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eUreKa! offers undergraduate students travel support. The purpose of this support is to help students gain experience in showcasing their work at and participating in professional conferences on a national and international scale. Keep in mind that research takes place in many different forms and in all disciplines. The study of social problems, the creation of a piece of fiction or poetry, the study of a scientific theory or a historic period of time, and the solution of engineering and mathematical problems all qualify as research, among many other activities.

Students may apply for travel scholarships to attend national or international professional conferences or competitions. To be eligible, a student must:

• be a full-time undergraduate student at the University of Kentucky
• have a faculty sponsor
• be registered for the conference or competition
• present (i.e., paper, poster, research, performance) and/or participate (orally)

One of the students whose travel was supported during 2006-2007 is highlighted here.

Brazil, South Korea
William Faulkner
Chemical Engineering

“I already know what you are going to do next summer.”
After my mother made this statement, she noticed a long and silent pause on my end of the phone. She then added on with a rhetorical question, “You are going abroad next year aren’t you?” Based on my personality and past experiences, my parents knew I would be up to something mischievous. Here I was in the summer before my junior year of college and I had already completed a Chemical Engineering co-op with Marathon Petroleum in Detroit, Michigan. With already a year of experience in Chemical Engineering under my belt, I had a leg up on most of my competition for jobs when it came time during my senior year. This only meant one thing; I had a free summer to do whatever I wanted to before my senior year of college. Most students would complete another co-op term in order to gain more technical experience but I wanted to do something not many college students have done before. I wanted to gain international experience in the field of Chemical Engineering.

The only goal I had for the summer of 2007 was to go somewhere outside North America, I did not care where. Just like my co-op, I started planning early in order to accomplish my goal. At the beginning of the school year I met with just about anybody and everybody who dealt with international relations in some sort of fashion. I met with people from the Education Abroad Office to Professors in the College of Agriculture about how I could go abroad. I even interviewed for an internship in Georgia (the country not the state) in order to teach local farmers how to farm based on the economy, that is how eager I was to go abroad.

Finally, Ilka Balk from the College of Engineering contacted me about a national organization that helped technical majors find short-term programs and internships abroad. The name of the organization is the International Association for the Exchange of Students for Technical Experience (IAESTE). There was not a student chapter here at UK, therefore one needed to be set up. IAESTE is an exchange program in which students from the United States go abroad for internships and research positions and international student come from abroad to the United States for an internship or research position. This program was exactly what I needed. Through IAESTE I was able to participate in the EMPOWER program through the University of Pittsburgh in Brazil for eleven days as well as complete a research internship in South Korea for two months.

William Faulkner in Korea
BRAZIL — EMPOWER

The main purpose of the EMPOWER program was to investigate renewable energy resources such as hydroelectric, wind, and alternative fuels, by exploring Brazil’s utilization of sustainable and clean power. The Universities represented during the EMPOWER program included students from the University of Pittsburgh, Carnegie Mellon University, University of Illinois, University of Minnesota, University of Wisconsin, Rice University, as well as the University of Kentucky.

While in Brazil, the group visited Rio de Janeiro, Sao Paulo, Campinas, and Foz do Iguacu. During the stay in Brazil multiple company and government sites were visited in order to discuss sustainable and renewable energy with top officials. One of the sites visited was a Caterpillar landfill in which methane gas produced by decomposing municipal waste was used in order to supply power to on-site generators to create electricity for the surrounding communities. Another site visited by my group during the trip was a DuPont sugar mill. Supplied by local farmers, DuPont sequentially broke down the sugarcane to create ethanol to use as a fuel source for automobiles. Also during my stay in Brazil I met with government officials such as the attorney general of the Rio de Janeiro state in order to discuss sustainable engineering. I was lucky and met with the Association of Sugarcane Producers who had met with President Bush and his advisors during their trip in March of 2007.

Not only did I meet with various top government and industry officials in Brazil, but I also experienced Brazil through a diversity of cultural and historical tours. Some of the historical and natural sites visited included Christ the Redeemer, Sugar Loaf Mountain, Itaipu Dam, and Iguacu Falls.

SOUTH KOREA — RESEARCH

“Create whatever type of nanofiber composite you think will be conductive by electrospinning and then get back to me.” This was one of the first instructions Dr. Hong-Sik Byung gave me during my research internship at Keimyung University in Daegu, South Korea. With scarce time to conduct my research, I had to get moving quickly, even though I had minimal training.

My research at Keimyung University consisted of creating and evaluating the electrochemical characteristics of different weight ratios of the composite fiber polyvinylidene fluoride (PVDF)/polypyrrole (PPy) prepared via electrospinning. Electrospinning is a process that creates nanofibers that have a diameter of only a few hundred nanometers. Because electrospinning is a fairly simple and versatile process to create nanofibers, it has received a great deal of attention in the past decade. When a high voltage electrostatic field overcomes the surface tension of the polymer composite solution droplet, a liquid jet of the polymer composite solution is ejected onto the collector. As the liquid jet of the polymer composite solution is ejected from the syringe, the solvent used in the solution is then evaporated by the surrounding air stream. Due to a high surface area-to-length ratio, the electrospinning process can have a major impact on the electrical conductivity of a polymer composite solution.

As the world’s energy consumption continues to grow at the current pace, there will be a need for alternative energy such as wind power. The main problem with wind energy is where to store the energy generated by the wind turbine during low energy consumption hours by consumers. During the low energy consumption hours, the power generated by the wind turbine is typically stored in some sort of battery. The batteries that store this energy do not have a large capacity. The research in which I participated in South Korea targeted this type of problem, which was to maximize electrical chemical capacity such as in flexible batteries to use for many different applications.

My short stays in Brazil and South Korea during the summer of 2007 have been and will be necessary for my growth as a Chemical Engineer in the new energy-crunch, globalized world. My prior education here at the University of Kentucky prepared me to interact with highly intellectual students from across the globe. These two international experiences provided me with an important foundation in the new world of Chemical Engineering.