

Secure and Trustworthy Computer Aided Designs for Additive Manufacturing



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<https://csaw.engineering.nyu.edu/hack3d>

The SaTC-EDU project will focus on developing a new graduate-level course “Cybersecurity in Additive Manufacturing” (AMSec), which will allow developing a new M.S. program and a certificate program for working professional and continuing education aspirants with focus on security. The project will also pilot AM hackathons (HACK3D) to explore and expose the vulnerabilities in the AM supply chain. HACK3D will inculcate a security mindset, create hands-on labs, and develop benchmarks for use by the AM community. In addition, PIs will organize a workshop series on AM cybersecurity for industry.

The cyber-physical process chain of AM is vulnerable to cyber threats at every step of the process. Education and training of professionals needs to integrate manufacturing and security to prepare a workforce that understands the threats and can develop customized solutions. The project will develop a suite of activities from threat analysis to solutions that are specific to the needs of industry using AM and develop education resources around this knowledge base.

AM utilizes computer and cloud-based resources at every step of the process. Collaborative resources are used in the design and manufacturing processes. A part from cybersecurity risks, the AM CPS is also exposed to additional risks such as reverse engineering of product that can be genuinely acquired in the market. The solutions require IP protection, authentication of genuine parts, and anti-reverse engineering methods. The project will address these threats and develop solutions.

