

High School Research Program 2019

Project List

Project Name	Project Mentor	Project Description
Systems Engineering		
Information and Data of Power	Dr. Jing Zhang	In this project, we will study the operation information and data of power grids and renewable energy generation. We will begin with the introduction to a number of important resource of information and data including U.S. Energy Information Administration and Independent Systems Operators (ISO's). Based on the analytics of information and data, we will investigate the integration of renewable energy generation and the technologies applied in different regional power grids.
Center for Nanotechnology Sciences		
Development of nanotechnology-based coatings for anti-icing applications	Dr. Ganesh Kannarpady	Nanotechnology is the study and application of extremely small things; it spans all science disciplines, including chemistry, biology, physics, materials science, and engineering. In the Advanced Deposition Lab at UALR's Center for Integrative Nanotechnology Sciences, researchers are working to develop coatings composed of tungsten nanorods that do not allow water droplets to form on a surface. As a result, the surface does not ice. These coatings can be applied in different industries like the aerospace industry and HVAC industry.
Instrumental techniques for characterizing biomaterial scaffolds	Dr. Shawn Bourdo	The physical, chemical, and mechanical properties of materials are critical to understanding a material's role in biological applications. In this project, the student will be exposed to instrumental techniques used to characterize nanomaterial-based tissue engineering scaffolds.
Information Science		
Social Media Data Analysis	Dr. Nitin Agarwal	Social media has become an indispensable tool for communication, information sharing and consumption. Social media, also known as participatory media, is especially vulnerable due to a low barrier for publication and lack of effective policies. Today, narratives on social media are weaponized and propagated online at a frighteningly fast speed. Such insidious threats that attempt to disrupt social norms need to be considered as modern weapons of cyber warfare. Dr. Nitin Agarwal is leading several collaborative research efforts at COSMOS (or, Collaboratorium for Social Media and Online Behavioral Studies) to develop methodologies to diagnose novel pathologies of online social media supported by DoD, DARPA, Department of State, and DHS totaling over \$10 million. Specifically, the student will be involved in a US Department of Defense (DoD) funded project, where (s)he will help collect data from social media platforms, including blogs, YouTube, Twitter, Facebook, Gab and others; detect malicious actors and groups; and identify the tactics used by such groups to propagate disinformation, sow discord, and provoke hysteria. Methodologies developed in the project would leverage concepts from cyber forensics, social network analysis, and big data mining, which will be incorporated in the tools developed in COSMOS, namely Blogtrackers and YouTubeTracker. These tools are used by NATO Strategic Communications and public affairs and selected by the U.S. Department of State in their national Tech Innovation Hub launched to defeat foreign based propaganda. During the three-week program, the student will work closely with Dr. Agarwal and a team of over 20 graduate students, undergraduate students, and postdoctoral researchers giving the student a unique, interdisciplinary, and real-world research experience.