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SIUE’s Shaw and Noble Receive Patent for Digital Potentiostat Circuit and System

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Photos: (Left) Brad Noble, associate professor of electrical and computer engineering. (Right) Mike Shaw, professor and chair of the SIUE Department of Chemistry.

Southern Illinois University Edwardsville's Mike Shaw and Brad Noble have received a patent (U.S. Patent Serial No. 13/371,230 issued as patent no. 8845870) for their Digital Potentiostat Circuit and System.

Shaw is a professor and chair of the Department of Chemistry in the College of Arts and Sciences. Noble is an associate professor of electrical and computer engineering in the School of Engineering.

“We designed a ‘no frills’ electrochemical and spectroelectrochemical methodology for teaching environments,” Shaw said. “The circuit was designed to minimize cost, yet still deliver high quality data for a limited range of functions suitable for the teaching lab.”

The basic concepts that can be demonstrated with this device are relevant to studying batteries, fuel cells and solar cells. Shaw and Noble believed that the scarcity of actual electrochemical practice at the freshman and sophomore undergraduate level was likely due to the expense to acquire reliable instrumentation. Potentiostats can range in cost from $6,000-$20,000 and more than 20 would be needed to run undergraduate laboratories.

“The design and patent is the first step,” Shaw said. “Our plan is to commercialize the units, so they can be broadly incorporated into educational settings.”

Their goal is to achieve broad dissemination of units through a commercial partner to reach more undergraduates, high school students and perhaps home-schooled students.

“There are a number of inexpensive potentiostat designs in the literature, but none appear to have been adopted broadly, possibly because construction and calibration are intimidating to the novice,” Shaw said.

Shaw and Noble seriously began designing the potentiostat in 2009 and ran into a variety of hurdles.

“The design is exceedingly tricky because of the small currents which need to be measured, and the small voltages which must be precisely controlled,” Shaw stated. “The technology to accomplish these goals is conveniently available in off-the-shelf precision devices, but such components are exceedingly expensive. Dr. Noble engineered clever solutions to these problems by fully deconstructing the application to its basics and taking advantage of opportunities afforded by a significant redesign where cost-savings is a fundamental consideration.”

Central to SIUE’s exceptional and comprehensive education, the College of Arts and Sciences has 19 departments and 85 areas of study. More than 300 full-time faculty /instructors deliver classes to more than 8,000 undergraduate and graduate students. Faculty help students explore diverse ideas and experiences, while learning to think and live as fulfilled, productive members of the global community. Study

abroad, service-learning, internships, and other experiential learning opportunities better prepare SIUE students not only to succeed in our region's workplaces, but also to become valuable leaders who make important contributions to our communities.

The SIUE School of Engineering offers one of the most comprehensive and affordable engineering programs in the St. Louis region with eight undergraduate degrees, five master's degrees and a cooperative doctoral program, all housed in a state-of-the-art facility. Students learn from expert faculty, perform cutting-edge research, and participate in intercollegiate design competitions. Companies in the metropolitan St. Louis area provide students challenging internships and co-op opportunities, which often turn into permanent employment. All undergraduate programs are accredited by their respective accreditation agencies.