

## 2021 SURP Faculty Mentor Applications Internal Review

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## In-Person Research on Utica Campus

**Professor Hisham Kholidy**

[kholidh@sunypoly.edu](mailto:kholidh@sunypoly.edu)

**NCS Dept., College of Engineering**

**Assistant Professor**

### (1) 5G and Cloud Core Security.

5G is introducing a world of opportunities for the consumer market with much speed and bandwidth. This project specifically contributes toward the development and validation of a proactive cyberdefense framework to self-protect a multitenant large-scale SDN/NFV enabled Cloud of 5G networks against cyberattacks in a timely, dynamic, and accurate way. To this end, this proposal uses the deception, adversarial machine learning, and modeling and

analysis techniques to provide the following capabilities (i) a dynamic vulnerability analysis and threat modeling approach based on the 5G attack vector. (ii) a deception-based moving target architecture to dynamically patching software, making it more robust against anti-deception efforts.



**Student skills / requirements:** Programming using C, C++, and/or Java with some experience about server setup and cloud computing.

**Location:** Albany Campus      Utica Campus      Remote

I am willing to accept students from the following tracks (Yes/No):

Yes No      Track 1: SURP-Funded

Yes No      Track 2: Faculty-Grant Funded SURP

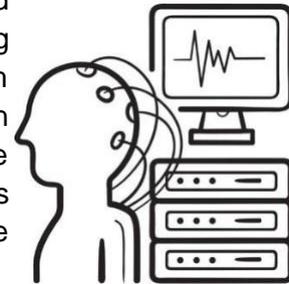
If you have funding for Track 2 students, how many do you plan to support?

Yes No      Track 3: Volunteer

Yes No      Track 4: Research for Credit

**Professor Daniel Jones**  
[dkjones@sunypoly.edu](mailto:dkjones@sunypoly.edu)  
**Utica Engineering Technology**  
**Associate Professor**

**(1) Analysis of Electroencephalography (EEG) Data.** EEG is used to measure and evaluate the electrical activity in the brain using electrodes placed on the scalp. We have collected EEG data from dozens of participants in the modern EEG laboratory at SUNY Poly in Utica. Signals were measured with 256 sensors at 1,000 Hz while participants viewed images and provided push-button responses. This project aims to analyze the data in order to understand the spontaneous neural activity of the brain in response to the images.



to

**Student Skills / Requirements:** General computer skills for analyzing data, Excel, experience with (or desire to learn) MATLAB and related programming environments, self-motivated, ability to work independently and in small teams.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Vijay Ramalingam**

[ramaliv@sunypoly.edu](mailto:ramaliv@sunypoly.edu)

**Chemistry and biology**

**Assistant Professor**

**Project Title: (1) Synthesis of Mechanically Interlocked Organic molecules.** UV-light assisted synthesis of rotaxane. Rotaxanes are a class of mechanically interlocked molecules, composed of a linear long chain molecule that threads a macrocyclic cavitand, which is sterically hindered on the terminal to keep the cavitand inside. These molecules have potential applications in the design of molecular switches, machines, asymmetric synthesis and nanomuscles because of their dynamic nature and capability to maintain permanent interlocking without covalent linkages.

**Student Skills / Requirements:** At least organic chemistry I or General Chemistry II

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Jiayue Shen**

[shenj@sunypoly.edu](mailto:shenj@sunypoly.edu)

**Utica Department of Engineering Technology**

**Assistant Professor**

**Project Title: (1) Development of highly flexible sensor for soft robots.** Nowadays, with the rapid advancement of manufacturing technology, additive manufacturing, has attracted much attention from the sensor fabrication industry. The project aims to develop a highly flexible sensor for measuring the strain change of a soft robot. The accepted student is expected to fabricate the flexible sensor and characterize the sensor performance under the mentor's guidance.

**Student Skills / Requirements:**

**Minimum Qualifications:** Major in engineering, engineering technology, nanotechnology, or chemistry; Ability to follow basic chemical safety rules

**Preferred Qualifications:** Experience in Matlab or similar data processing software; Experience in advanced manufacturing

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Jagannath “Jay” Upadhyay**  
[upadhyj@sunypoly.edu](mailto:upadhyj@sunypoly.edu)  
**Utica College of Engineering**  
**Assistant Professor**

**Project Title: (1) Optimization Study of Polymer Based 3D Additive Manufacturing Techniques.** In this project, our research effort is to conduct parametric study of bio-based and lithography based additive manufacturing techniques to design and develop a high resolution (feature size  $\sim 10^{-6}$ ) three dimensional microfluidics devices. In order to fully understand the capability of bio and UV lithography based additive manufacturing technique to develop complex organ surrogates resembling in morphology, one has to fully understand parametric effects, repeatability and reliability of such manufacturing technique. Organ surrogates, if successfully developed, have potential applications in understanding drug dissemination, drug screening, early disease detection, and understanding liquid biopsy transport mechanism. This proposed study includes:

1. Design, fabrication, and parametric study of three dimensional multiscale microchannel created by bio- and UV lithography based additive manufacturing techniques.
2. Conduct fluidic experiments aimed at understanding nano-particles transport mechanism in three dimensional microfluidics devices.

