NYUAD's Visiting Undergraduate Research Program

New York University Abu Dhabi (NYUAD) welcomes the unique experiences and insights visiting students bring to the university and region, and is excited about rolling out a pilot program for NYU NY and NYU Shanghai undergraduate students to have the opportunity to work closely with world-class faculty members and build their CV with invaluable research experience.

This summer (2018), a limited number of NYU NY and Shanghai undergraduate students are able to apply to take part in a research placement on-campus at NYUAD during the summer, supervised by NYUAD faculty members.

These selected undergraduate students will have the opportunity to get involved in cutting-edge research for 4 weeks, from May 21 – June 17, 2018. The positions are unpaid but the costs (meals, housing, local transport and flight) associated with these positions will be covered via the Undergraduate Research Program at NYUAD. Positions should be full-time, for 35 hours per week. Students will follow University guidelines for Ramadan working hours.

Eligibility:

- Students must be currently enrolled in full-time, undergraduate study at NYU New York or NYU Shanghai.
- Only students who have successfully completed at least 44 credits are eligible to take part.
- Students must have a cumulative GPA above 3.3, with a good academic and disciplinary record.
- The position must be in line with the student's declared major and academic interests.
- NYU New York and Shanghai students must be available between May 21 – June 17, 2018.
- Students will be required to enroll in a zero-credit, pass/fail class and attend an orientation, as well as in-person weekly sessions.

Application Process:

Students are encouraged to view the available positions listed below. To apply for any of the positions, please complete the Visiting Undergraduate Research Program Form. Applications should be received by March 31, 2018 at 11.59pm GST.

Questions:

Any questions regarding the particular position can be addressed directly to the faculty supervisor. Any questions relating to the program should be emailed to nyuad.undergraduateresearch@nyu.edu.

Professor Yong-Ak (Rafael) Song

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Project Details

Research Project Title: Non-invasive palate-based Intraoral biosensor for continuous monitoring of pH and Ca^{2+} ion concentration

Research Project Description: Caries is a biofilm-sugar dependent disease, which results from several episodes of acid formation by microorganisms in the dental biofilm. In the presence of a frequent sucrose-rich diet, there is an increase in the amount of biofilm formed, especially due to the formation of extracellular polysaccharides, in addition to the enhancement of biofilm acidogenicity. In general, if over time there is a drift in the acidogenic response of the biofilm towards lower pH values induced by these carbohydrates from the diet, caries lesion is likely to occur. The goal of this project is to develop an intraoral biosensor with a flexible microelectrode array for the diagnostics and assessment of caries in the oral cavity. The project objectives are to build a prototype of the biosensor using 3D printing and microfabrication with an embedded microcontroller and Bluetooth telemetry and test its functionality with the regard to the measurement of pH and Ca^{2+} ion concentration using an established in vitro model.

Dates: 05/21/2018 - 06/17/2018

Timeline: Week 1: Fabricating a microelectrode array for pH and Ca^{2+} ion measurement, Week 2: Testing of the electrodes in test solutions with different pH values and Ca^{2+} ion concentrations and their electrochemical characterization, Week 3: Building a circuit for telemetry via Bluetooth, Week 4: Packaging of the components in a mouth guard and its final testing

Responsibilities: Design, fabrication, and testing of an oral biosensor prototype for oral health monitoring

Skills the student will gain: The student will gain a various set of skills in multidisciplinary fields such as microfabrication in cleanroom, 3D printing, 3D CAD design, basic electronic circuit design, and electrochemical analysis using voltammetry

About the Student

Student's School: NY and Shanghai

Student's Class Level: any class

Student's Major: Mechanical, Chemical or Electrical Engineering

Skills Needed: Basic electrochemical analysis, 3D design using SolidWorks, and building circuits.

Any Other Requirements: Enthusiasm for research and building prototypes

ENGINEERING

Professor Borja Garcia de Soto

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Project Details

Research Project Title: Exploring the Potential of Predictive Analytics in Building Energy Forecast

Research Project Description: Buildings are responsible for 40% of the total energy consumption in the United States (US). More importantly, 80% of the energy consumed by a building occurs during the operation and maintenance (O & M) phase. If ideally operated and maintained, building's overall life cycle budget and environmental impacts can be significantly reduced by avoiding energy wastage. In fact, this is one of the key challenges faced by facility managers. Studies have suggested that accurate energy consumption predictions are essential for optimizing building energy use and performance, and simultaneously maintaining occupants' comfort. Current technology advancements have made it easier, when compared to traditional monitoring and inspections done manually, to deploy a large number of data sources (e.g. wired and wireless sensors) as part of Building Automation Systems (BAS), which has resulted in larger data sets. However, a majority of this data is not fully exploited and facility managers lack the tools to utilize this information and make appropriate decisions in a meaningful way. To address this key issue, the objective of this project is to explore the use of different machine learning techniques for predicting short and long-term building energy forecasts with the ultimate goal of clearly identifying the advantages, disadvantages, and key research gaps to advance the research in this area.

Dates: 05/21/2018 - 06/17/2018

Timeline: Approximate timeline: week 1-2 thorough literature review; week 2-3 understand the state-of-the-art methods developed in previous studies; week 3-4: investigate and interpret the current methods and identify advantages, disadvantages, and key research gaps (possibly propose a new method or suggest improvements to an established method); week 4 summarized work into a technical report, research poster, conference publication, or a peer-reviewed journal article

Responsibilities: For the first 1-2 weeks, a thorough literature review will have to be conducted to understand the state-of-the-art methods developed in previous studies. During the next week, investigate and interpret the current methods and identify advantages, disadvantages, and key research gaps. Furthermore, possibly propose a new method or suggest improvements to an established method and contribute to the existing body of knowledge. Finally, the work will have to be summarized into a technical report, research poster, conference publication, or a peer-reviewed journal article based on the conducted work's contribution as assessed by the faculty member. At every step, the faculty member or his Ph.D. students / post-doc researchers will provide proper guidance and support.

Skills the student will gain: Students will have the unique opportunity to work on interesting topics, conduct groundbreaking research under the guidance of subject matter experts and develop research skills. This experience will also help students identify their career interests and offer them with a platform to showcase their talents. In addition, this collaboration will provide a better undergraduate experience and might lead to more academic retention (e.g. continuation to graduate school).

About the Student

Student's School: NY and Shanghai
Student's Class Level: Sophomore or above
Student's Major: Civil and Environmental Engineering
Skills Needed: The student is expected to have a fundamental knowledge of building energy and data sciences. Experience handling real-world data sets is not required but will be an advantage.
Any Other Requirements: Interested in working in a young and dynamic research team