REU Site: Integrating Research in Sustainable Energy and the Environment across Disciplines
(IR-SEED)

Summer 2017 IR-SEED REU Program: June 4 to August 11, 2017

1. Innovative Improvement of Engineering Properties of Expansive Soils with Nanomaterials

(Faculty Advisor: Dr. Jong-Won Choi, Assistant Professor in

airtight such that satisfy the International Energy Conservation Code (IECC). There is a window on one wall of each test cell respectively. The test cells are sitting on wheels so that the window can face any orientation as needed. Identified products will be installed and their performance be measured comparatively. Students will instrument the test cells, design and conduct experime to collect extensive data on energy performance and daylighting performance of test cells installed with different fenestration systems, with consideration of different orientations, window sizes and window positions in the wall.

Task 3: Measured data analysis. The effect of fenestration system on energy and daylighting performance will be analyzed from two aspects: heat transferred and light transmitted through the window. Conclusions will be drawn and extended to other climate locations

ii. Undergraduate Research Opportunities: Undergraduate students will participate and learn during the whole period of the proposed project. Expected learning experiences include 1) hands on experimental skills; 2) professional software operation; and 3) data analysis and presentation skills. The stu.82 -1.15 Tda-1.1*-2(ns)-1(t)-2(ae)6(s)1(tu.82 -1.15 Tda-1.1*-2(ns)-1(1.15t)-4)-1(.00(f)-1

Task 3: Perform data analysis to quantify the impacts of key affecting factors on the concentration of VOCs in the vehicles. Statistical analysis methods will be applied to analyze the test data. Through data analysis, the relationship between affecting factors and the concentration of VOCs will be setup and provide reference for future research studies.

iii. Undergraduate Research Opportunities: Undergraduate students will participate and learn during the whole period of the proposed project. Expected learning experiences include 1) development of a comprehensive literature review and test plan; 2) hands-on experimental skills; 3) air quality evaluation methods and 4) data analysis methods. The students will also participate in the dissemination activities

4. Conceptual Design of a Small Scale Wave Energy Converter

(Faculty Advisor: Dr. Hua Li, Associate Professor in Mechanical and Industrial Engineering)

i. Motivation: Large scale wave energy generating systems that range in the scales of hundreds of kilowatts to megawatts capacity have been used in the grid systems. However, there are stand-alone systems that require electricity use in the scale of tens of kilowatts such as fossil fuel sources like petrol and diesel based portable regions and renewable sources like wind and solar PV cells. For small scale wave energy to achieve considerable use, its potential applications and potential harvestable wave energy resource in specific locations will trigger the design, manufacture and deployment of these wave energy converters

ii. Project Description:

The student participating in this project will 1) conduct data analysis using information from databases including the FAA Digital Obstacle File, USGS Wind Turbine Database, Department of Energy eGrid Database and NOAA Wind Database to assess their structure, characteristics and compatibility, 2) learn the ArcMap software to determine energy production and utilization ratio on wind turbines, 3) integrate geo-temporal and geo-spatial data to develop a database that will render on a GIS software application including statistical graphical applications.

6. Evaluation of wind turbine placement using Geographic Information Systems (GIS) tools

(Facuty Advisor: Dr. David Ramirez, Associate Professor in Environmental Engineering)

Correct placement of wind turbines is one of the fundamental factors for a successful wind energy project. The wind conditions will determine the amount of energy effectively produced. The distance between the wind farms and the consumption centers is a factor to estimate the cost of transmission lines. The optimum placement of wind turbines from the consumption and the production sites is important.

The student participating in this project will 1) conduct data analysis using information from databases including the FAA Digital Obstacle File, USGS Wind Turbine Database, Department of Energy eGrid Database and NOAA Wind Database to assess their structure, characteristics and compatibility, 2) learn the ArcMap software to determine wind turbine placement equivalence among databases and to perform rectification and harmonization, if needed, and 3) integrate geo-temporal data to develop a database that will render on a GIS software application including statistical graphical applications relevant to involved stakeholders.

7. Water Use and Water Scarcity Analysis at Regional Scale

(Faculty Advisor: Dr. Tushar Sinha, Assistant Professor in Environmental Engineering)

This project will include spatial and temporal analysis of water use data as well as data from a large scale hydrologic model. Water scarcity index will be estimated based on water availability and demands. This project will provide exposure for spatio-temporal analysis using Geographical Information Systems (GIS).

8. Estimation of Land Surface Conditions Using Remote Sensing Data

(Faculty Advisor: Dr. Tushar Sinha, Assistant Professor in Environmental Engineering)

This project will utilize data from remote sensing to estimate land surface temperature and soil moisture. These land surface variables are important to initialize hydrologic models for improving biweekly to monthly water availability forecasts. In addition, hydrologic models can be validated on larger spatial domain using remote sensing observations

9. Clean Energy Technologies to Minimize Carbon Release from P2v7cn -0.0wrg arrts0 Tc 0 -0.00 0 Td

due to low energy consumption and environmental impact. However, this process in conventional rea