**Student Skills / Requirements:** The summer intern should have foundation of solid-works modeling, MATLAB, statistical data analysis and be enthusiastic in hands-on activities and 3D additive manufacturing.

**Location:** Albany Campus Utica Campus Remote

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Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Linda R. Weber**

[flrw@sunypoly.edu](mailto:flrw@sunypoly.edu)

**Utica Social and Behavioral Sciences/ Arts and Sciences**

**Professor**

**Project Title: (1) Assessing the Economic Impact of COVID19 on a Rural/Agricultural Community.** My senior seminar class is working on the design of a needs assessment of one rural/agricultural community in Oneida County – Marshall, New York. The purpose is to assess the needs for community economic revitalization in an agricultural area of the Mohawk Valley. By the end of the spring semester, the project should be fully designed and approved by the IRB. This project will entail doing interviews with key informants (e.g., farmers, farm workers, residents, agri-business owners, and other small business owners in the town), focus groups, and content analysis (e.g. local newspaper, relevant websites). This project is the result of a collaborative effort of this professor with the Mohawk Valley Economic Development District, and contacts have been initiated with the Town of Marshall. The end results will be the identification of key needs created by or exacerbated by COVID19 within one agricultural community so that federal CARES Act monies and outreach programs can be better targeted. It is hoped that this study will reveal the particular vulnerabilities of one type of rural community to natural disasters in general, with a particular focus on pandemics.

**Student Skills / Requirements:** SPSS, NVivo, Research Methods -at least a grade of “B” (Quantitative and Qualitative) and Basic Statistics – at least a grade of “B”.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

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If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

- The research for credit will create a problem for most of my students as summertime is usually used to work for pay so that they will be able to afford college. If someone who has the qualifications is able to pay, this would definitely be an option.

**Professor Rebecca Weldon**

[weldonr@sunypoly.edu](mailto:weldonr@sunypoly.edu)

**Utica Social and Behavioral Sciences / College of Arts and Sciences**

**Assistant Professor**

**Project Title: (1) Putting the Brakes on an Automatic Response: The Neural Mechanisms of Braking Successfully.** Humans tend to have difficulty adhering to long-term health goals like quitting smoking or sticking to a diet. Cognitive neuroscience research has focused on how the brain is involved in inhibiting an automatic response (e.g., refraining from eating more of a tasty but unhealthy food) and why putting the brakes on that behavior may be difficult. In the summer of 2021, we will work on setting up an electroencephalogram (EEG) study in which participants will complete a computerized task that requires “stopping” before making a response while a net of electrodes records activity in the brain. We are aiming to understand which part of successful inhibition actually results in devaluing stimuli (e.g., is it a cognitive or motor process that allows us to successfully withhold an automatic response to rewarding stimuli?). The ultimate goal of our research is to use what we learn to design interventions to reduce risky health behaviors and improve health outcomes.

**Student Skills / Requirements:** We anticipate that the SURP student will be largely involved in behavioral and EEG study set up and data analysis during the summer of 2021. The successful student will be enthusiastic about learning and problem solving, have a positive attitude, have initiative (i.e., willing to troubleshoot on their own and also willing to approach team members when there is a problem), and work well on a team. Familiarity with any of the following is useful but not required: Microsoft Excel, SPSS, EEG.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

## In-Person Research on Albany Campus

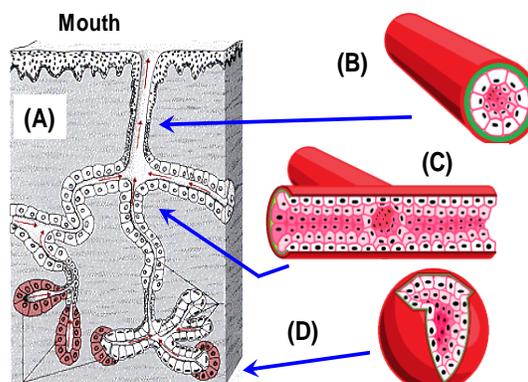
**Professor Robert L. Brainard**

[RBrainard@SUNYPoly.edu](mailto:RBrainard@SUNYPoly.edu)

**Albany CNSE**

**Professor**

**Project Title: (1) Bio Roll Up.** The goal of this project is to develop the methodology for controlling timing of self-assembly of bilayer stacks upon which cells are growing. The ultimate goal of this project is to determine how shape changes influence the biology of cells. Students will synthesize polymers and formulate polymers into photoresists, that will be coated onto silicon wafers into multiple stacks of hydrogel films. Students will study the kinetics of self-assembly of these multi-layer stacks under conditions suitable for cell growth. Students may participate in growing cells onto these stacks.



