Department of Mechanical and Aerospace Engineering
FALL 2020

ME-GY 6453: Security in Additive Manufacturing

Tuesdays, 2-4:30 pm (2 MetroTech Center, Rm 802)

The course will cover the topics of security strategies in additive manufacturing (AM). A completely digital process chain is exposed to significant cybersecurity risks from internal or external malicious players for sabotage and intellectual property (IP) theft. Also, product counterfeiting is possible by reverse engineering. Such concerns require new security strategies that are unique to AM process chain. The course will cover threat models, security strategies and industrial scenarios related to security in AM. The course is divided into three modules.

The course is designed for MS students from MAE, CUE, ECE and CS departments, who are interested in AM or are using AM for projects that contain significant IP.

Week	Topic
	Module 1: AM Threat Models and Attack Vectors
Week 1	Introduction to Additive Manufacturing digital process chain
Week 2	Sabotage: IP theft and product sabotage
Week 3	Case study: product sabotage – detection of sabotaged designs
Week 4	Threat model development: aviation, defense, energy and medical sectors
Week 5	**Midterm exam/project 1: Threat model and solutions case study**
	Module 2: Cybersecurity Tools in AM Process Chain and Supply Chain
Week 6	Encryption, integrity
Week 7	Authentication
Week 8	Side channel information leakage
Week 9	Virus, Malware
Week 10	**Midterm exam/project 2: Cybersecurity strategies and product/machine hacking**
	Module 3: Design-Based Approaches to AM Security
Week 11	Design based security method
Week 12	Secure product design, printing, testing
Week 13	Embedded codes in AM parts, obfuscation and reading techniques
Week 14	Encryption of design files
Week 15	**Final project and presentation: Part design hacking and authentication**

The course prerequisite is graduate status. Undergraduate seniors may take it as elective with the permission from their undergraduate advisor and the instructor.

For more information, contact: Prof. Nikhil Gupta (ngupta@nyu.edu)