Nine New Masters Take Up Careers Coast-to-Coast

From Minneapolis to El Segundo, Boston to Bangalore, and Baltimore to Columbus, nine students who recently received their Master's Degrees are off to new careers in leading high-tech companies or advanced academic work.

Current PhD candidates at Ohio State are Ulku Baysal (BS, Middle East Technical University, Ankara, Turkey) and Wei Hu (BS, Zhejiang University, China). Ulku's thesis was entitled "On the Design of Wideband Arrays," and Wei's thesis was "Blind Equalization and Identification for Differential Space-Time Coded Communications."

Chengjin Zhang (BE, Nanchang University, China), who is continuing PhD studies at UC San Diego, entitled his thesis, "Near-field Scattering Center Height Estimation in Ultra-Wide Band Synthetic Aperture Radar."

Bijoy Bhukania (B.Tech., IIT, Kharagpur, India) defended his thesis, "Detection of Differential Unitary Space-Time Modulation in Fast Rayleigh Fading Channels." Bijoy is now with Texas Instruments, R&D Center, Bangalore, India.

Tansu Demirbilek (BS, Middle East Technical University, Ankara, Turkey) has joined Mercury Computer Systems, Chelmsford MA. His thesis is "Three Dimensional Estimation of Scattering Centers from Magnitude Radar Images."

Oguz Demirci (BS, Bilkent University, Ankara, Turkey) defended his thesis "Feature Extraction from Polarized Synthetic Aperture Radar Imagery."

Life After Graduate School: Miller on Ground Floor in UWB Product Design

Tim Miller (PhD '99, MS '94), one of the first five employees hired at the startup of XtremeSpectrum, is now—three and a half years later—Vice President, Systems Engineering.

XtremeSpectrum is now the leading provider of ultra-wideband semiconductor solutions. The firm was recently acclaimed one of the top 20 "hottest" young communications companies in the market.

A native of Cincinnati, Ohio, Miller, 33, made his first contact with XtremeSpectrum as a student intern assisting in research at the Army Research Laboratory (ARL), Adelphi, Maryland. Miller's research work contributed to improvements in target detection for foliage penetrating radar, and to his own dissertation.

At ARL, Tim met Martin Rofheart and John McCorkle, now the top officers of XtremeSpectrum which was founded in November, 1998. Rofheart, president and co-founder of XtremeSpectrum, was then a contractor with ARL, and McCorkle, who is now
Chief Technological Officer of the firm, was then a federal government employee engaged in research for the U.S. Army.

As the key systems officer at XtremeSpectrum, Tim was responsible for development of the physical layer architecture and algorithms for the ultra-wideband (UWB) transceiver chipset known as Trinity. Introduced July 2002, Trinity is the fastest commercial wireless solution on the market today. It sends and receives digital streams of audio and video in “wire-like” performance quality at 100 megabits per second data rates while consuming less than 200 milliwatts of power. The chipset is hailed by industry observers as ideal for digital displays, camcorders, DVD players, digital video recorders, digital cameras and other multimedia-centric products.

In recognition of the Trinity chipset, XtremeSpectrum recently was awarded a Comet Award by Communications Design and EE Times newspaper at the Communications Design Conference in San Jose, California. The award honors companies demonstrating “vision, focus, innovative technology and risk-taking skills” needed to become significant players in the communications market.

Patrick Minion, editor-in-chief of Communications Design, called Trinity a “practical, real-world implementation of UWB for home audio/video distribution” which had “leapfrogged the competition.” Communications Design is a technical magazine for engineers and managers designing communications product, systems and equipment.

With its XS1100 four-chip Trinity, XtremeSpectrum is leading the charge to UWB, EE Times, a professional periodical, reported in September. Trinity is based on the company's bi-phased-modulated UWB technology with an integrated, direct-driven antenna. Consumer products using the XtremeSpectrum UWB technology are expected to be introduced this fall, industry sources report. Other manufacturers plan to introduce UWB products in 2003 and 2004.

Rebutting radiation control problems associated with a direct-driven antenna, XtremeSpectrum's Rofheart explains that "the antenna is not the primary mechanism for shaping the spectrum, though it is involved. The transmit signal is then coupled into an antenna whose frequency response is matched to it."