**Student Skills / Requirements:** No experience necessary, but strong background in chemistry and biology required.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

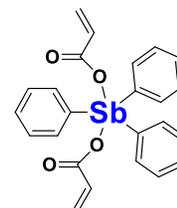
**Professor Robert L. Brainard**

[RBrainard@SUNYPoly.edu](mailto:RBrainard@SUNYPoly.edu)

**Albany CNSE**

**Professor**

**Project Title: (2) Molecular Organometallic Resists for EUV (MORE).** The goal of this project is to develop organometallic compounds that can be used as high resolution photoresists in the microelectronics industry to fabricate future integrated circuits. Students will synthesize and/or characterize compounds containing main-group metals. These compounds are designed



to undergo chemical reactions when irradiated with 13.5 nm extreme ultraviolet light resulting in a change in solubility.

**Student Skills / Requirements:** No experience necessary, but strong background in chemistry, particularly organic chemistry.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

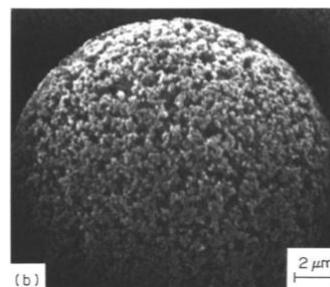
**Professor Robert L. Brainard**

[RBrainard@SUNYPoly.edu](mailto:RBrainard@SUNYPoly.edu)

**Albany CNSE**

**Professor**

**Project Title: (3) Micro-Structured Polymers.** The goal of this project is to design and synthesize polymers with specifically-designed microscale morphology for microelectronics applications. Students would conduct polymerization reactions and characterize micro-structured polymers using Differential Scanning Calorimeter (DSC) and Fourier Transform Infrared (FTIR) spectroscopy.



**Student Skills / Requirements:** No experience necessary, but strong background in chemistry, particularly organic chemistry.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Robert L. Brainard**

[RBrainard@SUNYPoly.edu](mailto:RBrainard@SUNYPoly.edu)

**Albany CNSE**

**Professor**

**Project Title: (4) Bilayer Polymer Films.** Students will formulate polymer solutions and spin coat them into 2-layer stacks. Students would then study the chemical interactions between these two layers using Fourier-transform infrared spectroscopy (FTIR), water contact angle, and/or changes in solubility. This project is aimed at developing a mechanistic understanding of the chemical interactions between two polymer films.



**Student Skills / Requirements:** No experience necessary, but strong background in chemistry, particularly organic chemistry.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Nathaniel Cady**

[ncady@sunypoly.edu](mailto:ncady@sunypoly.edu)

**Albany CNSE- Albany**

**Professor**

**Project Title: (1) Neuromorphic Computing.** The Cady research group is focusing on the development of novel chips that are customized for neuromorphic computing applications, based on memristor (resistive memory) technology. The student working on this project will be involved in the testing and/or simulation of these chips at the SUNY Poly site in Albany, NY.

**Student Skills / Requirements:** Programming experience (eg. Python) is preferable. Otherwise a general background in STEM fields is needed.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Greg Denbeaux**  
[gdenbeaux@sunypoly.edu](mailto:gdenbeaux@sunypoly.edu)  
**Albany CNSE**  
**Associate Professor**

**Project Title: (1) Process optimization for metal additive manufacturing.** We have developed a novel metal additive manufacturing system (3D printer). It needs programming of stages for automated sample fabrication and optimization of the process conditions for the metal deposition.  
**Student Skills / Requirements:** Hands on tool operation and programming for motor control.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support? 1-2

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Greg Denbeaux**  
[gdenbeaux@sunypoly.edu](mailto:gdenbeaux@sunypoly.edu)  
**Albany CNSE**  
**Associate Professor**

**Project Title: (2) AI for machine vision motion control optimization.** This project will involve learning and implementing a machine vision and AI system for motion control of a wafer in a custom transfer system for semiconductor manufacturing.

