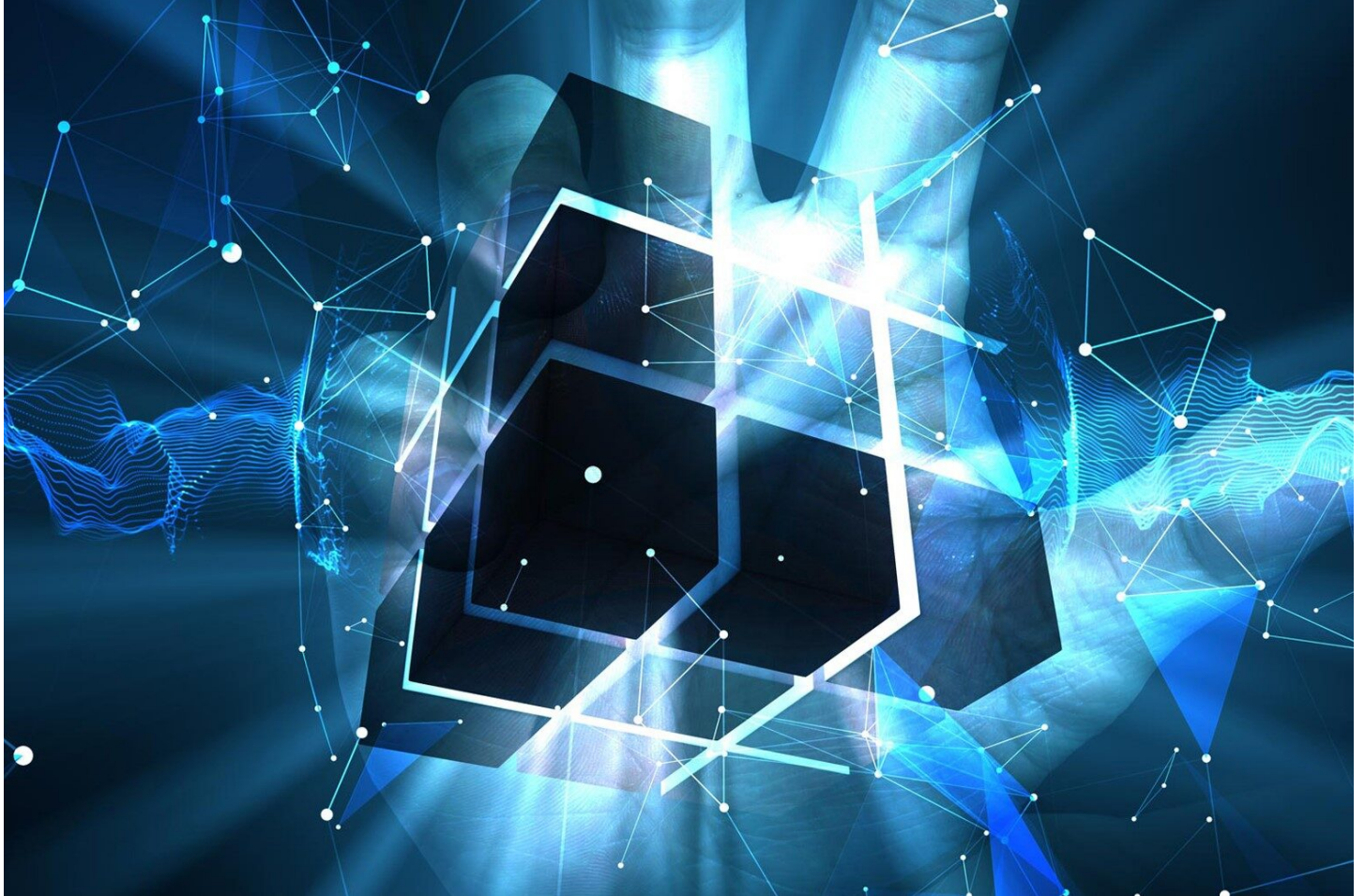# Unhackable: New chip stops attacks before they start

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MORPHEUS blocks potential attacks by encrypting and randomly reshuffling key bits of its own code and data twenty times per second. Getty Images.

ANN ARBOR—A new computer processor architecture developed at the University of Michigan could usher in a future where computers proactively defend against threats, rendering the current electronic security model of bugs and patches obsolete.

Called MORPHEUS, the chip blocks potential attacks by encrypting and randomly reshuffling key bits of its own code and data 20 times per second—infinitely faster than a human hacker can work and thousands of times faster than even the fastest electronic hacking techniques.

"Today's approach of eliminating security bugs one by one is a losing game," said Todd Austin, U-M professor of computer science and engineering and a developer of the system. "People are constantly writing code, and as long as there is new code, there will be new bugs and security vulnerabilities.

"With MORPHEUS, even if a hacker finds a bug, the information needed to exploit it vanishes 50 milliseconds later. It's perhaps the closest thing to a future-proof secure system."

Austin and his colleagues have demonstrated a DARPA-funded prototype processor that successfully defended against every known variant of control-flow attack, one of hackers' most dangerous and widely used techniques.