



Steinbrenner Institute Announces the 2012-2013 Doctoral Fellows

The Steinbrenner Institute is pleased to announce our new class of Graduate Research Fellows for 2012-2013. There are four new Steinbrenner Institute Graduate Fellows and one new Steinbrenner Institute Robert W. Dunlap Graduate Research Fellow. The fellows will be exploring research topics that are in alignment with the strategic interests of the Steinbrenner Institute and our affiliated faculty and centers.

Adam Ahern, Graduate Student, Chemistry

Project Team: Ryan Sullivan (Chemistry/Mechanical Engineering) and Neil Donahue (Chemistry/Chemical Engineering)

Adam is a graduate of Boston College where he was involved in aerosol studies in the Davidovits lab, looking at black carbon aerosol (smoke). After graduation he was employed by aerosol instrumentation company, Aerodyne. After taking a year off to travel, he returned to graduate school at Carnegie Mellon University to work in a collaboration with Aerodyne and CMU in developing the LAAPTOF, or Laser Ablation Aerosol Particle Time of Flight mass spectrometer.

"Characterizing Aerosol Emissions from Residential Biomass Burning"

Adam's project will involve taking the LAAPTOF to the FLAME IV study in Montana working with various institutions to better understand the effects of forest fires on the environment, both in terms of climate and human health. The project will also utilize the Center for Atmospheric Particle Study (CAPS) mobile smog chamber to simulate what happens to an air parcel that includes forest fire smoke as it is exposed to sunlight, dilution, and other atmospheric processes. Ultimately, the understanding of the impacts of forest fires and other forms of biomass burning (including agricultural waste, domestic waste, etc) will help guide legislation to have the greatest impact for the environment.

Raul Figueroa, Graduate Student, Engineering and Public Policy *Steinbrenner Institute Robert W. Dunlap Graduate Fellowship

Project Team: Granger Morgan (Engineering and Public Policy) and Paul Fischbeck (Social and Decision Sciences/Engineering and Public Policy)

Raul has had significant work experience in manufacturing and engineering management, mostly in industrial and construction projects in the Caribbean and in East Africa. He is also an Adjunct Faculty at Strathmore Business School in Nairobi. Raul holds a BS in Electrical Engineering from the University of Puerto Rico. His research interests are: building reliability in developing countries, green practices in the construction industry, energy efficiency of new buildings, building codes and enforcement.

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"Evaluation of Technical and Regulatory Strategies to Improve Structural Safety while Minimizing the Environmental Impact of Concrete-Framed buildings with Emphasis on Projects in Low-Income Jurisdictions and Developing Countries"

Most jurisdictions worldwide have adopted effective building codes and environmental regulations for the construction industry. But in developing economies these codes have not been as effective as expected. Structural defects are frequently identified too late, often after a catastrophic collapse. Improving the structural quality of building in poorer parts of the world is an effective way to significantly reduce fatalities when natural disasters occur. Careful implementation of cost-effective technologies and improved regulation could be effective in improving safety without exacerbating the environmental impact of built structures. Raul's research will consider whether instances of non-compliance with building codes and regulations that compromise safety and/or cause unnecessary waste or environmental damage can be predicted. And if so what would be the optimal combination of strategies to prevent non-compliance in different settings. His research is aligned with the Steinbrenner Institute strategic focus area of urban infrastructure and sustainable cities. This project will benefit society by improving safety of building in poorer places, reduce the environmental impact of new construction, and help minimize preventable deaths of thousands of people in the event of natural disasters.

Matthew Mills, Graduate Student, Chemistry

Project Team: Terry Collins (Chemistry)

Matthew Mills graduated from Shaler Area High School (Pittsburgh) in 2000. Joined the U.S. Marines as a reservist and attended James Madison University after initial training. He was a student at JMU from 2001-2004, with two deployments to Iraq in that time. He transferred to California University of Pennsylvania and earned a B.S. in both Secondary Education and Chemistry, went on to teach in an American school in Morocco, and then in a charter school in Homestead. Mathew worked at TestAmerica, an environmental testing laboratory, for a year before attending CMU as a graduate student in the Chemistry Department in the fall of 2011. His research interests are green chemistry, including organometallic catalysis.