**Student Skills / requirements** – good computer skills and interest in machine vision and AI.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support? 1-2

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Greg Denbeaux**  
[gdenbeaux@sunypoly.edu](mailto:gdenbeaux@sunypoly.edu)  
**Albany CNSE**  
**Associate Professor**

**Project Title: (3) Electron exposures for EUV resist measurements.** We are studying the effect of low energy electron exposures in EUV resists. This project will use an electron gun and vacuum system for exposing and measuring the effects of the low energy electrons on the fundamental chemistry of EUV photoresists.

**Student Skills / requirements** : skills or willingness to learn hands on experimental procedures for vacuum chambers and resist processing.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support? 1-2

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Harry Efstathiadis**  
[hefstathiadis@sunypoly.edu](mailto:hefstathiadis@sunypoly.edu)  
**Albany CNSE**  
**Associate Professor**

**Project Title: (1) Fast Charging Lithium Loss in NMC/Graphite Cells for Battery Applications.** Fast charging of a Li-ion battery is a key requirement for the acceptance of electric vehicles. However, charging at high currents and/or low temperatures is known to accelerate battery degradation when not conducted in an appropriate operational window. One way to influence the viability of fast charging is to optimize the cell formation procedure. During this internship the student will be trained to assemble battery cells, perform fast charging, and evaluate the formation of solid electrolyte interface and Li losses via electrochemical testing.

**Student Skills / Requirements:** Nanoscience, Nanoengineering, Physics, Chemistry, Engineering, Materials Science students.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Michael Fasullo**

[mfasullo@sunypoly.edu](mailto:mfasullo@sunypoly.edu)

**Albany CNSE**

**Associate Professor**

**Project Title: (1) Bioinformatics of profiling the yeast genome for carcinogen resistance.** We have profiled the yeast genome for resistance to several potent carcinogens, including heterocyclic aromatic amines (HAAs). We have performed computational processing of high throughput data to determine statistical significance and gene ontology groups based on function, process, and pathway. The project will explore different computational methods for processing high-throughput data.



**Student Skills / Requirements:** Math, Computer science, and Biology.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Michael Fasullo**

[mfasullo@sunypoly.edu](mailto:mfasullo@sunypoly.edu)

**Albany CNSE**

**Associate Professor**

**Project Title: (1) Mechanisms of carcinogen resistance by error-free DNA damage tolerance mechanisms.** Metabolic activation of carcinogens generates mutations in tumor suppressor genes. We have profiled the yeast genome for resistance to a potent liver carcinogen, aflatoxin B1 (AFB1) and to heterocyclic aromatic amines (HAAs), using budding yeast. We identified novel genes that are involved in both HAA and AFB1 resistance and that included DNA damage tolerance genes. Currently, we are now determining the mutagenic profile of these food carcinogens. This project will explore novel genetic mechanisms by which food carcinogens cause mutations using next generation sequencing technology.



**Student Skills / Requirements:** Chemistry and Biology.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Spyros Galis**

[sgalis@sunypoly.edu](mailto:sgalis@sunypoly.edu)

**Albany Nanoengineering - CNSE**

**Assistant Professor**

**Project Title: (1) Near-Infrared Single-Photon Emission Microscopy.** The overarching objective of this project is to provide proper and valuable team-driven educational experiences for an undergraduate student through participation in our ongoing National Science Foundation (NSF) research project. Our NSF funded project aims to advance fundamental understanding in developing and characterizing solid-state single-photon emitters (quantum emitters), capable of operation at the technologically important low-loss 1540 nm emission wavelength.



**Student Skills / Requirements:** Senior Physics/ Engineering student.

**Location:** Albany Campus Utica Campus Remote

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Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Iulian Gherasoiu / Harry Efstathiadis**

[gherasi@sunypoly.edu](mailto:gherasi@sunypoly.edu) and [hefstathiadis@sunypoly.edu](mailto:hefstathiadis@sunypoly.edu)

**College of Engineering / College of Nanoscale Science and Engineering**

**Associate Professors**

**Project Title: (1) Synthesis of diamond-like carbon (DLC) films on conductive substrates for hydrogen production via electrochemical water splitting.** Diamond is one of the allotropes of carbon that finds increasing applications in the field of power electronics and material surface augmentation due to its outstanding properties. Despite its importance, the few deposition methods that exist are all technologically complex and expensive. This project aims to study the deposition of DLC films on conductive substrates and correlate the synthesis conditions with the structural, electronic and optical properties of the DLC films. Synthesized films will be ultimately doped with B and P to determine the ability to modulate the film conductivity through process parameters. Besides material synthesis, the student will receive training in evaluating the results of the characterization techniques, such as SEM, X-ray diffraction and Raman spectroscopy. The efficacy of the DLC/substrate as an electrode on water splitting will also be studied.

