ECE Faculty Wins Distinguished “Caplenor”

ECE professor, Robert Qiu is the winner of Tennessee Tech University’s 2012 Caplenor Faculty Research Award. Dr. Qiu holds eight patents, has written 150 journal articles and conference papers and 6 book chapters. He has published four books and is currently working on two more. Dr. Qiu is also the recipient of the TTU College of Engineering’s Kinslow Award for 2012 and received the Sigma Xi award in 2003. Dr. Qiu was awarded the 2012 Caplenor Award, not only for his significant contributions to research, but also for the way in which he has strived to involve students in all levels of education, from undergraduate through PhD. Dr. Qiu leads the Wireless Networking System (WNS) Laboratory which is home to seven PhD, one Master’s, two undergaduate students, and two R&D engineers. This large team works on topics such as: device-free localization, cognitive radio networks, cognitive radar, radio tomographic imaging, spectrum sensing, and machine learning.

What makes the WNS Lab unique is the ways in which undergraduate students are integrated into research work. Undergraduate students find themselves immediately assisting the graduate students in their research, as each student’s skills develop they are assigned more complex tasks and given more autonomy. At every stage of their work the undergraduate students are mentored by Dr. Qiu, graduate students, and even the senior undergrads. This mentoring ranges from developing technical skills to advice on applying for graduate school, what courses to select, and help with homework. The idea is to make the transition from undergraduate to graduate research seamless. The only thing that changes for those students, who stay on to do their graduate work, is their academic status.

In one project students work with state-of-the-art facilities to explore algorithms for the tracking of people and objects using radio waves. Technologies of this sort are very useful for surveillance in areas where the need for privacy would make video based solutions unusable. By monitoring the changes in radio signals over time the students have been able to construct images of objects and even track a car moving through a parking lot.

Another project, one of the largest areas of research for the WNS Lab, is Large Scale Cognitive Networking and Sensing. A network testbed of over 80 nodes forms the backbone of this project and serves as an indispensable tool not only for research but also for the instruction of undergraduate students interested in topics like networking and radio frequency engineering.

Probably the flashiest of all the projects underway at the WNS Lab are the mobile cognitive radio platforms. A fixed cognitive radio testbed is good but having mobile nodes can open the doors for even greater research in sensing and networking. So how do you make a cognitive radio mobile? One word: robots. Under the leadership of a talented Master’s student undergrads get the chance to work in the development of a quad-rotor UAV and six-legged robot. From designing and building circuit boards to programming microcontrollers undergraduate students are involved in every level of the development of the UAV and robot. Even the plastic parts making up the bodies of these devices are created in the lab using 3D CAD programs like SolidWorks and a state-of-the-art 3D printing system.

Dr. Qiu’s work not only advances academic research but also creates an environment which enriches undergraduate learning and encourages the pursuit of graduate level studies. The ECE department thanks Dr. Qiu for his hard work and dedication to our students and congratulates him on receiving this award.