UWB research is rooted in the 1960s when in-depth study of electromagnetic impulses first became practical. "UWB" was coined in 1989 by the Department of Defense during development of radar, location and communication applications.

"It is very rewarding to bring life to the chips we have designed," Miller observed, recalling his early involvement in development of the Trinity prototype, "(because) building the prototype gives the designers lots of ideas for the next generation chipset." The Trinity prototype, "Moore's Law radio," scales performance in direct proportion to advances in semiconductor process technology without any need for enhancing the basic system architecture.

Miller is currently engaged in development of the Wireless Evaluation Kit (WEK), a radio transceiver set for customers to use in evaluating XtremeSpectrum's physical layer. Another project involves architecture design of the next physical layer chipset which will be the first UWB chipset distributed to customers for integration into products. XtremeSpectrum focuses on a customer base of PC-peripheral manufacturers, consumer electronic companies, and wireless networking firms.

Tim embarked on his educational trek in electrical engineering at the University of Cincinnati where he received a bachelor degree in 1992. Attracted to Ohio State University because of its top-notch reputation in electrical engineering, especially in detection and estimation theory, Tim was awarded a research assistantship, and was soon thriving in a graduate school experience which immersed him in "work on a project that involved real data and deliverables to a sponsor."

"Decide what your goals are," Tim urges current EE graduate students, "and shape your academic experience appropriately. If you want to go into industry, then meet with industry contacts and understand what it is like to develop products. Next, shape your academic career to prepare you for what comes next."

As for his own career goals, Tim says he "wants to successfully lead the (XtremeSpectrum) systems group to develop a chip architecture that will dominate in the marketplace."

To help achieve that goal, Miller's profile of a desirable team-worker includes five key values: (1) attention to detail, (2) aggressive pursuit of a goal, (3) a systems view of technology, (4) maturity, and (5) a high level view of the organization and the complex interaction of business and engineering.

Among Tim's coworkers at XtremeSpectrum is fellow Buckeye, G.P. "Jerry" Lynch, M.S '96, who is also a graduate of the Ohio State Information Processing Systems Laboratory. Lynch is Director of Projects. His wife, Molly Ellen, who holds a doctorate in psychology, also is a graduate of Ohio State.

For UWB developers, EE Times foresees a new "race to be first to market a practical, commercially deployable device" in the face of many present technical challenges. UWB must "find a home as a communications alternative, acquire a high-data-rate, low-level signal below the noise floor in presence of multiple users, multipath interference and interference from incumbent wireless devices (and) do it fast, at low cost, with low power and a small footprint."

Tim Miller and the XtremeSpectrum team already have proven with Trinity that they are in the race.

Some industry authorities believe UWB will have a successful future "only if it first targets applications that haven't already been mastered, such as localizing, see-through applications and even very-high data rates over short distances."

Tim Miller and his team already have their eyes on that future.

Editor's note: this is the fifth in a series of IPS alumni profiles.
Eight Join Research

Eight new students joined IPS research projects in Autumn Quarter. Five hold the competitive University Fellowship or multi-year Distinguished Fellowship awarded by the OSU Graduate School.

The new students included three Ohioans. Julie Jackson of Dayton (BS, Wright State University, Dayton) holds the prestigious three-year National Science Foundation pre-doctoral fellowship. Gene Whipps of Columbus (BS, OSU) returns to OSU following an internship at the Army Research Laboratory, Adelphi M.D. Undergraduate student Andrew Mank of Dublin is pursuing honors research that builds on his internship with Jacobs-Sverdrup at Wright Patterson Air Force Base.

Three of the new IPS students have completed the MS degree and are PhD candidates at Ohio State. Mahmoud Ismail (M.S, Cairo University, Giza, Egypt) hails from Cairo, Egypt. Mahmoud is studying multi-user and space-time communication systems with Professor El Gamal. Hong Iris Liu (M.S, Wuhan University, Wuhan, Hubei, China) is studying wireless communications with Professor Schniter. Jonghoon Ryu (M.S, Pusan National University, Korea) was born in Seoul. He is researching coding theory with Professor Takeshita.