**Student Skills / Requirements:** Chemistry, Physics.

**Location:**  Albany Campus

Utica Campus

Remote

I am willing to accept students from the following tracks:

Yes  No Track 1: SURP-Funded

Yes  No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes  No Track 3: Volunteer

Yes  No Track 4: Research for Credit

**Professor Mengbing Huang**

[mhuang@sunypoly.edu](mailto:mhuang@sunypoly.edu)

**Albany College of nanoscale Science & Engineering**

**Professor**

**Project Title: (1) Effects of embedded magnetic particles on magneto-transport in Si.** The project is designed to investigate the magneto-transport properties in Si and Ge crystals containing embedded magnetic nanostructures, with the aim to explore viable mechanisms for developing novel devices in these important semiconductor materials for quantum information processing and quantum computing. Magnetic nanostructures will be formed within Si and Ge using an ion beam method, and their effects on semiconductor band structures and electron spin transport will be assessed with low-temperature magnetoresistance measurements for various magnetic field strengths and orientations.

**Student Skills / Requirements:** SUNY Poly undergraduate

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Ji Ung Lee**

[ilee1@sunypoly.edu](mailto:ilee1@sunypoly.edu)

**Albany CNSE**

**Professor**

**Project Title: (1) Quantum Computation using Majorana Fermions.** The student will assist in fabricating 2D topological superconductors to help identify a new particle called Majorana fermions. These fermions are expected to revolutionize the development of a new type of quantum computer that are immune to decoherence.

The student will work closely with a postdoc and will be trained to fabricate and characterize devices. The student will have an opportunity to be included as co-authors in publications.

**Student Skills / Requirements:** 2<sup>nd</sup> year Science or Engr.

**Location:** Albany Campus Utica Campus Remote

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Yes No Track 2: Faculty-Grant Funded SURP

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Yes No Track 3: Volunteer

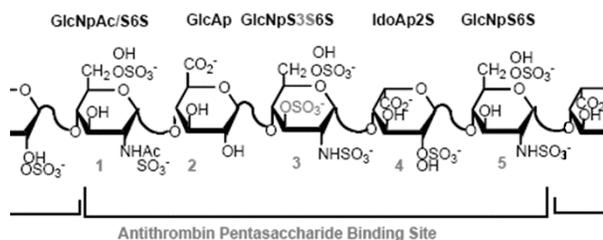
Yes No Track 4: Research for Credit

[ssharfstein@sunypoly.edu](mailto:ssharfstein@sunypoly.edu)

Albany CNSE

Professor

**Project Title: (1) Optimization of purification and assays for heparin productivity and activity.** This project focuses on developing a bioengineered heparin produced in cultured mammalian cells. As part of this project, we need to optimize the purification and assay of the heparin produced for speed of purification, reproducibility, accuracy and comparison with other techniques. This project will use a variety of separation techniques and spectroscopy to purify and quantify the heparin. There is also the possibility to help out with cell culture and metabolite analysis for other parts of the project.



**Student Skills / requirements** Students must have completed their sophomore year or later and have a background in nanoscale science/engineering, biology, chemistry or chemical engineering.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Possibly 1

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

Professor Susan Sharfstein and Yubing Xie

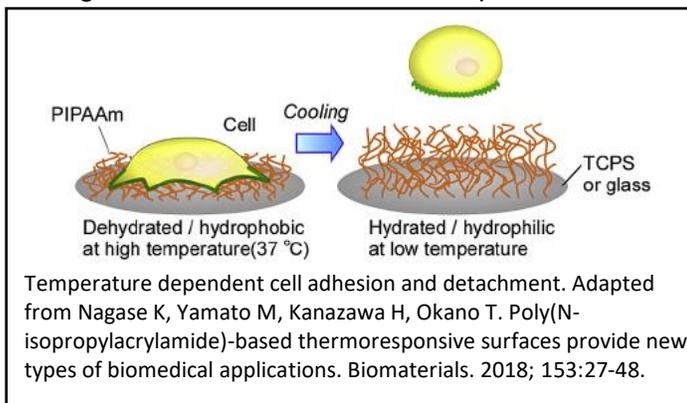
[ssharfstein@sunypoly.edu](mailto:ssharfstein@sunypoly.edu) and [yxie@sunypoly.edu](mailto:yxie@sunypoly.edu)

Albany CNSE

Professor

**Project Title: (2) Development of a novel wicking matrix bioreactor for T-cell expansion.**

This project focuses on using a novel wicking matrix bioreactor for T-cell expansion. The focus of the UG summer internship is on exploring novel thermo-responsive coatings that will allow the cells to “attach” to the fiber matrix and then be easily removed by a temperature shift. The work will involve some organic chemistry in exploring the coatings and mechanisms to attach them to cellulose fibers as well as optimization of the coatings to obtain the ideal temperature response.



