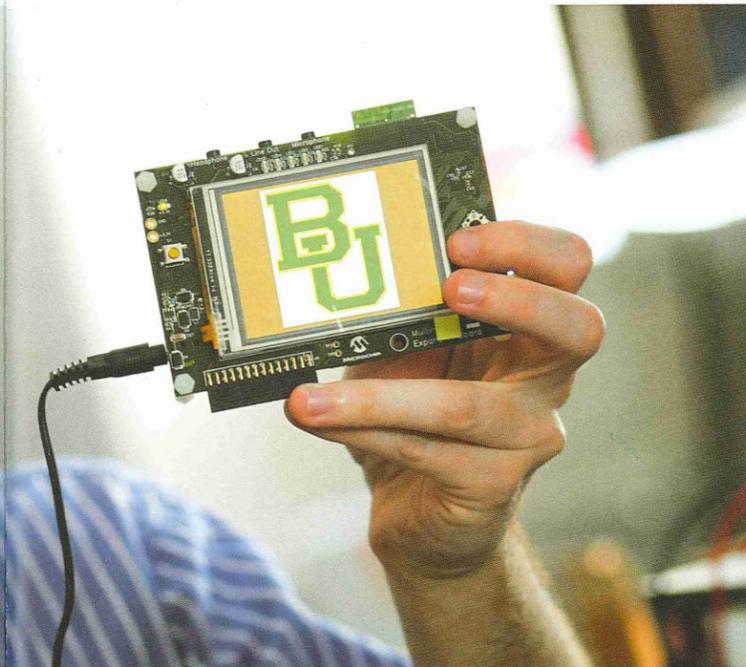
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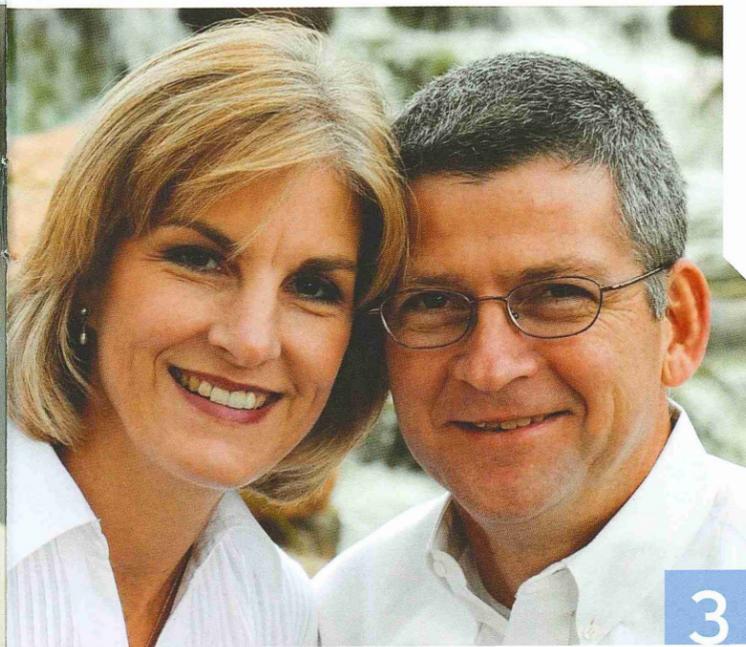
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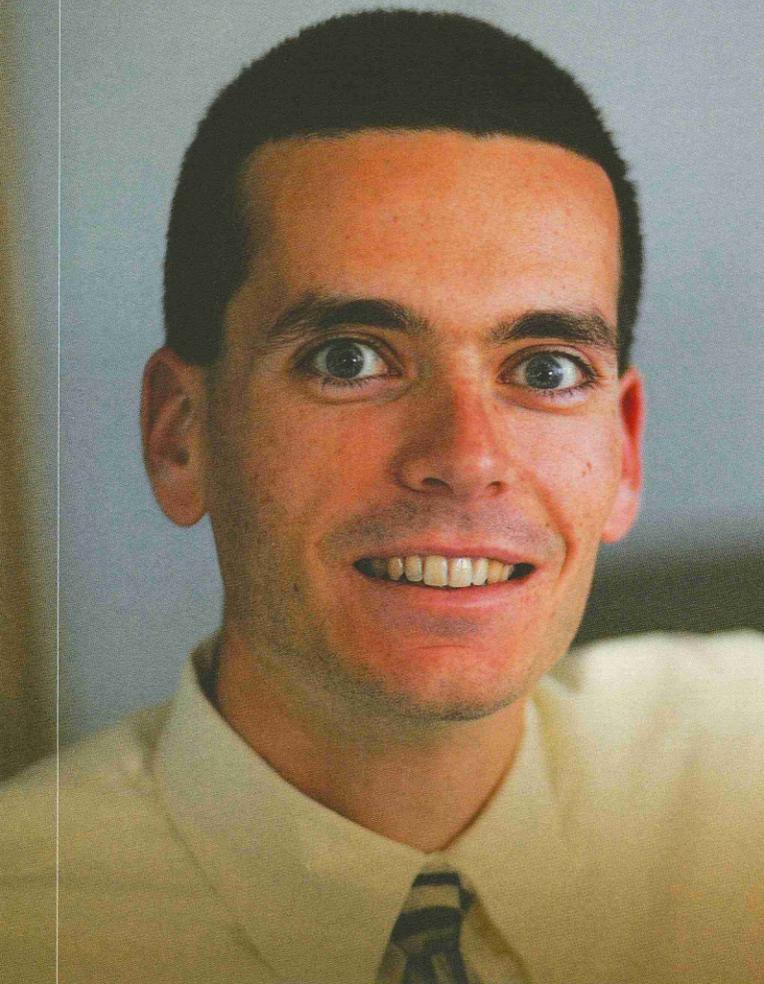
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Charles Baylis

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 (TIPP) 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 includes 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.

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