DISTINGUISHED
STAFF FELLOWS
AT ORNL

Logan Sturm

Alvin M. Weinberg Fellow

Where and when did you earn your PhD?

I was awarded my PhD in December 2020 from Virginia Tech.

What was the subject of your dissertation?

My doctoral research examined cyber-physical security for additive manufacturing systems.

What was your dissertation's major contribution to your field?

My dissertation delivered a framework for identifying and mitigating sabotage attacks on additively manufactured parts using in situ monitoring, new techniques for securely transmitting part quality information to air-gapped side-channel monitoring systems, and an impedance-based method of nondestructively evaluating additively manufactured parts for defects.

Who is your ORNL mentor and where are you working on campus?

My mentor is Mason Rice, Resilient Complex Systems section head. I am working in the Embedded Systems Security Group in the Cyber Resilience and Intelligence Division.

What will your fellowship research focus on?

My fellowship research is focused on identifying cybersecurity vulnerabilities in additive manufacturing systems and developing techniques and platforms to mitigate these vulnerabilities. As part of this, I will evaluate in-process monitoring systems for metal laser powder bed fusion in an adversarial setting and develop new methods for improving the robustness of these systems to attacks. I will also investigate human factors and training to improve awareness and understanding of cybersecurity threats in manufacturing and embrittlement.

What is your project's expected contribution to your field?

My project will lead to improved security for manufacturing systems and increased awareness of the threats facing modern digital manufacturing.

What are your research interests?

My research interests include in situ monitoring for additive manufacturing systems, vulnerability assessment in advanced manufacturing, data analytics for malicious defect detection, secure distributed manufacturing, unclonable security features for anticounterfeiting, and human–machine interactions in a cybersecurity context.

What led you to science and your specific discipline?

I've had a long-standing interest in machines, technology, and computers. I once disassembled one of my mother's music boxes because I was curious about how the figures danced. Unfortunately, I couldn't put it back together when I was done. After that, my father would sometimes let me pick out old devices from yard sales or flea markets that I could bring home to dissemble and investigate. In many ways, cybersecurity is similar, trying to figure out how things work and different ways they can be broken or modified. In college, I chose mechanical engineering due to its broad nature and my interest in robotics. I was exposed to additive manufacturing along the way and built a stereolithography additive manufacturing system as a senior design project. For my PhD research, I combined my interest in additive manufacturing with my interest in computers and cybersecurity to understand how these systems work and how they can be made more secure.

What did you do before coming to ORNL?

I was a graduate research assistant at the Virginia Tech Design Research and Education for Additive Manufacturing Systems (DREAMS) Laboratory. I also spent a summer at the University of Nottingham doing research with their additive manufacturing group.

Could you share an interesting fact or two about yourself?

In my free time, I enjoy whitewater kayaking. I've had training in swiftwater rescue and was active in the Virginia Tech Whitewater Club. I helped lead beginner trips and was an instructor during kayak rolling sessions. I also had the opportunity to do some sea kayaking off the coast of Cornwall during my time in the UK.

What nonscience topic or activity is important to you and why?

I am highly interested in environmental conservation and maintaining public access to rivers and other waterways. I enjoy the outdoors and participating in activities that use these resources, and I think that it is important to protect them for the good of society and for future generations.

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