**Student Skills / requirements** Students must have completed their sophomore year or later and have a background in nanoscale science/engineering, biology, chemistry or chemical engineering. Cell culture experience is a plus.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Possibly 1

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

Note that this project is contingent on a pending grant.

## Remote Research

Professor Asif Ahmed, PhD, PE

[asif.ahmed@sunypoly.edu](mailto:asif.ahmed@sunypoly.edu)

Utica Engineering Technology

Assistant Professor

### Project Title: (1) Using GIS to Create Digital Map to Visualize Geotechnical Parameters.

The ultimate goal of the project is to demonstrate that GIS technique is a great tool to visualize the geotechnical parameters that can be easily used directly in the assessment of site investigation. While the geotechnical industry has already started using GIS for bore log reports, there is a huge opportunity for using this tool in the undergraduate soil mechanics classroom. As such, we plan to:

- Collect bore logs from industry for a specific area i.e. Seattle, WA
- Analyze and tabulate the data in excel sheet
- Use the excel sheet as input data to create digital maps
- The studied parameters will be but not limited to Shear Strength, Liquid Limit, Plasticity Index, Compressibility, Ground Water Level etc.

A sample of the digital map is shown (Figure 1; from *Aldefae et al. 2020*).

**Student Skills / Requirements:** Student from any discipline; experience in GIS and MS Excel.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

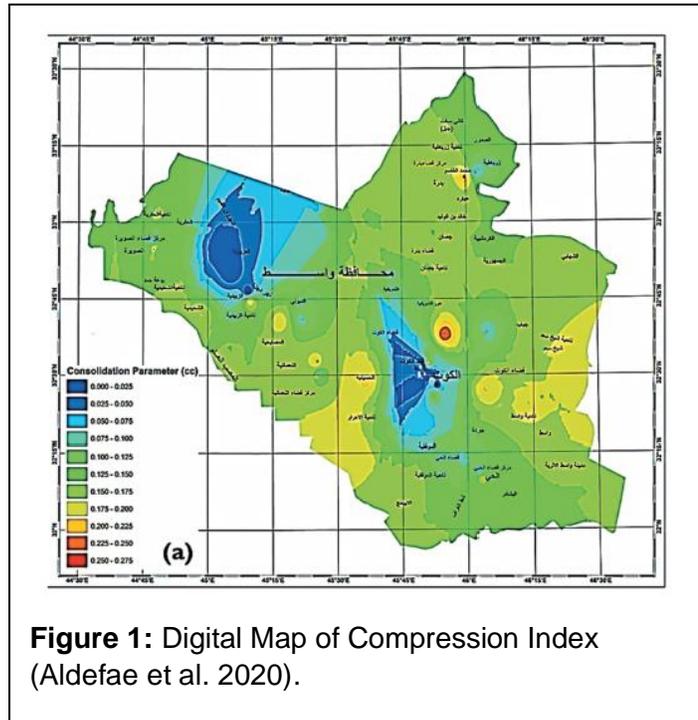
Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit



**Figure 1:** Digital Map of Compression Index (Aldefae et al. 2020).

**Professors Andrea Dziubek and Edmond Rusjan**  
[dziubea@sunypoly.edu](mailto:dziubea@sunypoly.edu) and [edmond@sunypoly.edu](mailto:edmond@sunypoly.edu)  
**Utica College of Arts and Sciences**  
**Associate Professors**

**Project Title: (1) Blood Flow in the Retina of the Eye.** Mathematical modeling of the blood flow in the eye has the potential to help medical professionals detect diseases sooner, better understand their dynamics, and to design better treatments. Students will apply state of the art analytical and numerical methods in physically based mathematical modeling of the blood flow in the retina of the eye. Specifically, they will work on the analytical solutions of the Poiseuille flow through the vascular tree network coupled to the numerical solution of the Darcy flow through the porous medium. The aim is to publish the results in an academic journal.