Distinguished University Fellow Indu Kalyanaraman (BS University of Madras, Tamil Nadu, India) is from Chennai, Tamil Nadu, India. Her academic interests are in wireless communications. University Fellow Sibasish Das (B. Tech., IIT, Kharagpur, India) is interested in communication theory and signal processing. His hometown is Jamshedpur, India.

Let IPS-o Facto Share Your News, Comments

News or comments to share? Send email to ipsofacto@ee.eng.ohio-state.edu.

Wedding Bells

Guohua Jing married Yu Yao on August 15 at the Yanchun Restaurant in Zhenjiang China.

Wendy Reed married Brian Garber on September 1, 2002 at Saint Gregory of Nyssa Orthodox Church, Columbus.

Brian Rigling, M.S’00, married Maria Stentz on July 20, 2002 at Saint Bartholomew Church in Cincinnati, Ohio.

Jing Sun married Xinning Chen on December 27, 2001 in a private ceremony in Dallas Texas.

Weijun Zhu M.S’01 married Haiyong Xu on April 27, 2002 at Weijun’s home in Qidong, China.

New Additions

Sage Manu Sabharwal, a boy, born June 27, 2002 to Ashutosh Sabharwal, PhD ’99, and Dr. Yafen Sabharwal in Houston, Texas. Weight: 7 lbs., 9 oz. Length: 19 in.

Selin Ertin, a girl, born July 8, 2002 to Emre Ertin, PhD ’99, and Professor Julide Yazar in Columbus, Ohio. Weight: 7 lbs. 9 oz. Length: 19.5 in.

Audrey Y. Li, a girl, born December 14, 2001 to Shengchao Li, M.S ‘00, and Yuqun Loo in Columbus, Ohio. Weight: 7 lbs. 8 oz. Length: 20 in.

IPS Students Hosted the 2002 Open House for Incoming Graduate Students

From left: Gang Xiong, Adam Margetts, Wendy Garber, Sid D’Silva, Anand Arunachalam, Kambiz Azarian-Yazdi, Smriti Raghunathan, Aditi Kothiyal, Julie Jackson and Gene Whipps
A Family Affair and a Homecoming

A husband-wife team from Ankara, Turkey and a student from Bangkok, Thailand defended PhD dissertations during Spring Quarter, 2002. Their research results provide analysis tools, code constructions and receiver designs for using multiple transmit or receive antennas to enhance the capacity of a wireless communications link.

Emre Aktas, BS Middle East Technical Institute, defended “Channel Estimation and Equalization for Wireless Communications Systems in Frequency Selective Channels.” Co-advised by Urbashi Mitra and Philip Schniter, Emre’s research developed receiver structures for multiple antenna systems using space-time coding with various levels of channel state information; pilot-based, semi-blind and blind techniques were proposed.

Defne Aktas, BS Middle East Technical Institute, presented her dissertation, “Improved Performance Measures for Space-Time Coding with Applications to Code Design,” advised by Michael Fitz. The research developed new analytical tools for characterizing frame or bit error probabilities for space-time code design. In addition, the effect of number of receive antennas on space-time code design was studied, and space-time trellis code constructions were presented for systems with variable number of receive antennas. Dr. Aktas is presently a Post-D octoral Researcher at Ohio State.

Siwaruk Siwamogsatham, BSEE Chulalongkorn University Bangkok, Thailand, defended “Improved Space-Time Codes for Wireless Communications,” advised by Michael Fitz. In addition to simplified performance analysis for diversity schemes in Rayleigh fading channels, the work proposed two new classes of space-time code construction: (1) a concatenated expanded multiple trellis coded modulation construction was proposed; for example, the 4-state QPSK code for two transmit antennas outperforms the pioneering 32-state AT&T design, and (2) provably robust space-time codes were presented for correlated fading. Dr. Siwamogsatham is presently a research fellow at National Electronics and Computer Technology Center (NECTEC), Thailand, working on implementations of wireless LAN/MAN, wireless voice over IP, and wireless security technologies.

Internet access to IPS is available at http://eewww.eng.ohio-state.edu/ips