

National Lab Internships Help Students Apply Classroom Lessons for Real-World Applications

By Nigeria Stephens

TAMPA, FL – Four talented College of Engineering students recently applied what they have learned in the classroom during internships at national labs in Summer 2016. Nichole Scarveles, William Serrano-Garcia, Francesca Moloney, and Matlock Mennu collaborated and received mentoring from world-class scientists to address real-life challenges in the areas of national defense, space technology, renewal energy, and the aerospace industry.



NICHOLE SCARVELES

Scarveles participated in the Air Force Research Laboratory (AFRL) Scholars Program at Eglin Air Force Base, Florida located in the Florida Panhandle. The AFRL program offers paid summer internship opportunities

to undergraduate and graduate students pursuing STEM degrees, as well as upper-level high school students, to work full-time with lab scientists and engineers on cutting-edge research.

Scarveles decided to apply for the AFRL opportunity because both of her parents are 20-year retired active duty Air Force. Eglin AFB, the site of the internship, was the very same one she was born twenty-three years ago.

Scarveles worked on the technology of 3D printing and its applications for the U.S. Air Force in desert conditions or other harsh environments. 3D printing technology has the potential to be revolutionary for national defense by enabling the military to print new materials on the battlefield. According to Scarveles, a primary component of her internship was developing a collaboration at a state college with a 3D printing lab and learning about their materials, including the capabilities of each type of 3D printer. “Our team looked at how we might use additional nozzle heads to increase their capability for printing different materials”, says Scarveles. She was also responsible for identifying

various software for each printer and programming them. Moreover, Scarveles provided lab tours as Team Lead for visiting AFRL officials and other guests over the summer. Her mentor and principle investigator of the project, Amanda Schrand, nominated Scarveles for the AFRL Outstanding Scholar Award in recognition of her contributions over the summer.

“Working with peers from other engineering areas gave me a first-hand understanding of different engineering disciplines, how we can collaborate, and all benefit each other on different projects,” says Scarveles. She graduated in May with a B.S. in Industrial Engineering, and now interning with the Retina Institute in Orange County, California.



WILLIAM SERRANO-GARCIA

Serrano-Garcia, a doctoral student in the Department of Electrical Engineering, also interned with the AFRL Scholars Program, but at Kirtland Air Force, in Albuquerque, New Mexico. He learned about the

opportunity through the NSF FGLSAMP Bridge to the Doctorate program. Serrano-Garcia worked on the project “Advanced Nano-Devices for Space Applications”; where he studied a numerical model using Green’s function method of transient time response in semiconductor devices. Serrano-Garcia applied mathematical tools learned in his coursework, and concluded when light or energy is applied to silicon, the behavior would be affected.

“I gained a mathematical approach to real-life problems which as an experimentalist will be useful for my PhD research in organic semiconductive polymers for nanodevices,” says Serrano-Garcia. He is also collaborating with his AFRL mentor, Ashwani Sharma, on a publication from his work during the internship.

Aside from the research, Serrano-Garcia participated in STEM outreach during the Kirtland AFB 75th Anniversary Air Show, and was included on a video of AFRL summer scholars sharing their experiences in the program. A veteran of multiple internships sponsored by the National Science Foundation and the National Institute of Standards and Technology from his undergraduate program at the University of Puerto Rico-Humacao, Serrano-Garcia would like to return to AFRL as a research scientist after completing his doctoral degree. “I want to help address the present knowledge gap in organic electrospun semiconductors devices while working on problems that have impact for society in electronics, space exploration, or national security”, says Serrano-Garcia. This summer, he is taking his passion for research to another lab at the National University of Singapore (NUS).



FRANCESCA MOLONEY

Francesca Moloney, a doctoral candidate in the Department of Mechanical Engineering and a NSF Graduate Research Fellowship Program (GRFP) recipient, participated in the Mickey Leland

Fellowship Program at the National Energy Technology Laboratory (NETL) in Morgantown, West Virginia. NETL focuses on applied research for the clean production and use of domestic energy resources. Sponsored by the Office of Fossil Energy within the U.S. Department of Energy (DOE), the Mickey Leland Fellowship Program encourages undergraduates and graduate students, especially women and minorities, to pursue STEM research and careers in energy.

Under the mentorship of NETL scientist David Tucker, Moloney’s ten-week summer research was part of the larger DOE Hybrid Performance (HyPer) project. Specifically, her study focused on the integration of thermal energy storage to the system. “I analyzed the applicability of thermal storage in a fuel cell and worked on numerical modeling,” says Moloney. The internship has led to one conference proceeding that Moloney will present in June, along with a pending journal publication. More broadly, the experience enabled Moloney to learn about different energy systems (fuel cells, hybrid systems, and others) outside the scope of her PhD research.

Along with the research training, Moloney received professional/career development guidance that will be essential for success in her PhD program and beyond. “I also enhanced skills on how to present research to scientists in my field as well to the general public, and how to technically prepare a journal publication”, says Moloney. She also gained insight on non-academia employment opportunities in energy-related areas from her mentor who has a successful career in industry, academic, and governmental research.

Moloney is grateful for the educational opportunities she received at NETL and recommends that other USF students consider joining a national lab over the summer.

“They can help you explore an area either related or different than your current study that could provide a great perspective on how to approach one’s career. In a short amount of time, this new environment can only enhance your future.”



MATLOCK MENNU

Matlock Mennu, a graduating senior in the Department of Mechanical Engineering, spent his summer at the National Institute of Standards and Technology (NIST). Located in both Gaithersburg, Maryland (near

Washington, DC) and Boulder, Colorado, NIST is one of the nation’s oldest physical science laboratories. Mennu was selected for the nationally competitive Summer Undergraduate Research Fellowship (SURF) program at the Gaithersburg site. He worked with his NIST mentor Gregory Vogl on a sensor-based method for checking degradation of Computer numerical control (CNC) machines. “CNC machine tools are essential in the manufacturing of certain components in the automotive and aircraft industry”, says Mennu. “However, billions of dollars are lost in the U.S. annually due to degradation of machine tools during production. My work was part of a larger effort to address this problem. It involved writing MATLAB functions to derive position data from acceleration data from the accelerometers in the sensor box.”

Earlier this year, Mennu presented his summer research at the Emerging Researchers National Conference in STEM and was awarded first place for best oral presentation in the engineering-undergraduate category. After graduating summa cum laude in May, he has returned to NIST to continue his research. Mennu, an Honors College and NSF FGLSAMP scholar, has been admitted in the PhD program in Aerospace Engineering at the University of Florida in the Fall, and plans to pursue a career either as a professor or in the aerospace industry.