"Biomimetic, Catalyzed Degradation of Ethinylestradiol with Hydrogen Peroxide for Use in Wastewater Treatment"

Matthew's primary project is the study of the degradation of ethinyl estradiol, an artificial estrogen found in birth-control pills, using an iron-centered organometallic series of catalysts (TAML) that have been developed by my research advisor, Terry Collins. The catalysts activate hydrogen peroxide to oxidize a number of substrates in water. Our focus is on studying the kinetics of the degradation process at environmentally relevant conditions as well as determining the final products. Ethinyl estradiol is becoming an increasing hazard in waterways worldwide. It has been shown to feminize aquatic creatures at concentrations lower than 1 part per trillion. Our research may enable the use of the catalyst-peroxide system to be used in wastewater treatment in order to destroy a number of harmful contaminants and prevent them from reaching environmental waters.

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Shalini Ramesh, Graduate Student, Architecture

Project Team: Khee Poh Lam (Architecture)

Shalini received her undergraduate degree from BMS College of Engineering in Bangalore, India and received her Masters in Landscape Architecture from Virginia Tech.

"Urban Energy Information Modeling: An interactive platform to communicate simulation-based high fidelity building energy analysis using Geographical Information Systems (GIS)"

An energy modeling study was initiated for a live project: 24-acre Urban Redevelopment of the Lower Hill district in Pittsburgh, PA. A high-fidelity energy simulation has been conducted using the energy simulation program EnergyPlus with DesignBuilder as the interface. Energy analysis has been performed using the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1 2010 standard as the baseline for the whole district. The research is ongoing in order to propose a design case with a minimum of 30% reduction in energy consumption from the ASHRAE 90.1 2010 baseline using sustainable technologies for heating, ventilating and cooling (HVAC) systems, building materials and advanced building controls systems. The results of the baseline energy simulation analysis are mapped using Geographical Information Systems (GIS) providing information on the energy analysis graphically, from a macro level of the Lower Hill District to micro level of individual buildings. The energy analysis provides information on the annual energy consumption, peak heating and cooling demands, energy use intensities (EUI) and monthly data for the above parameters. All this information mapped onto GIS is accessible only if someone is knowledgeable about and has access to the software since GIS is a stand-alone program. It does not have a user friendly data analysis display nor an interactive format to communicate with the user. This research focuses on creating an interactive platform to display the analysis performed to the user using GIS by finding common variables between the energy analysis programs and GIS and developing an interactive interface for data communication.

Yuxin Wang, Graduate Student, Civil and Environmental Engineering

Project Team: Jeanne VanBriesen (Civil and Environmental Engineering) and Mitchell Small (Civil and Environmental Engineering/Engineering and Public Policy)

Yuxin received her undergraduate degree in Environmental Science and a Masters in Environmental Engineering. Her masters research focused on biodegradation of polychlorinated biphenyl (PCBs) in river sediments. As a Ph.D. student, her current interests are the effect of source water bromide on the speciation of disinfection by-products in drinking water. She is interested in the effects of source water changes and operational changes at the drinking water plant.

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"Recommendation for a Protective Bromide Standard for Drinking Water Sources using Data from Southwestern PA"

Recently, significant increases of bromide concentration have been observed in the environment concurrent with expanded development of unconventional gas resources (in Marcellus Shale) and disposal of bromide-containing produced water in southwestern Pennsylvania. The increasing bromide in source water leads to the production of carcinogenic brominated disinfection by-products (DBPs) in drinking water plants that chlorinate the water. The formation of DBPs in drinking water depends on source water quality and drinking water treatment plant operations. Yuxin's research project will address the effect of source water bromide on DBP formation in finished water, and investigates the role of shale gas wastewater management in contributing bromide to the source water. The relationship between energy production, the environment and drinking water safety will be illustrated in the study.

Congratulations to all of the Steinbrenner Doctoral Fellowship recipients and best wishes for a productive year of research!