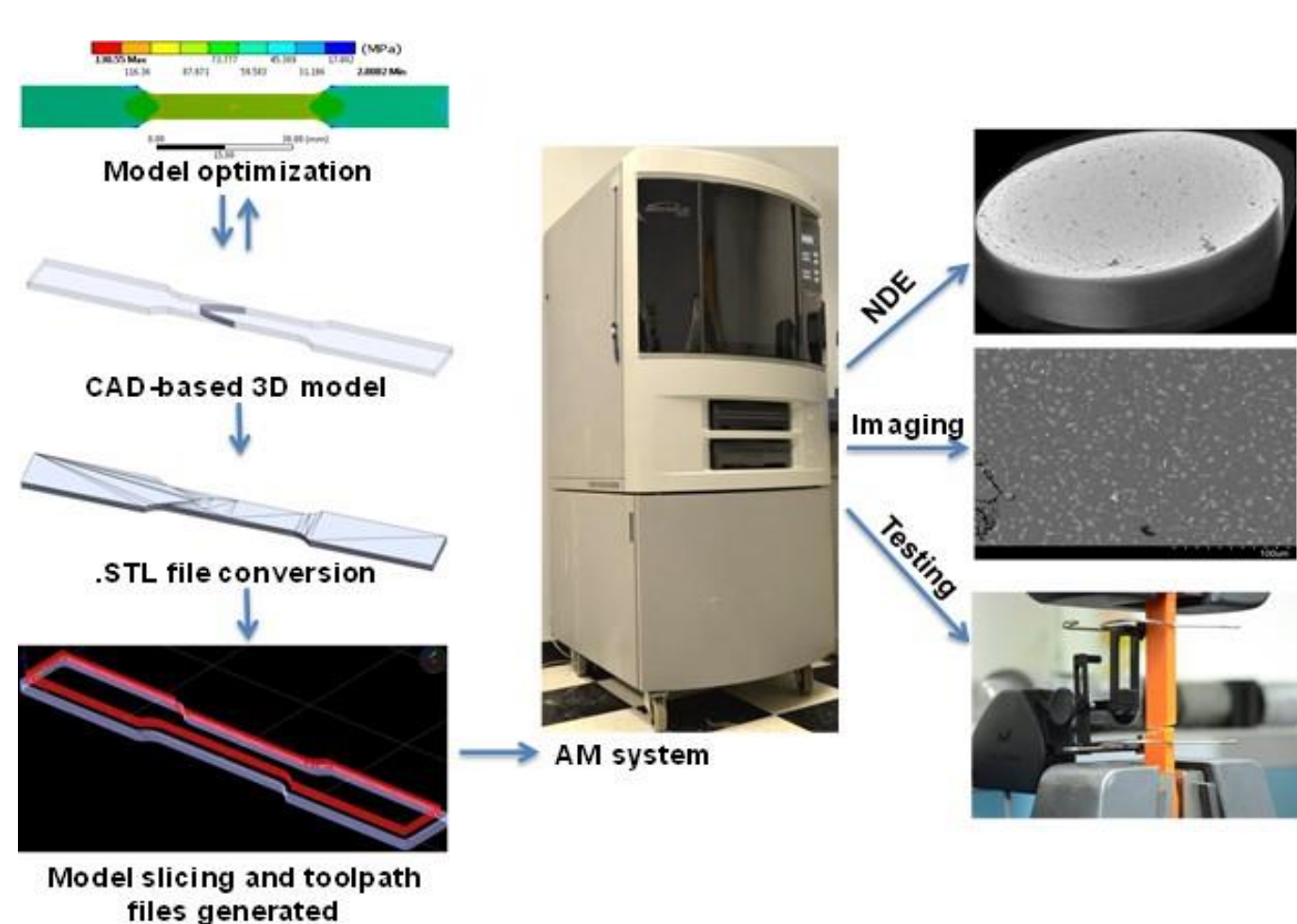


Fig: AM as a CPS.

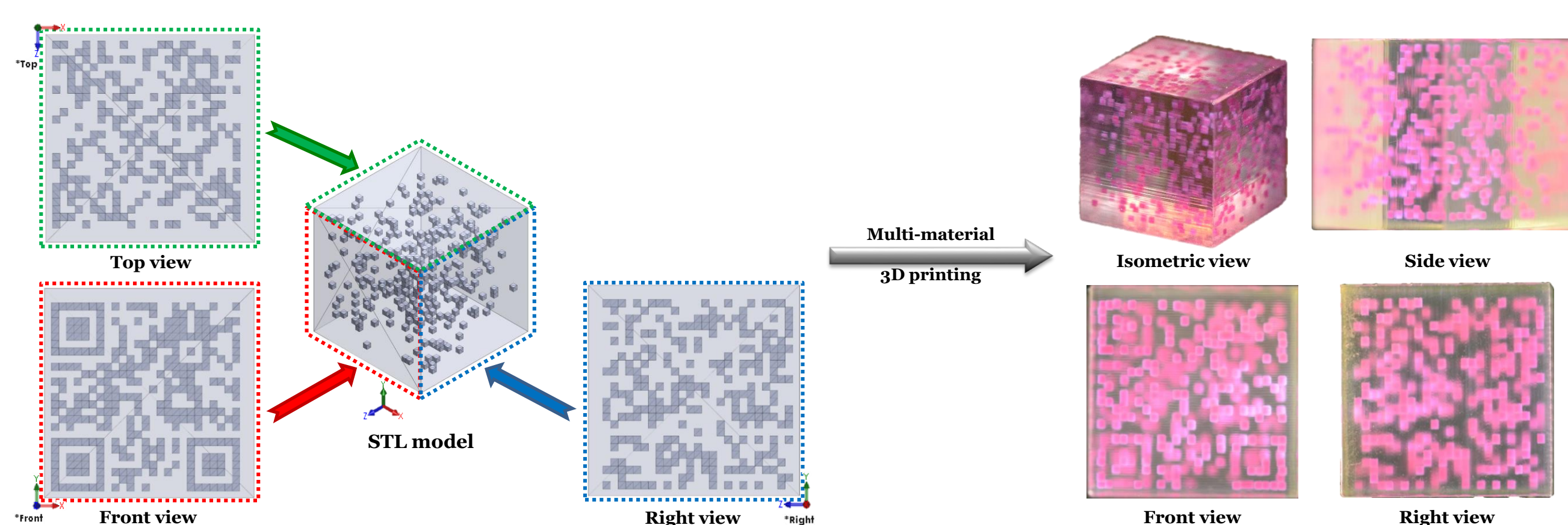


Fig: An obfuscated internal code for authentication of AM products.

Providing security mindset to manufacturing professionals and manufacturing education to cybersecurity professionals will prepare and train a workforce for the needs of Industry 4.0. The students trained through this program will have a unique skill set to meet with the needs of industry.

The project is in partnership with New York City College of Technology (CityTech), a designated Minority Serving Institute. Broadening participation in the cybersecurity and manufacturing education is an integrated goal in this project.

The project includes two graduate students, at least six undergraduate students and two high school students each year for resource development and laboratory research. The AMSecurity course will educate at least 25 students each year at NYU and CityTech.