**Student Skills / requirements** Differential Equations, Calculus III, Linear Algebra, Physics, and Programming in Unix environment, familiarity with Python or Julia an advantage.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Ana Jofre**  
[jofrea@sunypoly.edu](mailto:jofrea@sunypoly.edu)  
**Utica Creative Arts and Technology**  
**Assistant Professor**

**Project Title: (1) Designing an interactive digital humanities web resource.** This is an examination of an archive of Time magazine containing 3,389 issues ranging from 1923 to 2014, focusing on images of faces. We extracted 327,322 faces from the archive, categorized all of them by gender, and found compelling temporal patterns in the representation of women. Our data also includes detailed characteristics (including race, age, expression, and context) of a subset of 8,789 of those faces. The research examines how representations of human faces have evolved over time, with the objective of elucidating relationships between images and their corresponding socio-political contexts. The goal of this project is to create a web resource that makes our data and research findings accessible to the public through visualizations and interactive narratives. **The student will work from a design document to build the first prototype for this web resource.** More information about the project can be found here: <http://magazineproject.org/TIME/>

**Student Skills / Requirements:** Design skills are a necessity. Front-end web development skills (HTML5, CSS3, and JavaScript) **OR** The ability to create a web prototype using Adobe XD.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Jiayue Shen**

[shenj@sunypoly.edu](mailto:shenj@sunypoly.edu)

**Utica Department of Engineering Technology/College of Engineering**

**Assistant Professor**

**Project Title: (1) Development of highly flexible sensor for soft robots.** Low-cost, miniaturized, and self-sustaining circuits and systems to realize sensing and wireless communication functionalities which are critical in the future Wireless Sensor Networks landscape. The project aims to modify an existing circuit design to realize wireless sensing for resistive-based sensors. The accepted student is expected to conduct simulation, redraw the PCB board, pick the electrical parts, and test the board's function.

**Student Skills / Requirements:**

**Minimum Qualifications:** Major in electrical engineering or electrical engineering technology

**Preferred Qualifications:** Experience in PCB design

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Shuang Tang**  
[tangs1@sunypoly.edu](mailto:tangs1@sunypoly.edu)  
**Utica Engineering/Engineering**  
**Assistant Professor**

**Project Title: (1) Make High Performance Solid State Super Coolers.** Super cooling become very useful as the increase of waste heat from supercomputers, bitcoin miners, data storage centers cannot be dissipated by traditional heat conducting systems.

Super cooling is also important in cooling objects into super low temperature such as -200 °C.

The traditional fluid mediated mechanical refrigerators are big, ugly, expensive, noisy and not environmental friendly. Therefore, we want to develop solid state coolers that can cool stuff or pump heat only using a small piece of solid material, which is portable, quiet, cheap and non-polluting.

A Peltier cooler or a Nernst cooler may solve this problem. They can be as small and portable as a cell phone and still work wonder. For example, you can carry one to your camping night and freeze your Coca using a Peltier cooler just by plug it to your laptop USB.

This project aims to provide materials support for solid state super cooling devices. Literature review, simulations and hands-on design may be involved in the project.

**Student Skills / Requirements:** 3<sup>rd</sup> or 4<sup>th</sup> year student(s) majored in Engineering, Science or nanoscience/nanoengineering.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Shuang Tang**  
[tangs1@sunypoly.edu](mailto:tangs1@sunypoly.edu)  
**Utica Engineering/Engineering**  
**Assistant Professor**

**Project Title: (1) Make High Efficiency Seebeck Electricity Generators.** A great portion of energy from either fossil fuels or green resources is actually wasted as thermal pollution. A practical way to make our energy system sustainable is to develop an electricity generation device that can hopefully convert every single joule of exergy into useful work.

A Seebeck generator is an electricity generating device that can convert heat flow into electricity without using a traditional heat engine. It only needs a small piece of solid material, which can be as small and portable as a quarter coin. Industrial waste heat, nuclear reactor heat,

heat from your skin to ambient air, heat from your hot coffee to your desktop, etc., can all be converted into electricity.

This project aims to provide materials support for Seebeck generators. Literature review, simulations and hands-on design may be involved in the project.

**Student Skills / Requirements:** 3<sup>rd</sup> or 4<sup>th</sup> year student(s) majored in Engineering, Science or nanoscience/nanoengineering.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Shuang Tang**

[tangs1@sunypoly.edu](mailto:tangs1@sunypoly.edu)

**Utica Engineering/Engineering**

**Assistant Professor**

**Project Title: (1) Make Artificial Synapses for Brain-Like Computers.** The current artificial intelligence is not based on a brain-like computer. In human brains, the information are stored and process in neuron cells an synapses. Synapses weigh and pass electrical signal passes from different neurons differently, which results in a simple computing. This is called a neurocomputer.

This project aims to provide materials support for anisotropic synapses that can make brain-like computers. Literature review, simulations and hands-on design may be involved in the project.

