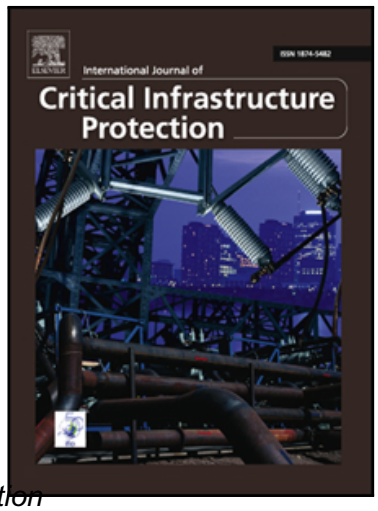

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Improving the cyber resilience of industrial control systems

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Abstract

Industrial control systems are designed to be resilient, capable of recovering from process faults and failures with limited impact on operations. Current industrial control system resilience strategies use redundant programmable logic controllers. However, these redundant programmable logic controllers, which typically are the same or similar makes and models as the primary controllers, can be exploited by the same cyber attacks that target the primary controllers.

This paper proposes a resilience strategy for industrial control systems that employs an active defense technique to reduce, if not eliminate, the likelihood of a common cause failure induced by a cyber attack. The active defense implementation is compared with a traditional industrial control system resilience implementation using a semi-simulated wastewater treatment system that was exposed to cyber attacks. The results demonstrate that the active defense implementation is very effective in the aftermath of a cyber attack whereas the traditional resilience implementation gives rise to a system disruption.

Keywords

Cyber Resilience; Industrial Control Systems; Active Defense; Common Cause Failure; Wastewater Treatment System

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