



International Research Experience for Students (IRES) Additive Manufacturing: Cybersecurity and Machine Learning



The USA-India program run by the New York University Tandon School of Engineering is funded by the National Science Foundation to provide the US students an opportunity to spend a summer at National Institute of Technology-Surathkal (NIT-K) in India. The program will place students in research labs for 10-weeks for research on cybersecurity and machine learning in additive manufacturing. The NYU and NIT-K faculty will jointly mentor the students. The selected Indian students will be paired with the US students to learn about each other's' culture and society and conduct high quality research in collaborative environment.

Due to the Covid-19 related travel restrictions, the program will be conducted in the remote mode in Summer 2021 with interactions between the USA and Indian participants using video conference.

Program Requirements

- Current undergraduate Junior or Senior or M.S. level students enrolled in **mechanical engineering, Materials Science** and **computer science/engineering** programs in the US or Indian institutions
- US Citizenship or permanent residency is required for the US based students. The participating Indian citizens should be enrolled in accredited Indian institutions
- Good academic standing
- No travel will be required this year; the participants will work from their own locations.
- The USA based students will receive \$600 per week stipend from this program. The program will not pay stipend to students in India.
- Program dates: June 7 – August 13, 2021
- Technical research topics:

Designing security strategies for additive manufacturing for intellectual property protection

Additive manufacturing (AM) has exploded in popularity and efficiency of use in industry over the past several years. AM processes include computer systems, 3D printing machines, digital design files, and cloud-based software. A side channel attack can indirectly gather information about a cyber-system by monitoring and analyzing properties of a physical system. These properties can be the system's power consumption, acoustic emissions, or electromagnetic emissions. In this research project, students will focus on case studies of side channel attacks and vulnerabilities in the AM process and relate them to the part design. Among other tools, students will be exposed to industry-standard machine learning tools and libraries in the Python (e.g. Keras, TensorFlow, and related).

Machine Learning for detecting compromises in additive manufacturing files

The additive manufacturing (AM) supply-chain has increasingly decentralized, giving rise to several vulnerabilities, such as hacking to tamper with designs and counterfeiting or reverse engineering. The machine learning domain (e.g. artificial neural networks) provides many powerful tools in this area for materials design, which can also be used for reverse engineering. In this project, students will aim to utilize machine learning tools for creating defects in the part design and also use the algorithms to identify defects in designs and 3D printed parts. Industry standard machine learning tools and libraries in the Python programming language (e.g. Keras, TensorFlow, and related) as well as 3D modelling using tools like SolidWorks will be used in the project.

Contact Information

Submit application by February 14 at: <https://nyu-apply.smapply.io/prog/ugsrp21/> (Select the correct topic title)

Program details: <https://engineering.nyu.edu/research/student-research/undergraduate-summer-research-program>

For questions related to application submission, contact uga.engineering@nyu.edu

For any questions about the program and the research projects, contact

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