

OU professor Julian Rrushi receives the DARPA Young Faculty Award

The award will support research on the physics of cyberspace, which could lead to groundbreaking advancements in cybersecurity.



cyberspace art

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Julian Rrushi has been awarded a Young Faculty Award from the [Defense Advanced Research Projects Agency \(DARPA\)](#) to discover the physics of cyberspace, an emergent research area that could revolutionize the field of cybersecurity.

Rrushi, an assistant professor in Oakland University's School of Engineering and Computer Science, describes the physics of cyberspace as "mathematical laws that govern the inner workings of hardware, operating systems, user code, algorithms and protocols, human-machine interaction, inter-process communication and networking."



Julian Rrushi

Deciphering these laws, he explains, could lead to better tools for detecting cybersecurity threats, such as malicious hardware and firmware implants, and other malicious code that take control of computers and intercept sensitive data.

"The physics of cyberspace have potential to see deep inside a computing machine. This has vast defensive applications that advance cybersecurity and provide safer computing," Rrushi said.

Moreover, the research project will develop high-fidelity models in a data-driven fashion to establish logical equivalence between cyberspace and physical matter, which creates potential for inheriting some of the past success of those methods.

"(In traditional physics), the molecules of a gas are constantly in motion and often collide with each other," said Rrushi. "Similarly, a computer runs instructions that often interact with each other. These instructions collide, so to speak, and give each other data. In doing so, they give rise to mathematical quantities that we can measure."

Enabling cybersecurity professionals to quickly identify and defend against cyberattacks is among the research priorities of the U.S. Department of Defense, which is sponsoring the project through a [DARPA Young Faculty Award](#). According to the web page, this highly competitive award is given to "rising stars in junior research positions."

Rrushi will present his research on the physics of cyberspace at the USENIX Enigma Conference in Oakland, California, in February 2021.