**Student Skills / Requirements:** 3<sup>rd</sup> or 4<sup>th</sup> year student(s) majored in Engineering, Science or nanoscience/nanoengineering.

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

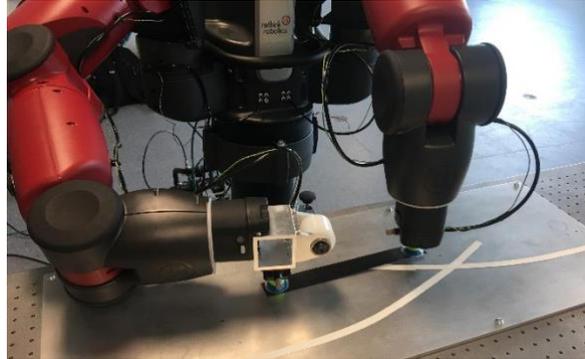
Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Yu Zhou**  
[zhouy2@sunypoly.edu](mailto:zhouy2@sunypoly.edu)  
**Utica Engineering/Engineering**  
**Associate Professor**

**Project Title: (1) Simulation Research of Control Approach for Robotic Composite Layup Process.**

The process of making a composite laminate is known as layup, which involves placing the reinforcement material into the mold, introducing the matrix material to the reinforcement, and molding to cure the composite. The prepreg technology uses reinforcements pre-impregnated with resins, called prepreg, in the layup process, with such advantages as improved strength properties, higher production consistency, less mess, less waste, and shorter curing time. The robotic prepreg layup process, which uses robot manipulators to pick and place prepreg plies to produce composite laminates, is a rising automated composite manufacturing process, with a potential of being more economic in investment and more flexible to products than existing heavy-machinery automated processes.



One major challenge is to control the robot manipulator to apply the layup force consistently during the continuous process of placing and compacting each prepreg ply and throughout the layup process for each laminate, in order to ensure the product quality. This project aims at developing a feedback control approach for real-time controlling the layup force during the robotic prepreg layup process. The specific goal of this summer project is to develop the force control algorithm and validate it by computer simulations, as a preparation for the next stage of experimental research with a Baxter-robot prepreg layup system. The specific tasks of the summer project includes 1) understanding how the Baxter robot works, its control commands, its sensor feedback, and its simulator, 2) developing the feedback force control algorithm, 3) simulating the force control process using Matlab and Baxter simulator, and 4) documenting the research process and results.

**Student Skills / Requirements:** Matlab and Python programming

**Location:** Albany Campus Utica Campus Remote

I am willing to accept students from the following tracks:

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

## Late Additions

**Professor Ben Boivin**

[bboivin@sunypoly.edu](mailto:bboivin@sunypoly.edu)

Nanobioscience/CNSE

Associate Professor

**Project Title: (1) Quantum biology and phosphatase activity.** PTP1B is a well-known regulator of insulin signaling, which plays an important role in fatty acid and cholesterol metabolism. While looking at the structure of PTP1B, we identified a cholesterol-binding pocket that allows stoichiometric binding, and structure-function studies show that this binding is of very high affinity. Interestingly, we found that sterols and oxysterols related to cholesterol could affect PTP1B activity. While the role of oxysterols as oxidizing agents is well established, the role of cholesterol in regulating PTP activity is unknown. We will expand this promising project to identify how cholesterol binding to PTP1B on the ER affects cholesterol homeostasis, and apply our finding to models of atherosclerosis and diabetes.

**Student skills / Requirements:** second year biology/biochemistry knowledge

Research will take place on: Albany Campus    Utica Campus    Remote

I am willing to accept students from the following tracks (Yes/No):

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit

**Professor Mark Bremer**

[bremerm@sunypoly.edu](mailto:bremerm@sunypoly.edu)

Department/College: Arts & Sciences

Faculty Rank: Lecturer

**Project Title: Campus LEED Building Certifications.** Research involves working with faculty and facilities staff to complete Leadership in Energy and Environmental Design (LEED) certification of two existing campus buildings. Additionally, student researcher has an opportunity to earn a green building industry-specific credential, such as LEED Accredited Professional.

**Student skills / requirements** Interest in sustainability principles, such as water & energy efficiency, renewable energy, waste reduction, indoor air quality, occupant health, and green cleaning. Background in science and/or engineering is a plus.

Research will take place on: Albany Campus    Utica Campus or    Remote

I am willing to accept students from the following tracks (Yes/No):

Yes No Track 1: SURP-Funded

Yes No Track 2: Faculty-Grant Funded SURP

If you have funding for Track 2 students, how many do you plan to support?

Yes No Track 3: Volunteer

Yes No Track 4: Research for Credit